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OF THE
**National Safety
Council**

SEVENTEENTH ANNUAL
SAFETY CONGRESS

VOLUME I



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NOTE

Volume III of these Transactions, containing the Public Safety Sessions, the Education Division, and the Women's Session, is being mailed automatically to certain members of the National Safety Council who are believed to be interested in them. Any other member of the Council may receive a copy of Volume III without charge by requesting it.

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SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Annual Meeting of Members

October 1, 1928

HOMER E. NIESZ, Chairman
President, National Safety Council

The Annual Meeting of Members at the Seventeenth Annual Safety Congress, National Safety Council, was called to order at ten-fifteen o'clock by the President, Mr. Homer E. Niesz, Manager, Industrial Relations, Commonwealth Edison Company, Chicago, Illinois.

PRESIDENT NIESZ: The Seventeenth Annual Meeting of the National Safety Council is now opening. Our deliberations will be started with the invocation by the Rev. Ralph W. Sockman, D.D., Pastor, Madison Avenue Methodist Episcopal Church, New York City.

REV. RALPH W. SOCKMAN: Almighty God, thou hast made us the heirs of all the ages; make us grateful for those visible and invisible forces which have fashioned this world in which we are living. We thank thee, our Father, for having brought us into the world in a land where life can be rich. We thank thee for having brought us forth in a day when life has become sacred.

We ask that that pioneer spirit which sought to make here a land where life, where body and mind and soul could be free and safe, that that spirit may be preserved. Grant us, oh God, in this countenance, so to capitalize the experiences of the past that we may make more rich the living and the present.

We thank thee, our Father, for that inventive genius which is making possible the machines of today. We thank thee that we can travel more rapidly and see more widely and live more deeply. But in the merchandise of all our speed and power, may life be kept safe; may we achieve the simple life in the midst of the complexity of our day. May we seek to keep the individual safe from the dwarfing pressure of the crowd. May we keep the minds of this land free from intolerance and bigotry. May we keep the bodies free from disease and accident.

Grant the deliberations of this Congress to be held in high level and noble purpose, and may its service go on bearing fruit, in the great cities and throughout the countryside of this land that we love, making richer the life, stronger the body, purer the mind.

We ask it in the name of the Master, Teacher and Thyself. Amen.

PRESIDENT NIESZ: This being a business meeting of the Council, the roll call is necessary, but as the Secretary has informed me there is a quorum present in person or by proxy, a motion to dispense with the calling of the roll will be received.

(Motion was regularly moved, seconded and carried that the roll call be dispensed with.)

PRESIDENT NIESZ: We anticipated having with us this morning the Mayor of New York. However, he was unable to come and has sent as his special represen

tative, to give the welcome of the city in his behalf, Mr. Thomas W. A. Crow, Assistant Corporation Council.

Address of Welcome on Behalf of New York City

By THOMAS W. A. CROW

Assistant Corporation Council, City of New York

It is a most unfortunate thing that our Mayor is unable to greet you here this morning. I come to relate to you his very deep, profound regret.

As you have probably read in the morning's papers, he is down in the City of Washington, where, as one of the counsel representing the City of New York in the 7-cent fare fight, he makes his first appearance before the Bar of the United States Supreme Court this morning. Were it not for that imperative and official engagement, I know he would be here and very glad to convey to you that which he has deputed me to do.

In speaking to me about coming here this morning, the Mayor said, "Tell the Congress, that to my way of thinking one of the most salutary and one of the most hopeful signs of our times is this: that in an age devoted to materialism, mass production, an age that is described as mechanistic, there is a large body of men and women who are moved with that very great objective, the conservation of our one great national asset, human life."

And he said, "We in the City of New York are most vitally interested in the work that they have already accomplished, in the work to which they dedicate themselves in the future, for in this city—and I think I may say with modesty, without any desire to boast, the greatest city in the world—we have all these problems that other communities have, but we have them on a larger and a more intense scale. Therefore, in this city, the problems that directly reach the question of life preservation concern us with a degree of intensity and application that perhaps, in our humble judgment, exceeds the situations as they present themselves in other communities."

So we, the people of the City, and the government of the City, greet you with a very warm interest on this occasion.

New Yorkers are sometimes referred to as the cliff dwellers, because we live in these great, high canyons along Broadway and the other streets, and we work and earn our daily bread in those vast centers. But after all, human nature in New York is exactly the same as human nature anywhere else in this glorious country of ours. We are not more or less provincial than any other people, and we are most eager to meet and to cooperate with anyone, with any group, with any organization that has for its objective the making of this world a better and a brighter and a safer place in which to dwell and live.

So it is my happy privilege; and it is a very great privilege, to convey to this Congress, the word of welcome by the Mayor of this City, the Hon. James J. Walker, has delegated to me to do.

I might say that in the last year or so we have had an almost envious stream of visitors from across the Atlantic, and the Mayor has in turn greeted each one, and to each one has presented the key of the city; and the last one to receive the key of the city departed from our city without returning the key. I might say he left the city unlocked, so you will find the city is wide open in hospitality, in interest, in cordiality.

And in closing, I might say (perhaps it is unnecessary for me to add)—Safety first.

PRESIDENT NIESZ: The next speaker will give us a welcome on behalf of the New York Safety Congress Committee. He is a graduate of Yale. He is vice-president of the General Motors Corporation, and is first vice-president of the National Automobile Chamber of Commerce. He is a director of the Lehigh Valley Railroad and many other large and successful organizations.

He learned the rudiments of safety in playing football against Harvard. He has maintained an interest in safety ever since, and his contribution to the cause is worthy of our praise and commendation.

It is a pleasure to introduce, Mr. Alfred H. Swayne, chairman of the New York Safety Committee.

Address of Welcome on Behalf of the New York Safety Committee

By ALFRED H. SWAYNE

Chairman, New York Safety Congress Committee; Vice-President, General Motors Corporation; First Vice-President, National Automobile Chamber of Commerce

It is my privilege and pleasure on behalf of the New York Safety Congress Committee to welcome the 17th Annual Safety Congress. May it be the greatest congress and the most profitable in life-saving accomplishment that the National Safety Council has ever held.

When the Safety Council accepted the cordial invitation of the Merchants' Association to hold its 1928 congress in this great metropolis, it was at once evident that considerable organizational work must be done to arouse public interest in accident prevention, stimulate attendance, and, in general, set the stage in a manner and to a scale appropriate to so large and important an event. We in New York, as you probably know, are vastly engrossed in our busy, everyday life; we are used to conventions and they are apt to come and go without creating a ripple on the surface. We are not indifferent, as some are disposed to think, but we are preoccupied. But the Safety Congress, it seemed to us, was far more than an ordinary convention: It was the culmination and review of a year's effort by the organized forces of the most intelligent and the most careless nation on earth to combat the evils wrought by thoughtless men; and it presented to the community in which it was held a rare opportunity to learn the habits and benefits of accident prevention.

And so we organized—first, the New York Safety Committee (which is the executive body) and later the New York Safety Congress Committee, which is the advisory and sponsoring body of which I have the honor of being Chairman.

The New York Safety Committee of the National Safety Council is composed of eighty of the leading safety engineers and experts in the metropolitan area, under the Chairmanship of Lewis De Blois of the National Bureau of Casualty and Surety Underwriters, a former president of the National Safety Council.

The work of the New York Safety Committee is described in a small leaflet. Time does not permit me to go into details, but I feel that in justice to its outstanding accomplishments in a short space of time and in the face of obstacles which are normal to the life and conditions of a great city I must cite a few of them.

An Inter-Fleet Drivers Safety Contest was organized; 420 firms entered their fleets of over 23,000 vehicles in the contest.

Safety material was sent to every public school principal, and many thousand safety posters and lesson outlines were distributed to the schools.

Twelve hundred sermon outlines were placed in the hands of New York ministers.

Four hundred thousand Safety Messages are being handed out by Boy Scouts to theatre patrons, and 200,000 safety wall-cards were placed in the homes through the courtesy of the Metropolitan Life Insurance Company.

Over 30,000 posters, stickers, car cards, and other advertising material were placed on public vehicles.

Special invitations to attend the Congress were sent to over 40,000 persons in the metropolitan area.

While the list of activities which the New York Safety Committee has pursued is neither long nor complicated, each one is characterized by the size and difficulty of the undertaking—conditions imposed by the vast area to be covered. And none of this great work could have been completed, even by such zealous and indefatigable volunteers, without the finest of cooperation by city and state officials, including the Mayor, commissioners of police and education, by prominent local bodies such as the Merchants' Association and other civic and trade organizations with which New York is so well provided, by the railroads, electric railways and other public utilities, by the great industrial corporations that are so deeply interested in the success of the safety movement, by the engineering societies, by the hotel men, and last but not least by the newspapers.

I wish that I might mention the names of all of the hundreds who have so generously contributed of their advice, time, efforts or money. It has been given freely that your congress might be a success and that the lives and limbs of human beings like ourselves might be spared the tribute to what we term "accidents."

On my own committee there are over two hundred of New York's most prominent and influential citizens. Philanthropists, captains of industry and finance, men prominent in civic affairs, presidents and chairmen of boards have gladly consented to sponsor this enterprise. It is, I believe, the most influential and representative committee that has been created since the Great War. Some of these men will attend the Congress; many will be deterred by their multifarious and exacting duties; but I know that when I welcome you to New York City and express the hope that your visit here will be enjoyed and will be profitable to you, to your great cause and to the City of New York, I voice not only my own heartfelt desire but that of every member of my committee.

The New York Safety Congress Committee and the New York Safety Committee, having prepared the way for you, now bids you welcome!

PRESIDENT NIESZ: On behalf of the National Safety Council, I desire to express appreciation and grateful thanks for the very cordial welcome given to us by the representative of the Mayor and by Mr. Swayne, chairman of the New York Safety Congress Committee.

It is indeed a pleasure and a privilege to have our Congress in this wonderful city and to be received with the cordiality and good fellowship which has characterized the greetings which have been extended to us this morning.

On behalf of the members of the National Safety Council, I thank these representatives for their welcome.

The President's Annual Address

By HOMER E. NIESZ

President, National Safety Council; Manager Industrial Relations, Commonwealth Edison Company, Chicago

Before I fulfill my final duty and render on behalf of your directors, executive committeemen and officers an accounting of their conduct of the affairs of your Council during the past year, permit me to exercise my highly valued privilege of extending a most cordial greeting to you—to members, representa-

tives of members, public officials, and guests,—all gathered here to attend the Seventeenth Annual Congress of the National Safety Council.

There can be no more convincing evidence of the real worth of the cause to which you have devoted yourselves, nor of the truly democratic character of the institution which you have created in its service, than the strikingly large numbers in which each year you come together to dedicate yourselves anew to the support of that cause and to determine how its service may best be advanced and enlarged.

For the third time we are meeting in the great metropolitan city of New York, and once more we are indebted to the leaders of this community, to the New York Safety Congress Committee, the New York Safety Committee, and others for their generous hospitality and preparations for our comfort and well-being during the progress of this Convention.

I am once more impressed with the constantly increasing interest in the great safety movement and with your clear understanding that only through the personal participation and cooperation of all members of the Council can the cause of safety be advanced as it should be and our organization take its proper and important place in the lead of accident prevention effort. Without such participation and cooperation the best efforts to those to whom you have entrusted the activities and management of your affairs could not have achieved anything like the same measure of success, and the safety cause would not be what it is today—a national movement of widest range and with practically unlimited possibilities.

Accident Records

Our national campaign for safety must continue to be based on facts. An examination of the trend of accidents over the past fifteen years discloses some facts which are indeed impressive. During that time practically every class of accidental fatality has decreased with the exception of those due to the automobile. Accident rates from burns, drownings, railroads, street cars, and other classifications show decreases of from 20 to 50 per cent. Smaller declines are found in the fatality rates from machinery, falls, and various other causes. In individual industries and groups of industries there are many notable instances of reductions. Striking evidence of the possibilities in such reduction is found in the Council's annual report of more than 2,000 industrial establishments, as well as in the notable volume entitled "Safety and Production" which reports the results of an exhaustive survey of the relation between accident prevention and production efficiency.

It is estimated that last year 3,000,000 industrial workers suffered lost time and 25,500 workers lost their lives through accidents. But if all of the industries in the United States had been as successful in their safety work as the 2,000 establishments that reported their records to the Council, 8,600 of these lives would have been saved and 400,000 lost time injuries would have been avoided.

It should be clearly stated, however, as a deduction from these recent statistics, that an unsatisfactory accident situation exists in many industries, especially in the smaller workshops. These small plants, so difficult to reach through general educational propaganda, present a real challenge to our resourcefulness and our continuous patient efforts for widespread acceptance of safety principles.

The 1927 records present the alarming situation of an increase in motor vehicle fatalities which is even greater in proportion than the increase in cars registered. It should be noted, however, that this increase in motor vehicle fatalities is smaller in those cities having community safety councils; and in

the cities where the best organized safety work has been done actual decreases have been secured.

Other public accidents have taken a toll of human lives during the past year numbering 20,000—an addition of more than 75 per cent of those caused by automobile alone.

Perhaps the most distressing group of accidents within our purview is the one occurring within the homes of our land—that haven of rest and security ordinarily considered safe. An exhaustive study of the available sources of information indicate the number of industrial fatalities.

While the facts on non-fatal injuries are meager it is estimated from the data at hand that there were at least 5,000,000 non-fatal home injuries last year. Knowing these facts is it not a challenge to our intelligence, our public spirit and our love for family and for our fellowmen? Shall we sit supinely by and let the slaughter go on unabated, or shall we accept our personal responsibilities, with a full realization of the pressing need for more organized safety work in all its branches?

Organization is necessary in this as in other fields of accident prevention, and I recommend the establishment of a Women's Committee or Division, whose most important function should be the determination and inauguration of means and methods of reaching the home-keeper and through her reduce home hazards and resultant accidents.

An interesting deduction from recent statistical data is that during the past five years the total accident fatality rate of children has been reduced while the adult rate has increased. It is well known that the most general and extensive safety activity carried on anywhere outside of the industries is the safety work done in and by the schools of America. Under the leadership of the National Safety Council's Education Division and through the efforts of other organizations working with the schools, especially through the efforts of school authorities, principals and teachers themselves, safety is now accepted as a natural and proper educational principle in thousands of American class rooms, and the record just cited proves that this work has been more than justified. If we can find a way of teaching safety to the adult population, especially outside of industry, to the extent that this has been done among school children, I believe we shall have solved a large part of our present problem.

A Review of the Year

The past history and achievements of the Council have been notable, and their narration would be but a repetition of previous presidents' addresses and other publications. I desire, however, to call your attention to some of the specific activities which have been inaugurated during the past year and are worthy of special mention. It has long been the policy of the Council to enlarge its field of usefulness as the opportunities occur and its finances permit, the possible projects usually running well in advance of the means to carry them out. Early in the year it was proposed to increase the service rendered to industrial members, and the first new service instituted was the publication in the NATIONAL SAFETY NEWS each month of suggested programs for safety committee meetings known as "Timely Topics for Safety Committees."

Recognizing the need felt by many industrial members for a medium to reach the individual worker as an aid in promoting interest in individual safety, a monthly magazine called *The Safe Worker* is now being published. It is furnished to members at cost and its popularity is evidenced by the fact that its circulation has already reached 125,000 copies per month and is rapidly increasing.

The inculcation in the mind of the worker of his own responsibility—the cultivation of a safety consciousness—is the most important factor in promoting safety and will bring to successful fruition, otherwise unattainable, the efforts of management, foremen, and safety organization in accident prevention. This little magazine, therefore, is an effort already proven effective in reaching the individual directly.

As a stimulus to life saving the Council has established during the year the "President's Resuscitation Medal," to be awarded to any one not eligible to receive other similar medals, who successfully restores breathing in cases of suspended respiration due to asphyxiation, electric shock or drowning, by the application of the Schaefer prone pressure method of resuscitation. This is supplemental to and not a duplication of similar medals awarded by the National Electric Light Association and the American Gas Association.

In recognition of the splendid safety work done in our largest industry and to encourage still greater effort in reducing accidents to employees, the Council inaugurated during the past year an annual award of trophies in a Steam Railroad Employees' Safety Contest. The first of these awards was made with appropriate ceremonies on May 21, 1928, to the seven Class I railroads having the lowest casualty rate for their respective groups arranged according to a man-hour exposure, and for the initial award the records for a period of from three to five years were included.

In order to make more effective the work of the Health Division, which has been active for several years, a Director of Health Service has been added to the staff, beginning September 1, 1928.

The study of industrial diseases, the health hazards of industry, their relation directly or indirectly to accident prevention and the furnishing of information not otherwise obtainable on industrial health subjects to our members are the chief objects for starting this new form of service under competent direction.

The choice of New York City for this year's Congress presented an opportunity for an experiment which has long been considered, namely, the establishment of a branch office. Its primary function was to assist with Congress arrangements and to experiment with other services to local councils and members with a view of determining whether such an office should be permanently established.

In the field of motor vehicle legislation and traffic control, the year has witnessed two major accomplishments, in both of which the Council has taken an active part. One of these is the completion of the model city traffic ordinance by a committee appointed by former Secretary Hoover and including numerous officers and members of the Council. The other is the preparation of an elaborate study and report of Traffic Signs, Signals and Markings by a committee of the American Engineering Council on which the National Safety Council was well represented.

Activities Continued

These are splendid examples of the sort of cooperative relationship for effectively prosecuting certain aspects of essential safety activities. An abstract has been published of the Uniform Vehicle Code, recommended for state adoption by the National Conference on Street and Highway Safety, and this abstract is proving of considerable value to those desiring to check up their present laws with the national model.

It would be an undramatic story to enumerate the posters, magazines, newsletters, safe practices pamphlets, and other publications distributed by the Council during the past twelve months. There is romance, however, in the

fast developing production and acceptance of this accident prevention experience. Two of the most significant activities during the past year have been the growth of our regional safety conferences and safety contests. Much has been accomplished by bringing together more than 15,000 people at these regional safety meetings held in various parts of the country. We have proof that many managers, supervisors, workers, public officials and others have received information and inspiration from these territorial meetings that they could not have received from any other source. The accident reduction achieved through the many safety contests has demonstrated that what is most needed in safety work is a popular incentive.

The Council has made progress during the year in mobilizing its latent forces for further analysis of the accident and health hazards of all processes and operations in industries. The completed study of the health hazards due to spray coating and the researches into the complicated problem of adequately safeguarding circular saws and annealing of chains are indications of what the Council can do to improve its service to industry. A start has been made by our Petroleum, Chemical, Rubber, Metals and Mining Sections in publishing sectional safe practices pamphlets, and other sections are ready to follow this leadership. Our ASSE-Engineering Section has organized sixteen committees of voluntary workers to study the accident hazards in miscellaneous industries. The policy of awarding medals in first aid and mine rescue work has been continued. Two new educational films have been completed this year. Continuous study has been made of the rapidly developing need for safety consideration in air transportation.

At considerable expense and through a well trained corps of men, efforts have been continued throughout the year to improve the community council activities and to organize new councils. There is not a city of 25,000 population or over in the United States that has not been reached by our field force with the offer of service to help organize the local effort to stop accidents.

Our public safety engineering staff has continued its community safety surveys and research work. Four of these surveys have been made during the year and research reports printed and distributed on the problems of parking as related to safety, on police traffic forces, and on traffic courts. The conduct of this work has been made possible through the continued monetary support of Mr. John D. Rockefeller, Jr., and other contributions.

Under the stimulus of the encouraging results I have already referred to our school work has likewise gone forward with the generous support of the National Bureau of Casualty and Surety Underwriters, and under the guidance of our vice-president, Mr. Albert W. Whitney. Our school memberships are increasing, as is also the circulation of our school magazine "Safety Education." Our school posters and lesson outlines have been used regularly in nearly 25,000 school classrooms in all parts of the country with beneficial results for both the present and future that can only be imagined.

Our Public Safety Magazine has taken safety information and encouragement to several thousand officials monthly; our large street safety posters have doubled in circulation during the year, and our first public safety film "The Verdict" has already won approval and will be shown at this Congress.

Public Safety

We are making continuous and intensive effort to arouse the interest of all kinds of community organizations, public officials, and others able to undertake the safety leadership of their communities. A special class of public safety membership and service has been developed during the year. The

number of non-industrial members is increasing but it must increase to a much larger extent to give us the contacts we need in many communities. I call upon every member present, especially the industrial members in small communities, to assist our headquarters' office to establish contacts with and give constructive service to the public officials and other public safety people in their communities.

Along with the development of a body of public safety members there goes inevitably the development of our public safety committee organization. I am happy to report that our Public Safety Advisory Committee has completed its second year of valuable service to the Council and under its general direction there are now functioning not only our Statistics Committee, whose work is so well known, but also an Engineering Committee and a Committee on Personality and Public Accidents, each of which is giving essential advice and supervision to our staff activities in these fields.

Publicity

It is gratifying to report that during the past year the prestige of the Council has increased with the press of the nation. Literally thousands of editorial observations have been voluntarily published by the leading writers of the United States whose attention has been called to our achievements by our reports, speeches and activities, and the accomplishments by members in the reduction of accidents everywhere. Although this city is approximately a thousand miles from the headquarters' office of the Council in Chicago, the daily papers in New York actually have printed more editorials about our endeavors than have the Chicago dailies. During the week of this Congress the newspapers and magazines of this greatest city in the world will be filled with reports, comments and pictures relating to this safety convention. I feel that this Congress owes its appreciation to the daily newspapers and to the trade, technical, and plant periodicals of America which have given unstinted recognition and support to the Safety Movement. The publications which are devoted to the industries of the nation have indeed been generous in their treatment of our efforts.

Industrial Sections

The officers and committee members of the industrial sections merit our continued thanks for the initiative and energy displayed in performing their duties since the last Congress. They are to be congratulated upon their success in achieving cooperative relations with the trade and business associations in their industries, for continuing the valuable monthly news-letters, for cooperative help in increasing the membership and in making preparations for the many meetings at this convention. The work of full time staff assistants in specific sections has now passed beyond the experimental stage. The value of the salaried secretarial work of the Petroleum Section, which continues to be supported by the American Petroleum Institute, should encourage each sectional organization to help finance similar specialties for all of the sections.

Conclusion

The personal volunteer work of the members of the Council, its officers and executive committeemen, section officers and the numerous committees deserve particular commendation. The managing director and his efficient staff at headquarters have administered the affairs of the Council in so capable a manner as to merit special recognition.

Our annual Congress includes in its diversified program many valuable contributions to the gospel of safety, which should provide inspiration for renewed efforts to achieve our objective—Universal Safety. Organization is the main spring of accomplishment in any line of endeavor and in the fullest use of this principle the National Safety Council can best extend its influence and usefulness. It must reach through the many organizations cooperating with it into every phase of life—the work shop, the schools, the home, the public places—in every community large or small, and must above all carry to the heart and mind of every individual the sentiment of safety.

This administrative year is ended with this Congress but the work of the Council must go on continuously and the united efforts of every man, woman and child associated with us in our glorious cause must be constantly exerted until, the safety millennium is achieved—the day whose sun will rise and set and rise again without an accident to mar the peace and happiness of our people.

PRESIDENT NIESZ: The next order of business is the annual election. The Executive Committee having appointed three inspectors of election, the Chair will appoint these men also tellers of this meeting.

This committee consist of: Mr. Austin P. Saunders, Chairman; Mr. F. C. Lynch, and Mr. Fremont Chester.

The next item of business is the reading and disposal of the minutes of our last Annual Meeting. As these minutes have been printed, a motion will be in order to adopt the minutes without reading.

(The motion was regularly made, second and carried that the minutes be adopted without reading.)

PRESIDENT NIESZ: We will now have the report of the Nominating Committee. Mr. W. J. Peacock, chairman of this committee, will present the report.

Report of the Nominating Committee

W. J. PEACOCK: Mr. President, complying with your instructions, we, the Nominating Committee appointed by you, with the approval of the Executive Committee, and as provided for in Section 4 of Article VI of the By-laws of the Council and as further provided by Section 5 of Article VI of the By-laws, present herewith the report of nominations for Directors to serve until the annual meeting in 1931.

The following list has been approved by the Committee and is submitted herewith:

Ernest P. Goodrich, Consulting Engineer,
175 Fifth Avenue, New York City.
Wm. E. Metzger, Detroit Athletic Club,
Detroit, Mich.
William Otter, Marsh and McLennan,
164 W. Jackson Blvd., Chicago, Ill.

The names of the following Directors whose terms expire October 1, 1928, are submitted for re-election:

David S. Beyer
W. R. Boyd, Jr.
C. L. Close
J. B. Douglas
F. W. Fisher
Isaiah Hale
Chas. E. Hill
Dana E. Jones

T. H. McKenney
H. E. Niesz
Lew R. Palmer
W. B. Pettibone
G. E. Sanford
David Van Schaack
J. M. Woltz

Very respectfully yours,
(Signed)

W. J. Peacock, Chairman
A. V. Rohweder
John Eib
G. A. Kuechenmeister
Carl L. Smith.

PRESIDENT NIESZ: There having been no other nominations received, under the provision of our by-laws, a motion will, therefore, be in order to close the nominations. May I have such a motion?

(The motion was regularly made, seconded and carried that the nominations be closed.)

PRESIDENT NIESZ: The nominations having been made in number equal to the vacancies to be filled, in order to save time, and there being no other nominations, a motion to authorize the secretary to cast the ballot for all members present in person or by proxy is in order.

(The motion was regularly made, seconded and carried.)

PRESIDENT NIESZ: The secretary has been instructed to cast the ballot.

SECRETARY CAMERON: The ballot is cast.

PRESIDENT NIESZ: I, therefore, declare the men, whose names have been read to you by Mr. Peacock, are elected as directors of the Council.

The next item on the program is the report of the chairman of the Resolutions Committee, Mr. Arthur T. Morey.

Report of Resolutions Committee

By ARTHUR T. MOREY
Chairman

Resolution of Thanks to the People of New York City

WHEREAS, This Seventeenth Annual Safety Congress of the National Safety Council in New York City promises to be the largest and most enthusiastic gathering of people interested in the prevention of accidents ever known in the history of the movement and the interest shown has been the most encouraging received to date, because of the wonderful cooperation received from the New York Safety Congress Committee, the New York Safety Committee, the Merchant's Association of New York, the press, the hotel men's organizations, other bodies of trade, technical and professional people and the most prominent civic, business and social leaders of the world's foremost metropolis, who have labored zealously to call the attention of the entire community to the importance of this convention and have spared neither time nor money to make this rally a success, and

WHEREAS, We, the members of the National Safety Council, gathered here from all parts of the United States and Canada and elsewhere, are thoroughly convinced that the inspiring interest and efforts contributed by these distinguished New York leaders have helped to make not only the people of this city but also the world think more about safety and have thus substantially helped the movement dedicated to the conservation of lives and limbs and property, therefore be it

RESOLVED, That a standing vote of thanks be extended to the City of New York, its public officials, various organizations and public spirited citizens who

have done so much to stage this great safety congress, particularly to Mayor Walker; Alfred H. Swayne, Chairman, N. Y. Safety Congress Committee; Lewis A. DeBlois, Chairman of the N. Y. Safety Committee; Willis H. Booth, President of the Merchants Association; the New York Police Department; Board of Education; American Museum of Safety the splendidly cooperating Press and the other distinguished supporters of this Congress, *the sincere thanks of the accident preventionists of America* who deeply appreciate the fact that the efforts of these benefactors have been a major factor in getting invaluable publicity and aid, through the metropolitan newspapers and press associations, which are relaying news of this event to papers throughout the world—through the broadcasting of timely safety messages via leading radio stations and numerous other forms of advertising *to the fact* that accidents do not just merely “happen” but are caused by certain circumstances that can in the main be controlled and eliminated, as conclusively proved by the reports, addresses of hundreds of speakers, exhibits and demonstrations, which feature this Seventeenth Annual Safety Congress.

Mr. Chairman, before you put that resolution to vote, I would also like to offer this one:

Resolution in Honor of the Council President

“Whereas, Homer E. Niesz has served the National Safety Council as President, during the past year with marked ability, faithfulness, and earnestness; and

“Whereas, Much of the credit is due him for the continuous success and expansion of the Council; therefore, be it

“RESOLVED, That the Seventeenth Annual Safety Congress, assembled in New York City, express to Mr. Niesz, by rising vote, its sincere appreciation of his service as President, of his helpful contribution to the cause of safety; and be it further

“RESOLVED, That the sincere gratitude of the National Safety Council be expressed in a similar manner to the Executive Committee and those other committees and workers who have labored so unselfishly and so well, and to our efficient and hard-working Managing Director, William H. Cameron, and to his splendid staff for their loyal development and successful effort in building up the remarkable progress of this great humanitarian movement.”

(The motion was regularly made, seconded and carried that the two resolutions be adopted.)

(The audience arose and applauded.)

MR. MOREY: Now, Mr. Chairman, I have two other resolutions to present. They are to the effect that it is the conviction of this Congress that a very large number of public accidents and industrial accidents can be prevented, and we want to put it in such form it can be broadcast to the whole world, to awaken those in industry and in charge of public safety to that fact, and to urge them to action. They are as follows:

Public Safety Resolution

WHEREAS, Last year, in the United States alone, approximately 70,000 men, women and children were killed and countless other thousands of persons were injured by accidents on the streets and highways, in other public places, on the sea, in the air, and at home, causing terrible pain and sorrow and an economic loss amounting to billions of dollars; and

WHEREAS, It has been conclusively demonstrated that most of these accidents could have been prevented through organized, cooperative efforts of those interested in the conservation of lives and limbs and property; and

WHEREAS, American leaders, concerned over the welfare of our people, are alarmed at this increasing toll and are determined that it shall be checked; therefore be it,

RESOLVED, That the members of the National Safety Council and others present at their Seventeenth Annual Safety Congress, pledge themselves to continue their endeavors to prevent accidents and recommend to all interested in this problem the following platform:

1. Immediate adoption of the accepted Standard Accident Reporting System in every state, city and town, that timely and accurate information may be obtained upon which to base accident prevention measures.
2. A comprehensive study of the traffic situation in each city; the necessary improvement of streets, revision of ordinances and regulations and the adoption of such traffic control measures as may be necessary.
3. Acceptance of the principle of uniformity in state and city traffic laws and regulations and in the design and use of signs, signals, and pavement markings and the support and cooperation of all interested organizations and officials with that end in view.
4. The elimination, as far as possible, of unfit and reckless motor vehicle operators, through the adoption of a driver's license law by every State.
5. Recognition on the part of both motorists and pedestrians of the rights and privileges of all users of streets and highways.
6. The furnishing of the necessary information to teachers, principals and superintendents of educational institutions so that they may give the needed instruction to the pupils under their guidance.
7. The widest possible publicity in newspapers and other publications for the specific ways and means of preventing accidents and the importance of personal caution.
8. Intelligent and impartial enforcement of reasonable laws and regulations which are intended for the control of the minority of the people who are responsible for the majority of accidents.
9. The organization and maintenance of a community safety council, committee or other group, in each locality, which should be non-partisan, non-commercial, cooperative, representative of all interests, created to mobilize the forces of public opinion and support officials in the performance of their duties.

Industrial Safety Resolution

WHEREAS, It is estimated that 25,000 industrial workers met untimely deaths and hundreds of thousands were injured while laboring in shops and factories last year, resulting in pain, grief, destitution, interruption of production and an economic loss of billions of dollars to both employers and employees; and

WHEREAS, More than 4,600 members of the National Safety Council have conclusively demonstrated that most accidents can be prevented through safety methods; and

WHEREAS, The conservation of lives and limbs and property is a responsibility which should be accepted by both employers and employees everywhere; therefore, be it

RESOLVED. That the members of the National Safety Council and others present at the Seventeenth Annual Safety Congress, assembled at New York City, Oct. 1-5, 1928, recommend immediate and earnest consideration of the following recommendations:

1. That both large and small employers make a regular and periodic inspection of their respective shops and factories, to ascertain how, why, when and where accidents occur and study ways and means of checking these accidents.
2. That employers maintain and analyze accident records, which are essential if they are to achieve real results.
3. That all employers safeguard, as far as possible, all dangerous mechanical equipment and revise hazardous manufacturing processes.
4. That employers impress upon their associates the importance of eternal personal safety efforts and the necessity of spreading accident prevention information.
5. That employers assist and cooperate with the National Safety Council and its affiliated community councils, federal, state and municipal officials and others engaged in accident prevention work.
6. That the inclusion of safety education in public, private and parochial schools, universities and colleges be encouraged by employers and employees.
7. That additional universities and colleges incorporate safety engineering in existing and future engineering courses.

AND, BE IT FURTHER RESOLVED, That those attending the Seventeenth Annual Safety Congress hereby express their deep appreciation to the thousands of employers who have been engaged in safety work, and also acknowledge their indebtedness to the millions of employees and to organizations, the press and the public generally for their support of accident prevention activities.

I, therefore, Mr. Chairman, move the adoption of these resolutions.

(The motion was seconded and carried.)

PRESIDENT NIESZ: We now come to a portion of the program which is of very special interest, as we are to have before us men who are prominent and well qualified to speak on the subjects they are to present.

The first speaker is a man who has been engaged in many activities of a civic as well as an industrial and business nature. He was president of Los Angeles Chamber of Commerce, later the Associated Chambers of the Pacific Coast, and still later became vice-president of the United States Chamber of Commerce.

And that is not all. In 1923, he became president of the International Chamber of Commerce. It is said that only the lack of communication and transportation prevented him from becoming chairman of the Interplanetary Chamber of Commerce.

In addition to these activities, he occupies the very responsible position of vice-president of the Guaranty Trust Company of New York. He is also vice-president of the Security Trust and Savings Bank in Los Angeles, a post which, it is said, he holds so that he can spend his winters in California.

Along with these activities and accomplishments, he has given time and attention to the cause of safety. In addition to this, he is serving as president of the Merchants' Association of New York City.

It is a very great honor and privilege to present to you, Mr. Willis H. Booth, of New York and Los Angeles.

The Humanics of Industry

By WILLIS H. BOOTH

**President of The Merchants Association of New York, Vice-President of
The Guaranty Trust Company of New York, New York City**

Shakespeare lived long before we had the labor problems of modern industry but he certainly must have had some similar labor problems of his own in mind when he observed, "If to do were as easy as to know what were good to be done" all sorts of wonderful things would have happened. The problem of the adjustment of human relationships transcends in difficulty and importance all other problems of industry.

When we accept the proposition that no two human finger prints are alike, we also practically accept at the same time the proposition that no two individuals are alike, so we are continually dealing with situations in which we do not have constant factors.

Two individuals may each possess all of the virtues that are humanly attainable and still not be able to get along with one another and so when we begin to talk about humanics in industry we are forced necessarily to generalizations. We can only reach, as the result of our studies, some ideas of the directions which should be taken, of the objectives to be reached, but the absolute method by which accomplishments can be registered is in each specific case largely a localized problem. Let us try to establish a little foundation for our thinking.

Last month in Glasgow, at the annual meeting of the British Association for the Advancement of Science, Professor E. B. Dailey asserted that millions of years ago Europe and North America were geologically united, but that they had drifted apart allowing the seas to flow between them and form the Atlantic Ocean. Professor Dailey's conclusion was drawn from an intensive study of the primary mountain systems of Europe and America.

Almost at the moment that Professor Dailey was publishing the results of his research, Secretary of State Frank B. Kellogg was returning from Europe after his consummation of the multilateral peace compact. Signed by fifteen nations and with every indication that its provisions will eventually be generally ratified, that document is now conceded a place in history as one of the great influences for world unity.

Between the prehistoric days of which Professor Dailey speaks and the modern times of Mr. Kellogg and his contemporaries, many influences have been at work. Racial characteristics and international disputes have produced gulfs between peoples greater than the oceans that separate continents. Wars have worked their havoc. Nation has risen against nation and discord, destruction and desolation have followed. It is a peculiar commentary that the very destruction born of man eventually teaches him the necessity of cooperation and provokes his efforts to influence the returning swing of the pendulum.

Industry has paralleled in the character of its history the other works that man has wrought. Industry's history has been one of strife, of conflicting forces, of chaos. But through all this trouble great progress has been made; undoubtedly even greater progress will be made in the future and as this progress will touch every phase of our national life, its permanent advancement will depend upon our ability to consider properly the human problem involved.

There is nothing new. All change, all development, all evolution, all progress is but the result of the operation of certain natural laws. The individual is the instrument through which these laws may be comprehended and employed.

The great material progress which you see around us and in which we glory had its foundation in individual thought. The human factor is the foundation of

it all. Certain inherent mental qualities exist in every man and are caused to develop in varying degrees of intensity and relativity. The dominance of any of the evil among these qualities tends to make of the man a destructive force; the man becomes a constructive influence when good qualities are dominant. But to some degree both destructive and constructive forces are necessary, just as the destructive forces which tear down the trees of the forest are necessary to the production of those commodities for which lumber becomes the raw material.

Let us be specific.

Not the least of these mental qualities which are the birthright of the individual is the instinct and desire to create. Industry is the product of the creative impulse of the individual. The first man conceived with his unaided brain and wrought with his bare hands the instruments that brought to him the necessities of life. As the boundaries of his little world expanded and crude competition came into being he devised improvements in method and product until barter and trade, the forerunner of our commerce, came into being. The contacts made in his journeys afield to trade his products for those of other men further enlarged his horizon and gave rise to competition. Competition brought aggrandizement and he, herding with others of compatible temperament and objective, unwittingly sowed the seed that, ages later, produced our towns and cities.

And so man struggled upward, forced by necessity to rely upon himself and use his individual inventive ability in the creation of those crude implements that have finally evolved into the wonders of our modern world.

The cumulative energy of this individual creative impulse produced in the years from 1750 to 1800 one of the greatest eras of invention that the world has ever known. During that period young James Watt invented the steam engine; Whitney, the cotton gin; Arkwright, the spinning frame; Hargreaves, the spinning jenny; Cartwright, the loom. History records approximately twenty other contemporary developments of lesser importance.

We can stop here and realize the effect which these inventions have had upon the progress of our own civilization and we can deduce from this experience one distinct factor which we must take to heart in our present problems.

The development of conditions in industry whereby the individual working in reasonable happiness and contentment may contribute to his tasks the maximum of inventive ingenuity is the first obligation of the employer, if our industrial activity is to continue to expand.

Stress is laid in this statement upon the development in the individual because there has been a distinct tendency in the development of our industrial situations to consider only labor in the group.

The introduction of machinery, carrying with it the opportunity for large scale production, and greater use of capital, was indeed a constructive development and contribution to our present day civilization. However, as is always the case with new situations, we overemphasized this mechanical importance, and this automatically tended to relegate to the background the importance of the individual in the resulting classifications of labor and division of industrial processes.

Through the nineteenth century there was a distinct disposition to consider man as an adjunct to the machine and we temporarily lost track of the fact that we were confusing cause and effect. The machine is the child of the mentality which created it and should in turn be its servant and not its master.

This attitude, no doubt, was the result of many conditions but the principal one originated within labor itself. Fearful that the development of machinery might result in the elimination of labor and resulting want and distress, labor organized groups to combat the inevitable advance of the machine era. In developing this perhaps necessary group antagonism to the forward progress of inventive ingenuity, the individual was subordinated to what was considered the welfare of the group. A philosophy based upon a minimum daily contribution in order that more labor

might be employed actuated the operation of these group movements, and so we had throughout the world this great combat between the power of inventive ingenuity and a labor philosophy which endeavored to restrict its operations.

At the same time, we were going through a particularly interesting change in the method by which industry conducted itself and this change has had a most important effect upon the human factor. In the advancement of our industrial era individual business has made way for the corporation and the individual owner or manager has been replaced by the corporate executive. This change in itself has produced a most constructive result in the relationships between the various companies and their workers. Obviously, the more enlightened and broad minded the corporate executive, the more intelligent are his considerations of the human problem.

By natural evolutions, therefore, in recent years we have stopped the swing of the pendulum in the direction which is making a man a mere adjunct to the machine. We have realized that dehumanization to the point where the personality of the worker has been subdued is of greatest possible disadvantage to the welfare of all people. In this new great industrial evolution more happiness has been brought to the masses of people. It is only necessary for us to continue our perspective for the progress to be genuine and real. Through it all the living conditions of the citizens of all enlightened nations have been steadily improving and are now more advanced than at any time in the history of mankind.

Our life today, with its automobiles and airplanes, its motion pictures and radios, its shorter working days and higher salary levels, could come to us only through the industrial influences here indicated. Our problem at this time in the relation of the human element in this industrial activity, is to promote, as we have earlier indicated, conditions by which and through which individual inventive ingenuity may continue to assert itself.

This first proposition couples itself automatically with the second. The object and the responsibility of all intelligent management is to develop conditions whereby all labor has the proper attitude toward its job.

Practically all industries now exist in a highly competitive social order and are forced by circumstances to survey every factor in any way connected with its operations. Of all of these factors, the human is the most important.

Competition has made it necessary for all industry to conduct a war against waste if it can hope to compete. Industry must make volume production its first and chief ally in this war, but as practical men we know that all efforts become fruitless unless properly supported by labor and they can only be so properly supported when labor itself has the right attitude towards its job.

Increased production demands larger markets. Our distribution is expanding in every direction. Almost instantly vast financial resources are transmitted from one corner of the globe to another. Geographical and international barriers to trade have been broken down. The world has become one huge market. Before we are aware of it, it may also become one large factory.

Generally speaking, the same quality of material, the same perfection in machine equipment, the same degree of refinement in methods and processes, are commonly available to all manufacturers. In the war against waste the forces of mechanics of industry work with a continually diminishing ratio of effectiveness.

But competition indicates that the struggle must continue and that a new ally must be found.

Our age of inventive genius, which has brought in its wake the very highest type of executive and managerial skill and intelligence, has brought our industrial leaders as a class rapidly to the conclusion that this new ally is embodied in the long buried potential creative impulse and ability of the workers in their plants. Much thought has been given and must be given, and much improvement has been made and must continue to be made, toward the devising of a method for

releasing this force first for the advancement of the individual industry to which it is devoted but more importantly for its contribution to the common social and economic good.

The trained executive knows that the human equation is of compelling importance if his company is to maintain its position in the field but what worries him is how he can keep his labor so minded toward its job that he obtains the best in service and inventive ingenuity. He knows that he must keep his labor reasonably happy if he would avoid the destructive forces of labor turnover and retarded production. How this can be done necessarily varies with every plant and with the type of employee. The important fact is that the modern corporation well managed is more human in its industry than any previous type of business.

In American industry in all of its ramifications and various signs we contemplate the whole gamut of labor from the non-English speaking alien to the college graduate and obviously the methods by which various types of labor might be made contented varies with each individual enterprise. At the same time, it is very hard to use the words management and employee, because management is in turn employed and oftentimes the directors of the corporations which select its management are in turn selected by stockholders who may possibly be employees of that particular industry, and the completeness of this circle emphasizes the primary consideration in all human operations. This consideration is the development of confidence, sincerity, absolute truthfulness and straightforwardness in both management and labor. These qualities above all others are appreciated by labor and are reflected in its attitude towards the industry. If management can get over to the human beings whose work it directs the fact that it is being at all times foursquare with them, the biggest part of the job is done. Humans respond to nothing so completely as mutual confidence, but they must engender it by personal integrity. This comes particularly true in large industries where we are forced to consider humans in the mass, where personal acquaintance in the nature of things is not always possible and where relations must be by understanding. The most outstanding characteristic of labor conditions in industry today is a sympathetic attitude displayed by management in every well ordered enterprise. Undoubtedly this offers the foundation for the better feeling which is the necessary basis of mutual cooperation.

At this point, there are a lot of details which we might well go into if time afforded. In the manufacturing industry the location of a plant is of primary importance. If commercially possible, it should be in a small community or on the outskirts of a large one so that light and air and conditions of living will greatly help the human problem.

Another is the petty boss standing between management and labor and oftentimes making the human problem more difficult for both by bad judgment.

The fact is that the philosophy among the more enlightened labor leaders is distinctly changing in character. That to which we have previously referred, based upon the subordination of the individual to the group and the minimum production of each employee in an imaginary protection of the others, has been replaced by a more enlightened philosophy based upon maximum production at low unit cost as a basis for high wages and more consuming power. This has changed the entire attitude of American business and is largely responsible for our present prosperous era.

Management is not now concerned with the cost of labor as much as with the cost of the unit of product. Labor realizes that increased production and lower costs afford greater business and higher wages. This philosophy now accepted by both management and labor has led both up to a more prosperous condition than has ever existed in industry anywhere within recorded history. The continuation of these conditions is based upon the proper development of the human factor for the very reason that as wages increase and hours of labor decrease,

unit costs can only be maintained or lowered by original conceptions of labor saving methods and these can only be found in the mind of the individual. Actually, then, in our human relations we are forced to return to the emphasis of the individual and to the hope that his development will respond to the advantage of the group. In future, the saving of the group will be in the intelligence of the individual rather than the saving of the individual by the mass power of the group.

In this great reservoir of inventive intelligence, found at a more average high plane in American labor than elsewhere, lies the continued prosperity of American industry. It is primarily a problem of human relations, operating with a guidepost of straightforward understanding. The solution will necessarily be gradual but intelligent effort will make it inevitable.

Colvin in his book "Labor Turnover, Loyalty and Output" says:

"No one is wise enough today to outline the precise way in which these problems will be solved. But no citizen who loves his country and his fellow men can shut his eyes to the impending changes or strive to prevent what the great majority deem progress."

The obligation to be straightforward, sincere and approachable rests just as much upon labor as it does upon management. Unquestionably they must both have the proper attitude towards the job and both must take pride in the work they are doing. Unquestionably labor will continue to expect its fair share in the profits of industry and there will probably always be difference of opinion on this point but each situation in its turn must be considered upon a basis of honest, sincere and straightforward cooperation. Entirely aside from welfare work, which is an outstanding consideration in modern business, every industry today is giving consideration to the question of wages and hours, to bonus systems; to profit-sharing and stock ownership. These methods are bound to vary in different industries and in type and will largely affect the attitude of managements toward the human problem. It is rather significant to observe that many of our industries which have been the most profitable are those which have taken the most advanced position in the consideration of the human factor. But the very fact that we have under discussion all of these various methods of increasing labor's participation, indicates clearly that modern management is alive to its problems and is approaching them as fast as it can with prudence. After all, the businesses must be made profitable or the problems will solve themselves automatically by the passing away of the industry in question. No plan will be fully successful unless conditions surrounding the tasks of men will in themselves attract labor to the job. Of course, this is not a hard and fast rule and depends upon the status of the labor market but in the long swing of years in which progress may be measured this rule will undoubtedly apply.

Granting that labor must have a proper attitude toward its job, the same is true equally of management. The voluntary cooperation of management is a hundred-fold more effective than the compulsory cooperation of management. Therefore, when we look at the human equation, is it too much to ask that the employer and employee both alike are sincere and honest in their mutual dealings? Is it not proper that this labor problem should be approached cooperatively as associates? The management is doing this continually in its interchange of thought through trade associations, engineering societies and other such agencies connected with other factors of the business. It is not too much to ask that management and labor as associates seek a common ground of understanding. The appearance of the more liberal labor leaders and so-called capitalists upon the same discussion platforms, the growing tendency to the abolition of the private offices, the growing ease with which executives may be approached by those under them are but the evidence that the search for this common ground is already seriously under way.

We are here today to discuss matters of safety. Does it not naturally occur to

us that therein lies perhaps the most important opportunity for developing this common understanding?

During the year ended June 30, 1927, more than 95,000 human beings lost their lives in accidents occurring in the factories and on the streets and highways of this country. In New York State factories alone almost 99,000 people were injured so severely that they received money compensation; 1,042 of those 99,000 died as a result of their injuries. These accidents, most of which, I venture, were preventable, cost New York State in excess of \$100,000,000. Charging deaths and permanent disabilities with a loss of 1,000 weeks each, injured employees were absent from work a total of more than 2,000,000 weeks.

Here is a condition, the relief of which demands the interest and effort of every human being, whether he sits in the president's office or works at a bench.

Here is a situation in which there can be no major controversy. The conservation of life and limb is of prime importance to both employer and employee, for death and disability cause disaster to both.

The solution can be found only in their combined effort; for divided they can accomplish but little.

Industrial safety is not a new subject. It is recorded that some thought was given to it in 1867. The problem of employees' relationships as a whole was considered as early as 1800 when Robert Owen, a Scotch mill operator, set up a paternalistic personnel program among his workers.

Robert Owen's effort was but the sowing of a seed. The harvest is contained in an ultimate civilization, the character of which we cannot conceive, but the fabric of which is being inevitably woven from the warp and woof of individual human thought and accomplishment.

The one outstanding fact is that our new standards of living have developed in the individual not only new capacities but new appreciations. This may not of itself make our so-called labor problem easier; in fact it may temporarily make it harder but it will ultimately introduce two factors which should have a distinctly stabilizing influence in our economic order:

1st—It should raise the level of education.

2nd—It should increase the per capita average of wealth.

These two factors should have a distinctly healthful influence in shaping the course of a democracy whose Government derives its authority from the consent of the governed. Possession of property is the best antidote for destructive socialism.

This unity of interest between industry and labor has increased as their productive capacity increases and a higher set of values for each in relation to the other follows in order.

The important fact is strikingly emphasized in this situation that these values must moreover be reciprocal if they are to attain their highest level.

The most casual survey of the field of industry reveals clearly that the employee who has a right attitude toward his employer usually makes the greatest progress personally and a group of such employees do so collectively. Only in an atmosphere of mutual understanding and interest, of cooperation toward a common achievement in the success of which all participate, can industry achieve its best results. We have learned many lessons in the past twenty-five years of industrial development, but perhaps none more important than the twofold lesson: first, by the employer, that high wages and protection of the human factor; and second, by the employee, that the development of mechanical power and mass production may combine to the greatest benefit of all concerned.

In this new appreciation of a common interest there need be no sacrifice of individual rights or ambitions which are the very basis of our social system. Paternalism toward employees is just as much out of place as communized ownership; self reliance must be developed as a primary virtue. Each party in this

new relation should stand squarely on his own feet, jealously protecting his own interests, but realizing fully how far that interest is one with his business partners. Ill advised charity is as much to be deplored as socialistic seizure of the other fellow's property. Each party to this relationship has important obligations to the other and each should recognize these just claims. The protection of life, of health, of productive capacity represents an obligation which is both humanic and economic. So also exists the obligation to protect property, the mechanical and financial organization of industry, as well as the human.

Progress in American industry is strikingly marked today by the dominance of a new psychology concerning industrial relations. Men, materials and money have combined in the development of our great resources and brawn guided by brain, wealth and labor directed by inventive genius and creative energy, have brought the United States to a foremost position in the industrial world. Each of these factors has its place of importance in industrial growth now as always. But today in sharp contrast with past industrial history we find a new controlling thought. That is the new appreciation of the importance of the human equation, of the economic as well as social value of its protection and conservation.

The golden age of English industrial supremacy following the Napoleonic wars and our own Civil war was largely founded on the exploitation of labor. The United States, as the world's new industrial leader, is basing its leadership on the cooperation of labor. England has been slow to make her readjustment to the new order and is seeing her former position occupied by others who see the wisdom of this new policy of reciprocal effort and understanding.

This new guiding thought is not formulated in pursuit of Utopian ideals. It is productive of the most practical results. First, it adds greatly to the productive capacity of the individual; second, it greatly increases mechanical efficiency and output; third, it increases the buying power of the consumer and raises the general standard of living; fourth, it greatly reduces labor turnover, the bane of all industry in its wastes and annoyances.

There is this further important consideration that must not be lost sight of in the development of this new thought, and that is that labor will naturally seek the substance and not be satisfied with the shadow in these new relations. Welfare provisions and social services will not satisfy in lieu of a fair participation in the earnings. Such efforts are fitting only when undertaken in addition to a just wage and bonus return in some form. Premiums for production above established minimums will go much further toward the establishment of industrial peace and the stimulation of industrial production than prize packages or medals.

In reviewing the whole field of industry, we may safely conclude that in these important respects intelligent self interest is guiding the way toward better standards of operation and a keener appreciation of the human values in industry and of the mutual rights involved. The ideals of peace toward which the minds and hearts of men are ever reaching may not yet have been fully achieved, but at least we are moving toward them, as such a gathering as this of today eloquently testifies.

PRESIDENT NIESZ: Mr. Homer L. Ferguson, the next speaker, is a graduate of the U. S. Naval Academy at Annapolis, and for some years after his graduation he continued to study the building of ships. A few years after that he changed his lieutenant bars for the unseen shoulder straps of a captain of industry, and that has been his job ever since.

For the past fifteen years he has been president and general manager of the Newport News Shipbuilding & Dry Dock Company, and he has retained his love for the sea and the things associated with it. He has taken a very intense interest in the safety movement and its development in industry.

It is a very great pleasure to me to present Mr. Ferguson.

Address**By HOMER L. FERGUSON****President, Newport News Shipbuilding & Dry Dock Company,
Newport News, Va.**

Not so many years ago I felt that safety work was largely waste effort, that after management had done its share to provide a safe place to work and met all of its legal obligations, it was then up to the men to take care of themselves. This was not on account of any lack or real sympathy for injured employees, but because it seemed a fairly hopeless task to make the careless careful about the one thing that most concerned them. My medical friends tell me that men of the soundest judgment in industry, finance or the professions, are apt to be quite childish about what is of greatest importance to them—their own health.

Accident hazards are undoubtedly increased by the speed and constancy with which we move about while awake. We are all sorry when anyone is hurt or killed, are glad that the injured man is properly compensated and his family made comfortable for the time being. The feeling of pity predominates. In an industrial plant, if a valuable piece of machinery is broken down or ruined by carelessness, there is usually a great deal of profanity and decisive action is taken to prevent a recurrence. The feeling of pity is quite apt to be absent.

My excuse for talking to you today is that I was drafted to discuss the question of industrial safety in a more general way at the first of your large meetings and feel that perhaps my experience may be helpful, as my ideas as to the value and efficacy of safety work have been changed.

For the benefit of those not familiar with shipbuilding, I would say that the Newport News Shipyard employs 5,000 men and has most of the hazards of industrial employment. There are machine shops, boiler, blacksmith and forge shops; iron, brass and steel foundries; copper, sheet iron and pipe shops; wood-working plants, ship sheds and furnaces; rigging loft, mold loft, shipways where hulls are constructed, dry docks and piers; probably twenty miles of railroad track, trucks, dozens of cranes of every description from three tons to one hundred and sixty tons capacity. The plant covers about one hundred and fifty acres. At our plant about thirty-five per cent of the men are colored, and these men do a large part of the stage building and rigging. We have found them rather less careful about getting hurt themselves and probably rather more careful about hurting any one else.

Our safety work started in a small way about fifteen years ago, with the appointment, and later the election, of a yard safety committee. This committee still exists, has regular meetings, with definite duties. Its members have the obligation to report immediately any unsafe practices or conditions, and may order emergency jobs of small extent done. In conjunction with the inspection provided by the State under the Workmen's Compensation Law, mechanical safeguards have been provided and applied and this work still goes on, although to a noticeably smaller extent.

Shortly afterward the Clinic was installed with nurses in attendance during working hours and a surgeon in attendance most of the time and always within easy reach. One of the chief values of a clinic in the plant is that minor injuries may be treated properly and quickly and infection prevented. This department is of great use, not only in the treatment of injury, but also in an educational sense. In a large plant, a clinic should have an X-Ray, for frequently small bones may be broken which otherwise would not be discovered.

The next step was the adoption of a definite employment and training program, with a physical examination for every new employee. In training men and boys for their jobs, the necessary instruction in safety is easily given. The record of our 200 apprentices for safety is excellent. A considerable contribution to safety is

made by the exercise of sound judgment in not placing men in jobs for which they are not suited by reason of their age, physical condition, or lack of training.

On account of the great risk involved in repairing vessels which have been carrying oil, it became necessary to have a certified chemist. We found a man who could do this work in addition to his other work and whose word is final as to the conditions of safety in or about tanks of an oil vessel, most particularly as to freedom from gas in such tanks.

We then took other natural steps in accident prevention, through the use of bulletin boards and posters throughout the plant, and the adoption of competitive methods as between the various departments. These steps were taken for the education of both supervisors and men and to create a spirit of competition. Every one can see these records daily, and there is apparently a keen desire on the part of the departments to keep their records clear. I would say, however, that the department causing an accident is charged with the accident, not necessarily the department of the man who is injured. The records of accidents are not only shown on bulletin boards, but are published monthly in a small plant publication. The rates of the various departments for order and safety are also shown in this publication. Organized safety campaigns with prizes are carried out once or twice a year—usually of a week's duration. In this connection, I would state that a clean plant where everything is kept in an orderly way, such as any good housekeeper or good industrialist should insist upon, adds considerably to safety.

We now have a full time safety engineer whose job is safety and nothing else, and who is primarily charged with the greater part of the safety work, keeping of records and the determination of the exact causes of accidents—and this means not only direct causes but indirect causes as well. Complete statistical records have been kept for years, and only from such records may sure advance be made.

Supervision is the key to safety work in a shipyard. We have adopted a plan of reducing bonus to a supervisor because of accidents to men under his care. In the case of serious or lost time accidents, a small court of inquiry is held at the clinic shortly after quitting time, and there appears at this meeting the superintendents and foremen of the departments involved, the employment manager and safety engineer, as well as the witnesses and the injured man if he can come. A report of the facts involved is made, and a copy sent to every one concerned. The effect of this is to create a real interest and to further extend the processes and benefits of education. It may be held that supervisors might give undue time and thought to this work. I do not agree with this view at all, as there is no reason why a man may not be a most competent machinist foreman and at the same time contract the habit of seeing and instantly correcting unsafe practices. Fortunately the human mind is one thing that can keep on growing indefinitely without getting too complete or too big. I am convinced that well directed and systematic effort in accident prevention will yield as large financial returns as will the same kind of effort applied in many of the other various fields under the control of industrial management.

Management finds in accident prevention that the interests of employer and employee are more nearly similar than in probably any other contact. The hurt man loses his time, his body is impaired in some way, even his life may be lost, and the employer loses valuable trained services, frequently sustains a direct money loss, has his labor turnover increased, and suffers that intangible but vital loss of morale.

Comparative records of industrial accidents may be more readily obtained than any other industrial records, and in this connection the records sent out by the National Safety Council are invaluable. The backing of the community is behind safety work, and practically every one believes in it after they become acquainted with it. It can not be turned over to hired men, however, no matter how competent

they may be as specialists. To further the laborious process of training and education constant effort is required.

At first it seems arbitrary to require men to wear goggles under certain conditions. We have come to the conclusion that the man with the record knows more about hazards than the man with a chipping hammer, and therefore insist that men in certain definite trades wear goggles, and in case they have to wear glasses of their own, goggles which go over their glasses are provided.

To illustrate that the problem of safety in an industrial plant is capable of breakdown and analysis like any other industrial problem, I have prepared for the benefit of such industrial engineers as may be interested, a brief statement of accident causes and prevention and responsibility.

Accident Causes

1. Failure of Mechanical Equipment
 - (a) structural Weakness
 - (b) Faulty Design
 - (c) Poor Material
 - (d) Abuse
 - (e) Lack of or Improper Safeguards

Accident Prevention

1. Engineering
 - Purchasing
 - Inspection
 - Plant Maintenance
2. Improper Methods of Doing Work
 - (a) Lack of or Insufficient Instruction
 - (b) Poor Supervision
 - (c) Improper Use of Tools and Equipment
 - (d) Workman Unsuitably Located to do Work Safely
 - (e) Physical Unfitness of Workman to do Work Assigned Him
2. Planning and Scheduling
 - Competent supervisors
 - Job Analysis
 - Intelligent Allocation of Labor
 - Selective Employment
 - Mental and Physical Examination
3. Individual Carelessness
 - (a) Recklessness—Chance Taking
 - (b) Lack of Forethought or Imagination
 - (c) Lack of Interest (absentmindedness)
 - (d) Improperly Clothed for Job
 - (e) Inexperience
 - (f) Horseplay
3. Safety Education
 - Thorough Training
 - Enforcement of Plant Rules

Safety Responsibilities

WORKMAN

- Health
- Suitable Clothing
- Safe and Efficient Performance of Duties
- Proper Conduct

MANAGEMENT

- Equipment and Tools
- Material
- Work to be Done
- Plans and Schedules
- Methods of Doing Work

Supervision
 Instruction
 Inspection
 Employment and Training
 Making and Enforcement of Rules
 Allocation of Help

There is a direct relation between accident prevention and any other industrial problem, both in the method of attack and the method of cure, and while we industrialists should always keep a proper sense of proportion, I would like to say for the benefit of those not already converted that as the result of many years of experience, I am satisfied that safety goes hand in hand with economical and high grade production, and the small cost involved is more than justified.

As a matter of fact, the principal problem involved is that of overcoming the natural resistance of the human mind to the entrance of a new thought. There will always be risks in industry. While it is a fine thing to have accident compensation, and it is a splendid sentiment that causes hospitals and charitable organizations to provide for the unfortunate, it is much more worth while to prevent accidents. When we can deliver to the owners a great ship, in whose construction and outfitting no workman has received an injury, I shall feel a very real pride in that achievement.

Annual Report of Managing Director

By W. H. CAMERON

Managing Director, National Safety Council, Chicago

To the Members of the National Safety Council:

During the past fiscal year 851 new members have joined the National Safety Council. A comparison of the total membership for the past two years shows:

Membership, July 31, 1928.....	4,638
Membership, July 31, 1927.....	4,359
Net Gain	279

The net gain in membership revenue was \$10,995.43. The total annual dues now being paid by 4,638 members is \$263,021.56, or an average of \$56.71 per member. The solicitation of new memberships through voluntary committees and in other ways has been continued unabated.

The NATIONAL SAFETY NEWS has gained in circulation and importance. The quality has improved and the number of special features and articles has increased. The minimum number of pages has been increased to eighty per issue. Two special issues were published during the year; the pre-convention issue of September, 1927, and the Chicago Congress Convention number. There has also been an increase in the number of extra copies ordered by members. The advertising doubled during the previous fiscal year and has considerably increased during the present fiscal year. The "Safety Exchange" and sectional articles have proved popular. Changes in typography and the use of more illustrations have improved the appearance of the magazine. The aim of the NATIONAL SAFETY NEWS is to provide practical information and to keep before safety workers a vision of the worthwhileness of their work.

The Safety Posters have been published regularly and steadily have been improved in quality. Four hundred and eighty posters were prepared during the year. This includes eight 17 by 23 inch posters and thirty-two 9 by 12 inch posters each month. More time and money have been spent upon their preparation and well known artists have furnished illustrations. The circulation has increased 27 per cent and the new varieties have emphasized the growing appreciation of

safety posters as an educational medium to lessen accidents. A 30-page catalogue of 252 selected posters was mailed to members January 1. Poster inserts for every package of posters were distributed on alternate months. Prizes were awarded to workers in contests for opinions on posters. The Council's street posters, distributed through community councils, have filled a need for continued education of the public in the safe use of the streets. The members and the sectional poster committees contributed generously to make this poster service possible.

The Safe Practices Pamphlets have appeared bi-monthly under the supervision of the Conference Committee of seventy-five safety engineers. Twenty-three of the series have been revised and reprinted during the year. Six new pamphlets have been produced. This "Safety Encyclopedia" now includes 99 separate treatises on the fundamentals of safety engineering practices. Two sectional Safe Practices pamphlets for the petroleum industry and one for the Rubber Section were completed during the year and thousands of copies distributed. New members are ordering complete sets of these pamphlets for reference purposes. One hundred and ninety-seven sets have been ordered by members during the fiscal year.

The Consultation Service has answered 7,010 requests for information. For the fiscal year ending July 31, 1922, there were 2,677 such inquiries. There is a marked increase year by year in the use of the facilities of the Library and Information Bureau. During the fiscal year 51,602 pieces of information were distributed in answer to 7,010 inquiries, including books, pamphlets, clippings, photographs, blue-prints, posters and similar material; 32,508 new pieces of material have been added to the Library files during the year. More exhibits were prepared for regional and national conferences than during any previous year. The information files have been systematically built up by the acquisition of up-to-date information on all phases of accident prevention, industrial health and hygiene, and allied problems.

Films and Slides have been in demand by members in increasing quantities. The five new stereopticon machines purchased last year for use of members have been in continual circulation and have justified the investment. The new film produced for the Chicago Congress, "The Handicap," met with the approval of the members, and six copies have been in steady circulation. A new public safety film "The Verdict," was produced during the year and six copies are now in circulation; a number of copies have been purchased by members and others. The list of motion picture films was revised and reprinted during the year.

The Safety Calendar increases in popularity as a medium for reaching the worker and his family, school children and the general public; 650,000 copies of the 1928 Calendar were distributed. The 1929 Calendar was ready for distribution June 1, 1928, and 160,000 copies have already been ordered by members. The information on the reverse side of the 1929 Calendar sheets refers to industrial safety and the primary relations of the worker to industry.

The 1927 Congress and Exhibit eclipsed every previous safety convention in attendance, number of speakers, exhibits and interest. The Transactions of that Congress were published in three volumes with complete alphabetical index. The sectional Transactions were also printed separately and the new method of distribution, allotting to each member one copy of the general meetings' report and the sectional report in which he is interested, seems to have met the full need of each member. The 1928 Congress program contains 80 pages.

National Safety Codes have continued to receive the careful attention of your committees and staff. Representatives of members of the Council are assisting in the formulation of 55 of the national standard codes. The Council is now sponsor or joint-sponsor for 14 codes. The Council continues to contribute toward the expenses of the American Engineering Standards Committee. Safety codes on Ladders and Stairs for Mines, and Underground Transportation in Metal Mines were approved during the year.

Editors of Employee Magazines have continued to receive a special service including original safety cartoons and accompanying stories. Other special material and assistance have been accorded members publishing employee magazines or contemplating the establishment of this type of publication. An attractive program has been prepared for the Annual Meeting of these editors at the New York Congress and the special feature in the NATIONAL SAFETY NEWS giving editorial advice to the publishers of employee magazines has been continued.

The Industrial Sections have been more active than ever. All of them have held Executive Committee meetings and have continued intensive service to the members within their groups. There has been an increase in the number of sections issuing monthly News-Letters. Many of the sectional committees have conducted energetic membership campaigns and performed invaluable service to fellow members by stimulating the furnishing of statistical data, material for posters and an interchange of safety experiences. There were twenty-four regional safety conferences during the year. Two thousand and eighty-nine plants contributed their accident records for 1927 and the tabulations have been printed in a pamphlet and distributed to the contributing members and others. Negotiations are in progress with the National Electric Light Association and the American Gas Association to contribute the statistical records of their members to the Council's annual report of its members. The officers and committees of the sections held a mid-year conference in New York City. The salaried secretary of the Petroleum Section has been continued through the generosity of the American Petroleum Institute. Three contests of members in the Paper and Pulp, Petroleum and Public Utilities Sections have been promoted and trophies will be awarded to the winners at the meetings of these sections at the New York Congress. Members interested in stopping accidents in the refrigeration business have organized a Refrigeration Section and will have their first meeting at the New York Congress. Two Petroleum Section Safe Practices pamphlets have been completed during the year, entitled "Pulling Oil Wells" and "Service Station Operation" also a Rubber Section Safe Practices pamphlet on "Compounding Materials" and thousands of copies have been distributed.

The ASSE-Engineering Section has participated in the regional safety conference as well as the Fifth Pacific Coast Safety Conference. Five research committees have been at work. The study of Wire Rope Attachments and Connections by two thesis students has been completed. Seventeen new sub-committees have been appointed to compile data on the best Safe Practices in sixteen industries. The two special laboratory research projects, Woodworking Circular Saws and Annealing of Chains, have made considerable progress and reports will be presented and discussed at the New York Congress. A report of the Committee on Elimination of Noise will also be presented and discussed. The amalgamation of the American Society of Safety Engineers and the Engineering Section, which took place at the Louisville Congress, has proved the wisdom of cooperation.

General Sections: In addition to the Health, Education, Engineering, Public Safety, Plant Publications and Employees' Benefit Associations, nineteen industrial sections have been rendering service to the members during the year.

Public Safety: The Advisory Committee of the Public Safety Division has held three meetings during the year. The Council has continued to assist the National Conference on Street and Highway Safety to accomplish its purposes by stimulating legislation based on the Uniform Motor Vehicle Code. The Model Municipal Traffic Ordinance, taken up by the Conference on our recommendation, has been completed and copies have been distributed. We have taken a leading part in cooperation with American Engineering Council, in standardizing traffic signs and signals. Much of the Council's activities for safety on the streets and in the home has been directed toward the formation and upbuilding of community safety organizations. The staff of the Public Safety Division has been increased during the year through the contribution by Mr. John D. Rockefeller, Jr., and an increase

in the appropriation made by the Council for public safety. The monthly bulletin, *Public Safety*, has been distributed to 7,000 public officials, automobile clubs, chambers of commerce and others, and the September issue will appear in a new and improved form. Twenty-six community traffic surveys have been completed to date. The 1928 statistical report, "Accident Facts—1928," was completed five months ahead of last year's report and distributed. An increasing number of communities and states are reporting to the Council their public accident experience and this information is being analyzed and interpreted for preventive purposes. The series of home safety addresses have been completely revised and reprinted. The Dash Board Card Service has been continued. Eight five-minute traffic lessons were printed in the NATIONAL SAFETY NEWS and later in pamphlet form. The result of a long study on the safety aspects of street parking eventuated in printing 3,000 copies of a pamphlet "Where Shall They Park?" The draft of a report on a study of "Traffic Work of Police Departments" is now in the hands of our Committee for approval. A monthly News-Letter has been started to public safety members. Many inquiries on public safety and traffic problems are answered daily. A committee has been appointed to investigate the relations of the individual to street and highway accidents and a laboratory investigation will be made under the auspices of our Personality and Public Accidents Committee. A summary of the Uniform Vehicle Code was printed recently and widely distributed. Posters and other material were contributed to the Boy Scouts for an overland trip. Special articles were contributed to many magazines and conferences were attended.

The Education Division has made progress through the leadership of Mr. Albert W. Whitney and the generous support of the National Bureau of Casualty and Surety Underwriters. Through the school magazine, *Safety Education*, field work, constant correspondence with many cities, attendance at educational conventions and other meetings and especially through the services of the executive secretary and field representatives the work has advanced. The school safety posters have been improved and a special service of a monthly poster and lesson leaflet distributed to 25,000 school rooms. A catalogue of sample posters was printed. Cooperation has been continued with other national bodies, such as the Playground and Recreation Association of America, the National Congress of Parents and Teachers and numerous others. This division was represented at the meeting of the National Education Association and other similar conferences.

Our Educational Publicity Service in the industrial and public safety fields has been considerably enlarged. Hundreds of news articles, special stories, seasonal safety lessons, photographs, charts and other propaganda have been published by numerous daily and weekly newspapers, magazines, trade, technical and class publications. Dispatches and feature stories have been cleared through the national news distributing agencies. Daily radio talks have been broadcast through a special service sent to more than 100 radio stations in different cities, at their request. Special material has been given to community councils and members for local publicity campaigns. Numerous periodicals have published editorials commending the Council's work. Our News Release Sheet Service is now sent to more than 1,500 newspapers and trade, technical and class periodicals. The Pictorial Mat Service is sent to 244 newspapers, on request. Among the national contests promoted during the year, were two "picture puzzle contests for boys and girls" and a "Safety photo contest."

Community Councils: Our intimate contacts by means of services to the community councils have been increased. There are now 57 affiliated local and state councils. These councils reach a population of 23,209,000. Twelve hundred volunteer committeemen are rendering service. The salaried staff aggregates 120 people and these councils are spending \$454,000 annually. The Council's service has been concentrated on existing councils but efforts are made to enlist the interest of other communities in local council activities. The director of this division of the Coun-

cil's service was transferred to the managership of the New York office and one of the field representatives was made the director of the division temporarily. The ten volume loose-leaf encyclopedia "Standard Practices for Community Safety Councils" has been kept up-to-date, and complete working standards have been continued for our field representatives. The monthly News-Letter of specific information to community council officers, with enclosures, has been continued. Two field representatives have given all of their time to the organization of and service to state and local safety councils. The second Summer Institute, lasting one week, was conducted for council managers and prospective managers. The Quarterly Conference of Managers was continued. The "Manual for Speakers" was revised, reprinted and distributed during the year. The service and experience of the National Safety Council and local councils on many recommended activities have been organized and prepared as memoranda.

External Relations: Friendly relations have been maintained with other institutions interested in safety, such as the American Red Cross, American Museum of Safety, Chamber of Commerce of the United States, Canadian Safety League, American Association of Industrial Physicians and Surgeons, the Safety Section of the American Railway Association, American Gas Association, the Safety Bureaus of the Insurance Companies, National Fire Protection Association, National Education Association, Joseph A. Holmes Safety Association, International Association of Chiefs of Police, Playground and Recreation Association of America, National Child Welfare Association, American Automobile Association, National Automobile Chamber of Commerce, Associated General Contractors of America, International Labor Conference of the League of Nations, the State and Federal Government Departments, as well as the American Engineering Standards Committee and the National Bureau of Casualty & Surety Underwriters. The Council has maintained its policy of cooperation with these institutions and has looked for opportunities for closer contacts with those leading the safety movement in their respective spheres of influence. A great many safety exhibits have been furnished on request for trade association meetings, etc.

General Activities: Many copies were distributed during the year of the completed report of the study of the health problem due to the use of spray guns. One thousand and sixty-eight bulletin boards have been distributed among members. A series of lectures and slides were completed for Engineering Colleges. A new pamphlet "Shop Safety" has been printed and is ready for distribution. Following considerable deliberation, a new service to members has been inaugurated through the publication of a new monthly magazine "The Safe Worker." Four issues have been distributed and the monthly circulation is now 125,000 copies. Another new service has been the printing in the NATIONAL SAFETY NEWS each month of suggested programs for safety committee meetings known as "Timely Topics for Safety Committees." A monthly News-Letter has been sent to members. Two new enterprises have been inaugurated to increase public interest in safety. One of these is the President's Resuscitation Medal. A number of these medals have already been awarded with appropriate ceremonies. Trophies were awarded to seven prize winners in a Steam Railroad Employees' Safety contest. A new industrial health division has been authorized and a director employed to commence work September 1. A branch office has been opened in New York City to assist with the Congress arrangements and to experiment with other services in the New York territory. The Council was represented at the quinquennial meeting of the International Labor Office, Geneva, Switzerland, and an elaborate exhibit was prepared for this meeting and left with the Labor Office for use at conventions in Europe. The new service department, to look after new members, has proved its value. The Council now prints all posters, as well as miscellaneous printing jobs. The new cost accounting and bookkeeping system has been adjusted and has now proved its worth. The entire offices of the Council have been rearranged and addi-

tional accommodations will be rented within a few weeks to take care of the increasing work of the headquarters. Personnel activities were formally inaugurated during the year, including committees on safety, fire protection, first aid, library service, exercise contest, and the bulletin board of the headquarters is changed every day.

Staff: The real staff of the National Safety Council is the membership, a large number of whom have contributed to the NATIONAL SAFETY NEWS, the safety poster service, the Safe Practices Pamphlets, the upbuilding and service of the sections, the Annual Congress, the film and slide collections, and all of the committees, both sectional and local. More than 1,000 persons now serve on these committees. The headquarters staff now numbers 82 persons. The leaders in this staff are:

William H. Cameron, Managing Director.
 Sidney J. Williams, Director, Public Safety Division.
 Julien H. Harvey, Manager, New York Office.
 Paul F. Stricker, Director, Territorial Councils Division.
 W. Dean Keefer, Director, Industrial Safety Division.
 Willard L. Wheeler, Director, Business Division.
 Arnold A. Mowbray, Director, Public Information Division.
 Clarence O. Sappington, M. D., Director, Industrial Health Division.
 Lee H. Gardiner, Director, Poster Division.
 Ernest W. Cern, Field Representative.
 Robert C. Haven, Field Representative.
 Carman T. Fish, Editor, NATIONAL SAFETY NEWS.
 Guy M. Briggs, Associate Editor, NATIONAL SAFETY NEWS.
 Stanley H. Kershaw, Safety Engineer, Industrial Safety Division.
 George E. Burns, Safety Engineer, Industrial Safety Division.
 Stewart J. Owen, Jr., Safety Engineer, Industrial Safety Division.
 Harry N. Blakeslee, Petroleum Representative.
 Earl J. Reeder, Supervising Engineer, Public Safety Division.
 James S. Baker, Engineer, Public Safety Division.
 Carroll E. Robb, Engineer, Public Safety Division.
 Reuben L. Forney, Statistician, Public Safety Division.
 Philip N. Bushnell, Director, Service Extension Division.
 Mrs. C. H. Miller, Advertising Department.
 Herbert H. Greenwald, Accountant.
 George O. Lindquist, Director, Publication Service Division.
 Gerauld E. Crandall, Director, Membership Service Department.
 Idabelle Stevenson, Executive Secretary, Education Division.
 Marian L. Telford, Field Secretary, Education Division.
 Florence Nelson, Editor, *Safety Education*, Education Division.
 Mary B. Day, Librarian.
 Mary M. Wells, Assistant Librarian.
 Myrtle H. Mollan, Chief Clerk.

Annual Report of the Treasurer

By G. T. HELLMUTH

Treasurer, National Safety Council, Chicago

COMPARATIVE BALANCE SHEET—JULY 31, 1928 AND 1927

Assets				
	As at July 31, 1928	As at July 31, 1927	Increase	Decrease
Current Assets:				
Cash	\$ 13,894.39	\$ 27,562.40		\$13,668.01
Investment Securities		19,833.75		19,833.75
Accounts and Notes Receivable	37,664.04	27,470.61	\$10,193.43	
Advances to Staff	1,579.24		1,579.24	
Inventory of Supplies	7,342.47	5,341.82	2,000.65	
Deposit with Postmaster	428.95	285.80	143.15	
Demand Loan Receivable	20,000.00		20,000.00	
			\$33,916.47	\$33,501.76
Total Current Assets	\$ 80,909.09	\$ 80,494.38	\$ 414.71	
National Safety Council Reserve				
Fund Investments	99,913.75	82,840.88	17,072.87	
Office Furniture and Equipment	7,810.14	15,512.94		7,702.80
Printing Department Machinery	7,050.00	9,930.54		2,880.54
Deferred Charges	20,785.44	25,009.94		4,224.50
			\$17,487.58	\$14,807.84
	\$216,468.42	\$213,788.68	\$ 2,679.74	
Liabilities				
	As at July 31, 1928	As at July 31, 1927	Increase	Decrease
Current Liabilities:				
Accounts Payable	\$ 4,733.06	\$ 290.84	\$ 4,442.22	
Current Accounts (Local Councils)	235.53	235.53		
			\$ 4,442.22	
Total Current Liabilities	\$ 4,968.59	\$ 526.37	\$ 4,442.22	
Accrued Expenses	315.00	240.00	75.00	
Deferred Income	20,672.78	28,557.76		7,884.98
Reserve for Future Service to Members	99,913.75	82,840.88	17,072.87	
	90,598.30	101,623.67		11,025.37
			\$21,590.09	\$18,910.35
	\$216,468.42	\$213,788.68	\$ 2,679.74	

STATEMENT OF GROSS REVENUES AND EXPENDITURES

Fiscal Year Ending July 31, 1928

Gross Revenue

Membership Dues:

Active	\$263,811.66
Sales of Calendars, Pamphlets, Bulletins, Chauffeurs' Lessons and Miscellaneous Receipts	254,580.34
Contribution of National Bureau of Casualty and Surety Underwriters Toward Expense of Education Division.....	41,000.00
Education Division—Sundry Receipts.....	401.77
Public Safety Division—Contributions.....	54,057.77
Public Safety Division—Sundry Receipts.....	3,208.13
Gross Revenue, National Safety News, Advertising and Sales of Extra Copies (Dues from Council Members Not Included).....	40,520.28
Interest Earned (Bonds, Bank Balance, etc.).....	6,378.21
	\$663,958.16
Transfer from Reserve for Future Service to Members, Difference in Value of Investment Securities Sold and Securities Purchased.....	293.75
	\$664,251.91

Gross Expenditures and Disposition of Net Revenues

Annual Congress Expense.....	\$ 3,168.13
Annual Congress Exhibit	2,942.38
1927 Annual Congress Proceedings.....	17,120.71
Automobile Dash Cards.....	487.94
1928 Calendars	98,406.05
Chauffeurs' Lessons	87.20
Depreciation of Office Furniture and Equipment.....	13,660.42
Depreciation of Printing Department Machinery.....	3,207.23
Exchange	511.75
Territorial Councils and Field Work.....	39,030.34
General Bulletins	16,181.71
General Office Expense.....	6,469.53
Library Expense	794.34
Membership Solicitation Expense.....	13,388.05
Miscellaneous Publication Expense.....	3,550.77
National Safety News.....	56,731.05
Office Supplies, Printing and Stationery.....	6,688.82
Postage	4,705.05
Publicity	5,087.06
Rent, Light and Power.....	26,722.06
Safe Practice Pamphlets.....	2,310.94
Salaries of Officers and Staff.....	164,276.55
Sundry Activities	55,976.52
Taxes and Insurance.....	397.98
Telephone and Telegraph.....	2,509.66
Traveling Expense, Administrative, Including National Committee Expense	5,490.25
Loss on Exchange of Equipment.....	133.80
Sectional Activity Expense, Including Posters	20,824.30

Education Expense from Contributions of National Bureau of Casualty and Surety Underwriters.....	41,000.00
Education Section—Sundry Disbursements.....	401.77
Public Safety Division.....	40,544.70
New York Office Expense.....	3,682.37
	\$657,910.66
Transfer to Surplus.....	6,341.25
	\$664,251.91

We have examined the above Comparative Balance Sheet of the National Safety Council as at July 31, 1928, and July 31, 1927, and the accompanying Statement of Revenues and Expenditures for the year ending July 31, 1928, and have compared them with the books and vouchers and have found them correct.

ARTHUR YOUNG COMPANY,

Chicago, Illinois, August 13, 1928.

Certified Public Accounts.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Annual Banquet

October 3, 1928

HOMER E. NIESZ, Presiding Officer
President, National Safety Council

HON. GROVER A. WHALEN, Toastmaster
Chairman, New York Mayor's Committee on Reception of
Distinguished Guests

The Annual Banquet of the Seventeenth Annual Safety Congress, held at the Hotel Commodore, New York City, was called to order at eight-twenty o'clock by the President, Homer E. Niesz, Manager, Industrial Relations, Commonwealth Edison Company, Chicago, Illinois.

PRESIDENT NIESZ: The starting of our program has been slightly delayed by the late return of some of our party who went out on a pleasure trip on a boat and remained sightseeing until long after dark, through no fault of their own.

My part of the program is very short, and I will proceed to do the things allotted to me and pass the leadership along into better hands.

I have a telegram from one of our associates in safety, which I would like to read:

"Montreal, Quebec.

"The members of the Board of Directors and the Permanent Committees of the Province of Quebec Safety League, in session at the regular fortnightly meeting, held last Wednesday, send you their sincere wishes for a successful and profitable Congress.

"It is hoped that the National Safety Council will hold one of its Congresses in Montreal at an early date."

The new Executive Committee will please take notice.

That telegram is signed, "J. C. Pettiguard, Chairman, Finance Committee and Acting Secretary."

I have also a telegram from Mr. R. B. Morley, General Manager, stating:

"Industrial Accident Prevention Association sends greetings to the Annual Congress of National Safety Council."

I have a telegram from remote Australia:

"Heartiest greetings from the youngest Safety Council in the world. We are with you in spirit and are sure to find inspiration in the work of the New York Congress for greater efforts in far-off Australia.

"Best wishes to you all, and may your tireless energies in this noble work be crowned with even greater achievements during the year to come.

"Horace J. Cook, Secretary,
National Safety Council of Australia."

There are many other telegrams and letters, but I shall not have the time to indulge on your patience to read them.

I have, however, a letter in which I know you will be vitally interested, because it is from the President of the United States:

"Nothing is of greater importance than the conservation of human life. Great strides to that end have been made by science, medicine, and surgery.

"For some years, earnest and intelligent efforts have been made to secure a greater degree of safety, but the annual toll from preventable accidents is appallingly high.

"Every well-directed movement to reduce this social and economic loss deserves the utmost encouragement from public officials and agencies and private individuals.

"It is my earnest hope that the Seventeenth Annual Safety Congress, to be held in New York City, on October 1 to 5, under the auspices of the National Safety Council, will be productive of still more effective organization, methods and enthusiasm, in the fight to increase the safety factor in modern existence.

"My greetings and best wishes go to you who will be assembled to consider these important matters.

(Signed) "CALVIN COOLIDGE."

I also hold in my hand a letter from the next President of the United States. Knowing that such a statement might well be challenged, I would like to say that I do not state this as a prophecy, but as an actual fact, because the letters I have are from the candidates of both the two main political parties.

The first letter reads:

"Your meeting serves a great human need. The universal establishment of safe conditions in our industrial plants, on our streets and highways, in our homes, is one of the highest responsibilities of public officials, of business executives, and of the individual citizen.

"Proper organization and proper measures to meet the growing complexities of modern life require changes of ideas and information. Through the Annual Safety Congress, which provides opportunity for searching discussion and record of opinion, the National Safety Congress renders a great contribution to these ends.

"I am glad to testify to the accomplishments of the safety movement. In industry the awakening of management to its responsibility for the safety of employees has not only saved human life but has had far-reaching effects in promoting a sound understanding between management and men.

"Without a doubt it has greatly contributed to the marked advance which recent years have witnessed in the producing industries of this country. Our railroads have done marvelous work in accident prevention. With the plans that have been worked out for improvement of street and highway traffic conditions, the attention now being given to the subject by official and organized bodies throughout the country and the encouraging results already attained in some localities, there is reason to expect a distinct and nation-wide improvement in this vital field.

"Modern science has given us many wonderful means for adding to the effectiveness of the individual and making life worth living. It is essential that we likewise apply modern methods for increasing the safety of our people. This you are doing and thereby greatly contributing to the well-being of the Nation.

(Signed) "HERBERT HOOVER."

The other letter reads:

"As Governor of the State of New York, I have been brought in contact with the accident prevention problem through the administration of the Compensation Act, Grade Crossing Elimination, the operation of the Bureau of Motor Vehicles, and in other ways.

"I have viewed with concern the steadily increasing number of accidents with their accompanying toll of life, injury, and destruction of property. The present situation, occurring in spite of the well-directed and earnest efforts of official and private agencies, demands our serious thought, our best plans for constructive action, and an intelligent, educational policy.

"The forthcoming Safety Congress, to be held in New York City, October 1 to 5, deserves the attention of our best minds. I believe that by directing public attention to the seriousness of the problem and by demonstrating that the majority of accidents can be prevented, the Congress is capable of doing much good.

"I sincerely hope that it will receive the attention it deserves. Loss of life and property through avoidable accidents is among the most regrettable of our national wastes.

"I send my best wishes for the success of the Congress.

(Signed) "ALFRED E. SMITH."

As the National Safety Council has already had its election, we know who our next President is.

I will read the names of the officers who have just been elected for the various offices in the Executive Committee of the National Safety Congress:

Vice President for Industrial Safety—E. W. Beck.
Vice President for Local Councils—George Opp.
Vice President for Public Safety—Miller McClintock.
Vice President for Public Relations—Charles E. Hill.
Vice President for Finance—C. E. Pettibone.
Vice President for Engineering—George E. Sanford.
Vice President for Membership—Arthur M. Tode.
Vice President for Education—Albert W. Whitney.
Vice President for Health—Prof. C. E. A. Winslow.
Treasurer—G. T. Hellmuth.
Managing Director—W. H. Cameron.

I have not given opportunity for any of the gentlemen to make a speech, much as they desire to do so. It remains, however, for the President-elect to give us his views, which will be those of the other officers who have been elected.

It gives me great pleasure to have as a successor for the coming year, as the head of your organization, one who has given many years of service to the Council, and who deserves the honors that have been tendered to him. I take great pleasure in presenting, Mr. Henry A. Reninger.

Address

By MAJOR HENRY A. RENINGER
Newly Elected President, National Safety Council

Having known the National Safety Council almost from its inception, its aims and ideals, I accept with a deep sense of responsibility the position of honor and trust as your president, appreciating fully the confidence your Executive Committee has imposed in me.

May I ask for your generous and constructive support toward all of the efforts and activities of the Council.

Placed on a firm foundation by our past presidents, executive committees and loyal workers, we have built up in a comparatively short time vast responsibilities. No longer are we promoting safety in industry only. The work now of the National Safety Council through its various sections, Local Safety Councils, committees, as well as individual personnel, touches every phase of life.

We are not only a National organization, but recognized internationally as the leader of the world in accident prevention work.

This summer I again visited the battlefields of France and was deeply impressed, after ten years of peace, with the hundreds of thousands of crosses in the poppy fields "over there." This was a terrible sacrifice of human life, but it was war.

Now, in time of peace, the annual toll in America due to accidents is 90,000 lives lost—an unnecessary sacrifice. After the experience of educating and training men for war, what a great satisfaction and happiness we have today in educating men, not to kill, but to save themselves and their fellowmen from needless destruction, pain and suffering!

The problem of the National Safety Council is the expansion of its present activities. Home, school and public safety programs must be more fully developed. This can only be accomplished, however, by an increased membership and income and through the generosity of public spirited citizens.

Speaking for your officers, Executive Committee, Board of Directors and Council Staff, on whose shoulders rests the responsibility of this great movement, we accept it cheerfully, knowing that we have your hearty and loyal support, as well as the enthusiastic cooperation of the thousands of other safety workers throughout the country, whose influence is felt in their own communities.

After these ten years in active safety work, let me assert there is no better use we can make of our lives than to dedicate them to the great cause of Universal Safety.

As your president for the coming year, it will be my endeavor to give you the best I have, gladly, knowing that I have you all with me in active help to make Safety understood and appreciated throughout our country—to carry on the noblest task that can be given to any man or woman—the saving of human life.

PRESIDENT NIESZ: Now it becomes my pleasant duty to turn the meeting over to the Toastmaster, who will conduct the affairs of this gathering from this time on.

The gentleman who will preside for you is well known in both public and business life. If I am correctly informed, he was secretary to Mayor Hylan more than ten years ago. He has served as commissioner of New York's Department of Plant and Structures, chairman of the Board of Purchases for New York City, and member of the New York-New Jersey Tunnel Commission. His regular job is general manager of the store of John Wanamaker, an institution which is modestly admitted, by its advertising manager, to be the greatest merchandising establishment in the world.

Among his other duties, our Toastmaster has been acting in the official capacity of chairman of New York's Committee on Reception to Distinguished Guests, and I know of no guests, as distinguished as those whom he has received have been, who are entitled to receive his attention more than this gathering of safety women and safety men.

I have the honor of introducing to you, Grover A. Whalen.

(Toastmaster Whalen took the chair.)

TOASTMASTER WHALEN: After listening to that introduction, I am quite sure that you must be surprised at the object that you see before you.

There are certain statements in the President's remarks that I concur with absolutely, and one of them is that the institution that I have the great privilege of being general manager of, is the greatest merchandising organization in the world. Ladies, please take note. (A very distinguished guest here just said that I have left out nothing but the address.)

The pressure of time is rather great at the present moment, and although I should like to talk upon the subject of safety, in which we are all so intensely interested, I shall have to forego this pleasure because of the fact that one of the speakers finds it necessary to leave very shortly.

However, there are a few things that I have noticed in the "*National Safety Noise*" that I should speak about. There is a statement here which runs something like this:

"New York, undisputed main stem of the western hemisphere, inspiration of writers and desperation of reformers!"

Do you know why it is the desperation of reformers? Because we are so lily-white here in New York we need no reformers.

Then it comes along and states that it is the finest place in the country to visit—on an expense account. You could even come here on a budget account and get away with it.

I am very sorry that His Honor, the Mayor, cannot be here personally to give you his own word of welcome, because there is no mayor in the world that could do it half as well as he can do it. And I am sure he would tell you, if he listened to what you read tonight from one of the telegrams, that he hopes that in your visit in New York you are finding just as great pleasure as you anticipate it will be in Montreal.

I am not going to lose very much more time in introducing the first number of the musical program. We have often heard of this young lady, who is familiar to us over the air, perhaps as familiar as anybody else in the country.

It gives me great pleasure to present, Miss Gladys Rice.

(Miss Gladys Rice, Prima Donna of "Roxy's Gang," sang two songs.)

TOASTMASTER WHALEN: I am sure we all enjoyed Miss Rice's rendition of those beautiful songs, and we wish to thank her for coming here.

The next speaker is a very distinguished gentleman, whom you all know. He is a man who is known very favorably throughout the country. We in New York are distinctly proud of him, because he represents a great people, and in the representation of those people, he has always found it possible to be a great citizen.

It gives me great pleasure to present to you a distinguished orator, a leader of his race, and one of the leading rabbis of the City of New York, Rabbi Stephen S. Wise.

Address

By RABBI STEPHEN S. WISE
Free Synagogue, New York City

I am rather doubtful of some of the things that have just been said by my friend, the Hon. Grover Whalen, in the light of the statement in your program:

"Grover, we are with you and ready to laugh at anything. Next we shall hear Rabbi Wise."

Mr. Chairman, Mr. Toastmaster, if this is a National Safety Council, my question is whether, if the next convention or congress of this body meets in Montreal, it will be safe for the Scotch?

I have fared rather unevenly tonight. On my way to this Congress, in the company of one of your officers, we were nearly wrecked in our taxicab. One of the waiters deposited most of the contents of the soup tureen on the back of my coat. And Mr. Whalen, in one of his friendly gestures, toward the end, placed the contents of his demi-tasse in my lap.

I was reminded of an experience that befell me some years ago. During the term of the incumbency of office of your distinguished chief, I was motoring, after a Sunday service, up to Pleasantville. You know, New Yorkers will hardly believe there is any place near this city which is a "pleasant ville."

I had to get there, make a speech at a luncheon, motor to Harmon and then take a train to Chicago. We had a chauffeur, sent by Mr. Lewisson, a very good chauffeur—but he ought to be the life president of the National Safety Council.

We motored at the rate of about twelve miles an hour, until I said to him: "Now see here, I want a bite of lunch, Mrs. Wise and I have got to get to the meeting, motor to Harmon, and get a train."

Well he is a Belgian, and my French is Parisian, and he couldn't understand me. Finally I said, "Look here! I know the police. Move!" Well, we moved.

He was going quietly along at the rate of about forty-five miles an hour, when we were hailed by a mercury on a motorcycle. Our chauffeur was thoroughly frightened. I said, "Just keep your seat."

I stepped out of the seat and said, "Thank you, Officer. I am very glad you stopped me. I was hoping an officer would, because I have got to go to Pleasantville. I am Rabbi Wise, and I want someone to take us along a little faster."

He said, "Certainly, Rabbi, step right along."

He motored with us for about ten or twelve miles. We never went faster than fifty miles an hour, and then he left with, "Thank you."

A few days later I met Commissioner Enright and told him the story, and he said, "Well, Rabbi, you were lucky. That must have been one of my Irish cops you put that over. You couldn't put that over on a Jewish cop."

What relation has a minister of religion to a safety movement? Well through religion, we priests of all churches try to assure safety hereafter. It is a great joy to be here tonight and to have part in this program, arranged under the inspiration of the National Safety Council.

Will you forgive me, if I say that I, a Jew and a Jewish teacher, have a peculiar right to occupy myself with and to engage your attention in, the problem of National Safety? For after all, the safety movement at its highest grows out of a conception which my fathers contributed to the spiritual treasury of humankind—the conception that human life is sacred, that human life is holy and inviolable, not only the immortal spirit of man, but the mortal vestment with which that immortal spirit for a time clothes itself.

The great movement on behalf of security and inviolability of life and person for humankind began with the teaching of my fathers, which has become a teaching of Israel and Christianity alike. Man was made in the image of God. "In the likeness of God, created He him." Well, that meant for all time that human life might not be violated. But there was something holy and of abiding sanctity in human life which it was the business of those who presided over the welfare of men, whether as kings upon thrones or as masters of industry, to safeguard, to cherish, and to conserve.

My own interest, as a churchman, in the National Safety Movement is bound up, not chiefly, nor least of all solely, I confess, with the economic aspect of the economic gains which are interwoven with the results of your great work. I venture to say that you represent a great moral and spiritual movement in two senses of the term, or rather upon two grounds. For one thing, you are teaching the irrevealable and unalterable truth of human responsibility

"Am I my brother's keeper?" was asked not by a man, but by a slayer of men—

the first destroyer of his fellowman, skeptically, cynically, fearfully asked, yes, and guiltily asked—"Am I my brother's keeper?"

The answer of your great movement is: I am my brother's keeper. I am to be co-guardian of my brother's life and will be as long as, and as far as, I have the power to safeguard and to make for the conservation of his life and welfare.

I would like to have emblazoned as the slogan of the great campaign you are waging, not the query, "Am I my brother's keeper?", but, "I am my brother's keeper." And I become my brother's keeper only when I recognize God made man in his holy and immortal image; and again when I accept the eternal truth that humans are brothers as well as fellow-keepers, brothers as well as employers and employees—brothers first and after that workers, employers, masters, employees, participants in the mighty creative industry of American life.

Gentlemen, there is one word that I want to say tonight, one word that I would have some of you, perchance, remember when I shall have done.

A few years ago, there was a great deal of cynical contempt, uttered oftentimes, and felt most of the time, touching the safety-first movement as if the safety movement meant that safety was to be the one, sole, dominant concern of the human race.

I should hate, I should loath, I should be ashamed to be seated at this board of the National Safety Council, if you declared that the great end of human life is safety, if the implication was that the business of man is to avoid taking risks.

But, after all, you and I know that life is full of risks, of human perils, which are unavoidable, of material dangers, of moral adventures, of spiritual temptations; life is full to overflowing with risks of every kind. And I have the right as an individual to take a risk, I have the right to incur perils. Ah, it is one thing to incur a peril or to take a risk, and it is another to inflict a risk. I have got the right to take every risk I choose within certain human limitations, provided that I have no responsibilities and moral and material liabilities; but it is another thing for me, as a master of industry, to decide that you, my employee, shall be subject to risks, risks which are avoidable, risks which are reducible.

I stress that word "reducible" for you know, gentlemen, better than I that every year the irreducible minimum is reduced further and further. You have found that. There is nothing that is as flexible as the irreducible.

And I repeat, Mr. Chairman ere I have done: I have the right to take risks. Everyone of us has, as individuals. But after all we are not individuals, save in a very small, limited area of our lives. We are social beings. Aristotle said: "Man is a political animal." He meant, of course, that men live, must dwell, together, and the richer and fuller life becomes the closer when knit together.

Shall we suffer a fellowman to endure, to be undone, to be overwhelmed by any risk which we may reduce or lessen or obliterate? That is the great problem of the National Safety Council.

Mr. Chairman, I come to you tonight, without authorization from the great heads of the churches of America. I can't speak for the heads of the Protestant and the Catholic Churches. But after all, I do speak for a great church, great not in its number of its communicants, but great in the influence, moral and spiritual, which it has exercised upon the human race. And in the name of that Testament which is cherished by Christian and by Jew alike, I tell you that you are performing a great moral and spiritual work. It is a work that has the sanction and the blessing of every church, including my own.

I come to you tonight, as it were, not to speak to you, but to invoke a benediction upon your great human-saving, ethical, spiritual task—national safety, safety for every American; safety, blessing for your and my America.

TOASTMASTER WHALEN: We must feel particularly pleased after listening to the address of Dr. Wise. I was sure that you wouldn't be disappointed in what he

had to say or in how he said it. He does so well always that we in New York look upon him as one of the greatest orators of all time.

The City Service Cavaliers will now entertain us.

(The City Service Cavaliers sang a number of songs.)

The "Three Cheers" will now present us with their original song, "Safety."

(The "Three Cheers" sang the Safety Song.)

TOASTMASTER WHALEN: It is rather difficult for any speaker to follow Dr. Wise, and I hope that you will extend to the next speaker the sympathy that he deserves in following such a distinguished speaker.

Your committee has been very fortunate to invite tonight a stranger, with whose presence you did not expect to be honored. We have here a former diplomatic officer of the Government of Norway, and he has now associated himself as the Port Captain of the Norwegian Steamship Company. He has given a great deal of his life and service to the work of safety, and he comes here with a full knowledge of the subject.

I ask you, if his English is not as good as you would hope it would be, that you be patient with him during his address.

Captain Olsen Talks

By TIMOTHY DAVID LINES

New York City

I did not think, when your very handsome Toastmaster asked me to come to this dinner, that I would have to speak. But I fooled him, I came prepared.

When your President introduced Mr. Whalen, he said he was to be toastmaster, and that he was personally known from one end of the land to another, and so on. But did you ever try to get tickets for any celebration here? No? Then I will tell you what they have to go through.

I have some Norwegian friends, and some Swedish friends too—of course, we don't get along together, but we tolerate each other! They said to me, "Captain, we would like to get a couple of tickets for the Lindbergh celebration."

I said, "All right. How do you get them?"

They said, "You have to go to the City Hall."

So I went to the City Hall, and I said to the man at the door, "Where can I get a couple of tickets for the Lindbergh celebration?"

He said, "You don't get them here. You have to go to the Municipal Building."

I went to the Municipal Building, and I said to the fellow there, "Could I have a couple of tickets for the Lindbergh celebration?"

He said, "You don't get them here. You have to go to the eighth floor of the Automotive Building."

So I went to the eighth floor of the Automotive Building and I said to the little lady there, "Could I see Mr. Whalen?"

She said, "What is your name?"

I said, "Captain Olsen."

She said, "Will you take a seat there?"

I said, "All right," and I sat down.

About thirty minutes later a great, big fat fellow came in there and said, "Is Grover in?"

She said, "Yes, go right in."

About half an hour later this man Grover came out and said, "Do you want to see me?" He was smiling, you know: and I told him who I was. He said, "I have no tickets. You go down to the Mayor's Committee."

I went down again to the Mayor's Committee, and I said to the fellow, "Are there any reservations for Captain Olsen?"

He said, "What do you think I am, an Indian?"

After about three or four days, I finally got two tickets—way out west some place! But I am not through with him yet. I have something else I want to tell. I want to tell you about what he did to me about three Sundays ago.

He said to me, "Captain Olsen, would you like to see a baseball game?"

Can you imagine a Norwegian going to a baseball game?

I said, "All right, I will go with you."

He took me up to the Yankee Stadium. I said, "What are you going to do here?"

He said, "You come in with me and watch the game. It is baseball."

I said, "Oh," and I went in and got in a little box, as I thought it was. And there was a hole and fellows were going down there.

I said, "What are they going to do?"

He said, "You watch for a few minutes."

I watched them throwing a ball here and catching it and knocking it with sticks and everything else. One fellow in particular had a padded chest and a mask on his face. There was a fellow with a megaphone who kept hollering.

There was a man behind me who kept pestering me and saying, "Captain!"

I said, "How do you know me?"

"Oh, I know you," he said, "I will bet you eight to five the Americans win."

I said, "I don't want to bet. You leave me alone."

Anyhow, after a while the players got out. One was up on the hill and there was one, two, three,—one here, and one there, and one, two, three,—and one there. (Indicating.) They had sticks in their hands and would take them and swing them this way and hit the foot there and hit the foot here. (Demonstrating.)

One fellow had a stick in his hand, and another fellow was squatted down (this way) catching. A fellow was throwing the ball and the man standing with the bat started arguing with the fellow.

Then I had to be bothered again. This fellow said, "I'll bet you eight to five they stay there."

Then another fellow came up, and it was Babe Ruth, a big fellow. He took a stick and struck the ball—Bang! you could hear him way from where I was sitting. He hit the little white thing, and if I may say it, he knocked it a hell of a ways.

It was way out in the field. A lot of fellows were sitting there, and everybody was fighting for that thing. Then another fellow got up, and he hit the ball, and he was running down. I said to Mr. Whalen, "What did he do?"

Mr. Whalen said, "He chased him home."

I told you I would get back at him, didn't I?

When I asked Mr. Whalen what this banquet was all about, he said it was a National Safety Council. Well I want to tell you, ladies and gentlemen, and distinguished guests here, that we, too, in Norway, are interested in safety and accident prevention.

For a long time the Safety Committee in Christiania, Norway, was in a quandary on account of automobile accidents. Everybody would come up with a device and say, "This will do," or, "That will do." One fellow wanted a fender bumper. It is placed on the fender of the car. Then the automobile driver can just drive down a big boulevard 40 or 50 miles an hour. Just picture this. A pedestrian walks across the street. The automobile hits him and stops instantly. Both of us reach out, grab hold of the body and lift it off the ground, without hurting the pedestrian one bit, and preventing a serious accident. That has been in use for the last three months in Norway.

One fellow, Captain Lawson—I spoke about the Swedes before—tried to invent an automobile with wings on the side that when you came to a bad part in the road

you could press a lever and lift the automobile up and go over the bad spot in the road.

"About two weeks ago, I happened to walk along Fifth Avenue at 42nd Street, and I never saw such chaos in my life and such a deplorable condition in traffic. My friend who was with me said, 'Don't worry, Captain. Don't you know, there are fifty-three people killed at this corner every day?'"

I said, "Why should the people in New York mind if they have fifty-three people killed every day? They have plenty more to kill."

If you will listen to me for just two or three minutes, I will tell you what we have in Christiansand. We have viaducts at our busy streets so that the pedestrian does not have to cross the street in the traffic. It is much safer. It is physically impossible for anybody to be hurt that way.

New York has plenty of money, why don't they try that?

Then we have the subway platform. We have what you would call a railing or fence. You just picture the subway across the platform, where people will be forced over on the tracks. Then there will be people going across the tracks and committing suicide.

The engineer is held responsible for everything. When his train is coming to the signal "stop" he gets out of the train, goes to the pillar, turns it, and down comes the railing, preventing anybody from going on the track. In the meantime, the guards of the trains open the doors to let the people in and out. Then when the car is crowded, he goes to the door again and locks it and up it comes. The door is locked, and he continues on to the next station, and thereby insures safety.

I did not intend to talk so long, but you have been kind and courteous to me, and I wanted to be kind and courteous to you.

I want to say one word in conclusion. My name is Timothy David Lines, and I am born and bred in New York. I thank you.

TOASTMASTER WHALEN: I told you that you would need to extend sympathy to the speaker who has just concluded. I am sure you agree with me.

You will hear next from a man who is well known to you all. He is a pioneer and organizer in the safety movement. He comes to us as representative of a great railroad—that has done much in safety work.

And while we are on the question of railroads, we have with us tonight, the president of one of the largest railroads in the country, and I think we ought to have the pleasure of having him get up and just bow.

President Patrick Crowley of the New York Central Railroad!

(Mr. Crowley arose.)

Mr. Crowley is one of those modest individuals that it is very difficult to get out on public occasions. -I want to congratulate the Safety Council on bringing him to this banquet.

The pleasure of introducing the next speaker is one of great personal pride, because I feel that he has made a great contribution to humanity in working in the interests of preserving the man power of the nation. And when we find men and women gathered together, as we all are, in a movement of this kind, and we have the pleasure of hearing from a man who has made such a distinct contribution to this cause, it gives us all a great deal of pleasure. It is a particular privilege at this time to introduce to you, Mr. Isaiah Hale, Superintendent of Safety for the Santa Fe Railroad.

Address

By **ISAIAH HALE**

Safety Superintendent, Santa Fe Railroad, Topeka, Kansas

The invitation which accounts for my inconspicuous appearance on this program was for a "Practical Safety Talk." A school girl was once asked "What is a

turlough?" She said "A mule." In explanation of her rather unusual reply he it noted that her mind had reverted to a time when she saw a picture of a soldier riding a mule, over the title, "Off on a furlough." She was therefore logical. So while I shall try to be practical, I hope you may be logical, that you may glimpse my points even though they may be somewhat vague.

For unusual reasons I shall repeat at this time a number of things said on former occasions which a favored few of you have heard, but I hope may have long since forgotten. Two prominent Englishmen were once dining with friends, and one of them offended the other by falling asleep while his friend was telling one of his favorite stories. When the sleeper awoke the other reproached him for going to sleep. "I wasn't asleep," he said, "I only had my eyes closed, and I heard distinctly every word you said." "I'll bet you were asleep" said the offended man, "and that you can't repeat what I said." "I'll take that bet," said the drowsy one, and to prove he had not been asleep he repeated word for word the story the other man had told. "You win," said the story teller, and paid over the money. Then the other man said, "I really was asleep and didn't hear a word you said, but I know that at this time in the evening you always tell the same story."

The man who has Safety for his subject is fortunate in that a large proportion of his audience, wherever it may be, is likely to be interested in his proposition. That expression reminds me that a Black Hand Society once wrote a quite wealthy man and told him that in event of his failure to leave \$25,000 at a designated place and time, they would kidnap his wife. The letter, by mistake, was delivered to a very poor man whose name happened to be the same as that of the rich man. The poor man replied to the threatening letter by saying, "I haven't any money, but I am interested in your proposition."

When given this assignment I was asked for the subject of my talk. I've heard a text defined as "a minister's self-starter." If mine serves no other purpose than to get me away from the dock on my short cruise, it will have done all that can fairly be expected of it. Looking ahead over the time covered by the length of your cigar I imagine an analysis of my talk, at its close, will show it to be not unlike a modern woman's dress, in that it will have touched everything but covered nothing.

As a preface I would pay all possible honor to that handfull of men, many of whom honor us by their presence here tonight, who met in Milwaukee about eighteen years ago with more of a vision than reason to hope it might ever be realized. There was no band music, no parade, they went into Milwaukee unheralded and came away unsung, but during the few short hours of their conference they gave to the appalling human toll of accidents its first serious consideration, and out of whose deliberations has grown more than merely one of the greatest humanitarian movements of all times; there has come also a humanization and a harmonization of relations as between employer and employee never before dreamed of.

I would do homage too to *this* army of men and women, and countless others not here tonight, who have "carried on" and who, each year, have been able to drop by the wayside some of the trials and discouragements of former years, and many of whom have accomplished the all but impossible, in spite of the apathy of their own managements.

The question of greater safety as the solution of an industrial problem that has existed since one man first worked with another, has been approached from many sides, but too often from an angle that permitted the fitful force to ricochet off into space without registering.

The Safety Movement, so called, has more than once been launched by a ranking administrative officer returning to his office from lunch, and saying to his assistant, "I lunched today with Smith, of Smith & Co., who tells me they have a safety organization. I think we ought to have one, too; we have a lot of injuries among

our men, and some of them must hear like the deuce. So I wish you'd go out and tell everybody to get up on their toes; that henceforth we are not going to have any more injuries. If we need to clean up a bit or even to put guards on a few machines here and there, I am willing to do that, but we do not want to do anything we can get along without."

Thus the "movement" is launched, and since my time is short, thus it died, or is slowly dying, because it never had the managerial interest and direction which alone would have made it a success.

Under the common law it is the duty of employers to provide a reasonably safe place in which men are to work, to provide reasonably safe tools, and to provide reasonably safe and competent fellow-workmen. Of far greater importance than any or all of these is the moral obligation of the employer to acquaint his employees with the known hazards of their employment, a long and arduous undertaking at the best, and one predestined to failure unless the directing officer is unafraid and unashamed to go before his men, at intervals, and earnestly and convincingly assure them of his wish to go hand in hand with them in working out their objective. Contrary to a too common belief, safety is not something that will ever boil up from the bottom; if it ever permeates the fiber of an organization it must percolate down from the top.

An other angle to the problem, a very important one, and one which, in turn, must have intelligent, forceful and continual supervision, is supervision by supervisors. Safety more than any other one policy sponsored by a management must rely on supervision, not alone for its advancement but for its very life. It is a hackneyed phrase, but no less true, that "a foreman is the key man." Not only what a foreman may say about safety in the presence of his men, but more important still, the manner in which he says it, will either breathe life into the Cause or bring about its early and complete collapse.

Too many supervisors think their principal, their only function, is to watch their men, to stand guard over them. One of the first duties of a foreman should be to feel and show an interest in their men. In our organization, for years I've daily told our supervisors that their first and most important duty is to give their men a right viewpoint on their relationship with the Santa Fe Railway. Failing to accomplish this after conscientious effort, to get rid of the man who cannot or will not tune in on the "home station;" or failing to accomplish it in any number of cases, to seriously take stock and see what is wrong with himself as a supervisor.

Quite as much as it is the duty of a foreman to teach a man how to hold a hammer or dump a wheel-barrow, it should be both his duty and his privilege to give his men higher ideals, to teach them not only their individual responsibilities but give them a fair understanding and appreciation of the rights of other men; and teach them to see in their jobs the best friend they have in the world, the friend that does more for them than all other friends combined;

To daily drive home with their men the thought that this idea of doing only what is necessary to get by is never doing quite enough;

That the secret of real happiness or success in life is not found in doing what one likes to do, but rather in liking what one has to do;

That it isn't enough for a man to be merely always doing something; he must be taught the advantage, to himself, of actually getting something done;

That two-thirds of promotion consists of motion, and that it is just as true in the accomplishment of promotion as in the spelling of it;

That a man should look upon his job as a stepping stone for today and not as a resting place for tomorrow;

That the limitations of a man are not the things he wants to do but can't, but rather the things he should do but doesn't do because of indifference or laziness, and if I might interpolate a personal observation right here it would be that the

greatest, and in many cases the only *difference* between a success and a failure in life, is *indifference*;

That no man can fairly expect recognition or advancement until he has earned it, but having earned it such recognition will come to every man;

That while it is easy enough for a small man to make a big job shrink, it takes a big man to make a small job grow, and there is not today in your organization or mine a single job that might not be made a bigger and a better job than it is, and that, too, by the very man who holds it, if he only had gumption enough to see it.

In this connection I am not at all in sympathy with much that is spoken today from the platform, from the pages of magazines and the daily press, that all men may be supermen; that what one man has done any or all men can do. To me it seems absurd to say that what some rare genius, Edison, Steinmetz or Marconi, has done, I might have done, even with diligent study. I believe much harm is done by spreading such fallacious ideas because occasionally some fellow will conscientiously try and fail, and following his failure will come a disappointment and a discouragement that cheat him out of the reasonable success that might have been within his reach. The point I would make is, there are few, if any, men who might not do more work and do it better than they are now doing it, if willing to pay the price of honest effort, and certainly no one is in quite so advantageous a position as a foreman to sell ambition to his men. The same feet that have carried me, and many of you, only to the top of a lowly hill, would have taken us to the top of a high mountain if we had turned in that direction and kept saying to them "Go on and on."

I no longer talk safety to our men in the way I did years ago, when I went about saying "Don't do that;" to the limit of my humble ability I am trying to boost the morale of our men; I am trying to increase their loyalty to their government, to themselves and to their job; I am trying to put into their minds and hearts an ambition to be somebody and do something worth while; and may I remind you that if *that* can be done, it will no longer be necessary to watch or stand guard over men.

Foremen are seldom or never eye-witnesses to injuries, but a far more important fact is they too often fail to see an injury in the making; they fail to see a workman doing something today which their experience ought to tell them will, if repeated, result in an injury on some tomorrow, and stop the practice before and not after an injury occurs. Following this thought, so firmly am I convinced that it is the exceptional supervisor who has even a reasonably clear understanding and appreciation of the responsibilities and privileges of foremanship, that I imagine when they were called into the "inside office" and told they were to be made a foreman, while some of them knew they had been struck by Opportunity, they did not know just where or why.

Later, and still in a daze and wondering what it was all about, I imagine they turned to a dictionary to learn what a "foreman" really is. Among other things they found a foreman is an "overseer;" all very interesting, but what is an overseer? Turning a few pages they found an overseer is one who oversees; following their quest they found that one who oversees is one who overlooks, and so from that day to this they have been overlooking things they ought to have seen.

Safety is not something a safety worker can ram down a workman's throat; if he could, getting it that way would not do the man any good. A workman must be taught by his foreman to want to believe in it; his conversion, if or when it comes, will come when he has had put into his heart the wish and the determination to pick up the banner as an honest-to-God crusader because he believes, in principle, it is right and just.

The one obstacle which more than another has impeded progress along safety lines is the disinclination on part of so many men to give the subject careful

enough thought and study to intelligently make up their own minds if worthy of their support—and therein lies the *real* obstacle, the constitutional objection on part of so many men to any effort so laborious as thinking seriously about anything. The remedy lies in the beneficent influence of their supervisors.

That reminds me that one of the problems of every large organization is the man who knows a lot of things that are not so. My observation on that is that the thing a man is down on is generally something he is not up on, and that would seem to open a wide and expansive field for such educational efforts on the part of a foreman as seems necessary. Failing to get constructive help from his employer, the workman often turns to the bally-hooers who are ever ready to tell him of the wrongs being done him; of his rights, "his inalienable and God-given rights as a liberty loving American citizen" * * that "all men are born equal," and a lot of rot of that sort. As for rights, *no man has any*, not until he has proven himself worthy; then, the sky is high and the horizon is wide. It may be true that all men are born equal, but men need to be taught it is their own fault if they remain that way. Every large organization has its bally-hooers, men who are sowing dissention and dissatisfaction; it should not be difficult to locate them because the man who is *against* something always talks louder than the man who is *for* something. The good of the service demands their early identification and conversion, or their removal from the service, because no man can think crooked and work straight.

I spoke awhile ago about the substantial friendship which ought to exist between a man and his job; I believe every workman should be taught to calmly and intelligently appraise his job in terms of its earning capacity. For instance, the man who is earning \$150 per month should be taught to realize he is earning 6 per cent on \$30,000; the workman earning \$200 per month, that he is earning 6 per cent on \$40,000, which is their employer's capital investment in them. Few men are as proud of their job or guard it as carefully as they would its equivalent in savings, yet the job is worth infinitely more—for several reasons. First, if a man is a square shooter, no one will ever take his job away from him, yet by some "dirty work at the cross-roads" he might be flim-flammed out of his money tomorrow; second, the workman who is earning \$150, for instance, can make it a \$200 job in a fractional part of the time it would take him to increase his savings from \$30,000 to \$40,000. Again, it is the supervisor who must teach his men these things if they are ever to know them. The most worthy of human achievements, what ought to be the greatest of human desires, is to be useful, and one needs not be a genius to be useful, because industry, faithfulness, integrity and knowledge of one's business will make a winner even out of an ordinary man, and the ordinary man must be taught to believe this.

It is high time managements began to realize the different levels of intelligence in men, and be more discriminating in taking new men into their service. Out of the 1,700,000 young Americans given a psychological test during the World's War, 70 per cent of them were given the mental rating of a child fourteen years of age, and 45 per cent of that number, or 31½ per cent of the entire total, were rated by our government experts as "morons," a moron being defined as "a person not mentally capable of complete self guidance." A man applies to one of you, looking for work; you take his chest expansion and note his back-muscle development, and if it compares favorably with a prize-fighter or wrestler you hire him even though he has not the brain capacity of a jumbo peanut. On the other hand, if you were considering the purchase of a piece of machinery at \$25,000 or \$30,000 there would be no end of conferences and analyses to make sure the new machine was worth its cost.

At intervals some chap tells me that a workman without influence "has no chance," not seeming to understand that a third person's "pull" is a puny thing as compared to a man's own inherent *push*; the poor nit-wits do not seem to realize

that the less one has the more there is to get; and the more there is to get, certainly the easier it ought to be to get something.

Managements need to remind supervisors and supervisors need to tell workmen that there are in this country 750,000 major executive positions paying up to \$100,000 per year, that there is a 10 per cent turn-over, 75,000 being vacated and filled annually; that 53 per cent of the pay-envelopes in America are for less than \$25 per week, and that out of our 42,000,000 wage-earners less than 4 per cent earn more than \$4,000 per year; and tell them too that only the fit survive.

There is too much self-complacency; it isn't to our credit that many of us have stuck in one job a long term of years; it is high time we realized that if we had been much account we would have been promoted a long time ago.

Roger W. Babson, recognized as an eminent authority on the subjects he discusses, said not long ago: "Only one man in fifty in America ever thinks; only one in five hundred ever originates anything, even an idea, that is worth anything to himself or anybody else; and at the age of fifty years, 53½ per cent of the male population of America are down and out, have quit cold, and are living on the bounty of relatives, friends or some charitable organization." Rather a sad commentary, I would say, on our much vaunted civilization and intelligence when we are told that at fifty years, at what ought to be the best years in any man's life, 53½ per cent of us are through. Do you know why these men have quit? They've quit, most of them, because they never tried; they never tried because they never cared, and they never cared because they never had the right sort of influence from men like you. Management involves responsibilities not always recognized, and direct supervision carries with it a stewardship of which only the exceptional supervisor has any conception whatever.

I would have you supervisors, be your title manager or straw-boss, go back to the job and be a supervisor, a leader of men in fact as well as name; I would have you earn, and earning get, and getting, hold the respect, the confidence and the friendship of your men; I would have you find them coming to you with their petty personal problems, that some day you may feel the cockles of your heart warmed by that thrill—comparable to which there is no other—the thrill that comes from reaching a helping hand to some poor devil who is in a rut, who needs nothing (and down in his heart wants nothing) quite so much as a pat on the back, a kindly word of encouragement from his boss, that he now too seldom gets.

Quoting something Van Ambergh, "The Silent Partner" once said: "The passing of an impressive number of summers and an equal number of winters have taught me a lot of things; they've taught me that other people treat me just about as I treat them; taught me that when I go out looking for trouble I always find it, and taught me too that the 'Golden Rule' is the sum total of all wisdom for getting on with the world." The Golden Rule is a biblical term; the American for it is "a square deal," and I want to say to you, Mr. Leader-of-Men, with all the emphasis I can give, it isn't the Golden Rule nor is it a square deal when we take flesh and blood and make out of it nothing more than a commodity at an agreed price per hour or day.

Some one has said that "too much of this world is run on the theory that one does not need road manners if one drives a five-ton truck," and by the same token there are far too many men in positions of authority who have yet to see any reason why they should be considerate of and kind to others, forgetting (if they ever knew) that kindness is a language even the deaf can hear and the dumb can understand. The manager or foreman who fabricates steel, builds or runs a railroad, makes cement, pumps oil or refines it, or does anything else, who does not undertake the satisfying and ennobling task of building characters among his men, presents a mighty sorry spectacle as a leader of men. I do not often turn to verse but one of Edgar Guest's seems apropos right here:

"Let me be a little kinder,
 Let me be a little blinder
 To the faults of those about me.
 Let me praise a little more,
 Let me be, when I am weary,
 Just a little bit more cheery,
 Let me serve a little better
 Those that I am striving for.
 Let me be a little braver;
 When temptation bids me waver
 Let me strive a little harder
 To be all that I should be.
 Let me be a little meeker
 With my brother who is weaker;
 Let me think more of my neighbor
 And a little less of me."

The wonderful appeal of the American Red Cross lies in their humanitarian service. They follow disaster everywhere; they bury the dead and comfort the bereaved, they nurse the sick, feed the hungry and clothe the naked. Though less spectacular, when properly understood organized safety has no less an appeal; its definite purpose is to set up and maintain such an orderly process that disasters, and their consequences, shall no longer be known in industries.

We hear much now-a-days about service; service is only a modern symbol for countless human virtues known to every generation since the beginning of time; service is a mother's solicitude for her children; service, in the long hours of toil our parents gave for us, was the hardships endured uncomplainingly, all these and a million others which only the Recording Angel will ever number; but service is the one thing which every man and every woman must put into his life and his job if he ever expects to take anything worth while out of either of them.

Success in life is not possible except through service; there is no open gateway to success; if it is ever reached one must climb the barrier, not often an easy thing to do. The great tragedy of life is that the multitudes go wandering through the years looking for a breach in the wall, for an easy way through, only to lie down at the end of the trail, weary and disappointed.

John Burroughs once said: "a man's life may stagnate as literally as water may stagnate, but just as motion and direction is the remedy in one case, so is purpose and activity the remedy in the other."

In every activity, catastrophe is only a step or two behind integrity and honesty of purpose, and if you will go with me and look under the hood of any failure stranded along Life's highway, we will find there unmistakable evidence that the man had used a substitute for common honesty and hoped to get by with it; yet today we all know any number of men who are dishonest—they are dishonest with themselves!

ADJOURNMENT

**SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL**



A B C Session

October 4, 1928

R. F. THALNER, Chairman
Safety Director, Buick Motor Company, Flint, Mich

The A B C Session of the Seventeenth Annual Safety Congress was called to order at two o'clock by the chairman, R. F. Thalner, Safety Director, Buick Motor Co., Flint, Michigan.

CHAIRMAN THALNER: Gentlemen, we have two subjects this afternoon which are to be discussed, and those two subjects are to be treated from two different viewpoints. You men who are safety directors and engineers, you men who are foremen, plant superintendents and managers, have always been told about the two divisions of accident prevention work, the mechanical side and the educational side. Both of these viewpoints will be discussed today at this meeting.

The first one, The Part Mechanical Safeguarding Plays, will be discussed by a man who is very well fitted to undertake that work. I know that you are all going to enjoy listening to our first speaker, Mr. David S. Beyer, chief engineer, Liberty Mutual Insurance Company, Boston, Massachusetts. Without any further remarks, I present to you Mr. David Beyer!

The Part Mechanical Safeguarding Plays

By DAVID S. BEYER
Vice-President and Chief Engineer, Liberty Mutual Insurance Company,
Boston

The comment that we live in a mechanical age has been made so often that it would be bromidic to repeat it here. It is scarcely an exaggeration, although it may be a slight mixing of metaphor, to say of the nineteenth century infant that "the hand that rocks his cradle" is an electric motor, and that the stork which brings him into the world has rubber shoes and a fifty horse power engine. Everywhere we turn, in the home, on the street or in the office or factory, we are confronted with mechanical devices and so many wonders have been demonstrated before our eyes in recent years that our credulity is no longer taxed by any mechanical miracle.

When the laboratory of one of our large electrical concerns recently announced that they had produced a "Robot" or a mechanical man, who at his master's spoken orders would answer the telephone or turn off the electric lights, the story was widely printed in our newspapers but accepted by the public without much question. I know it is true for I have before me a picture of—shall I say, him, her, or it?

You will remember in the popular play which pictured the development of the

Robot, the mechanical servants finally became so powerful that they revolted and destroyed their masters. It is accordingly quite appropriate that we should turn on the spotlight and see whether these new servants are indeed being properly trained in the way of obedience and discipline, or are they getting out of hand and becoming a menace to our safety?

Of the great efficiency of the mechanical helper there can be no doubt. Most of us can recall the little old grandmother who knit our socks a generation ago. When we are told that one operator in a modern factory can turn out as many pairs of socks as 6,000 such grandmothers,* we realize that the machine is here to stay and the growing use of machinery is constantly adding to the importance of machine guarding.

Seriousness of the Mechanical Accidents

While the machine hazard varies with different industries, it is a substantial part of the whole cost of industrial accidents. For example in Massachusetts during the years 1918-20 inclusive, the 53,000 tabulatable mechanical accidents that occurred were 25 per cent of the total number, but they caused 33 per cent of all the days lost. In other words, the average mechanical accident is nearly half again as serious as the average non-mechanical accident.

This checks pretty closely with an analysis made by the National Council on Workmen's Compensation Insurance covering 27,000 separate inspection reports for plants located all over the country and employing about 1,700,000 persons, with accident payments of \$29,000,000, in which 36.1 per cent of the total cost was represented by mechanical accidents, divided as follows: Point of operation of the Machines 28.8 per cent; Moving Parts of Machines 1.9 per cent; Machine Drives 1.6 per cent; Transmission 1.7 per cent and Elevators 2.1 per cent. In the woodworking industry, (including carpenter shops, pattern shops, planing mills, etc.) as much as 60 per cent of the entire cost came from mechanical accidents; just about half the total cost of all accidents in these industries was due to accidents at the point of operation, in other words, the saw blade, jointer head, etc.

In the metal working industries the percentage of cost for mechanical accidents ran somewhat less, about 37 per cent for machine shops, and 23 per cent for foundries.

Construction of Mechanical Guards

Just a word about the construction of mechanical guards; if I were to say much on this subject I should feel like the young man when one of his friends said to him "I saw you with a new girl the other night."

He replied, "No, that wasn't a new girl; it was just the old girl with a new coat of paint."

I won't attempt to repaint the information on the construction of guards for you because that field has been quite well covered already. One can turn for such information to the excellent "Safe Practice" pamphlets of the National Safety Council, to the Standards that are being developed by the American Engineering Standards Committee, or to the various books on Industrial Accident Prevention (of which one by the writer of this article has just had its third edition printed).

In a paper presented at the Milwaukee National Congress in 1920 the writer summarized the important "Fundamentals of Safeguarding" as follows:

*See in *Industry* (June 19, 1926) published by Associated Industries of Massachusetts, an article by Colonel Charles R. Gow, entitled "Industry's Contribution to Human Welfare."

1. Make the guard strong so it will stand the necessary wear and tear.
2. Make it convenient so it will offer the minimum interference.
3. Use the material that is best suited to the particular conditions encountered. (Usually, metal, with wood where there are acid fumes, etc.)
4. Have the machine guarded by the builder or when it is installed if possible, but where guarding is done locally, have it done by some one specially trained in guard building.
5. Make all guards conform to insurance and state standards, so as to get the benefit of any insurance rate reduction and to avoid later criticism from state factory inspectors.

Those principles still hold good, but in looking them over now it appears that one more might well be added, that is,—

6. Design the guard if possible so that it will *increase* production.

Of course, it is not always possible to put on a guard that will actually increase production but at least a very strong effort should be made to so design and install it that it will not interfere with production; otherwise it will take a constant battle to keep it off the scrap heap.

Probably many of you are familiar with the very constructive work along this line that was done by our old friend Gus Kaems, and more recently by Louis Boraks, on the punch press operation, through the use of gravity or chute feeds.

I have before me numerous illustrations of guards which have produced substantial improvement in production such as the following:

Increase from 800 pieces per hour to 1,400 pieces with a reduction in cost from 6 cents per hundred to 4 cents per hundred—in short, 75 per cent.

Increase from 600 to 950 pieces per hour, with a saving of 2.3 cents per hundred—60 per cent.

Increase from 15,000 pieces per day to 50,000 per day,—and so on.

It is very fortunate that the trend toward higher speeds and increased production for the machine very often brings out mechanical methods of inserting and removing the stock, which will practically eliminate the hazard to the operator. Where you can get the production man fighting *for* the safety appliance instead of *against* it the battle is surely won!

Results From Mechanical Guarding

There is one question in connection with mechanical guarding in which I am sure we are all interested, and that is, what results can we actually expect from the installation of such safeguards?

I am sure every Safety Engineer on going into a large factory and seeing hundreds of machines with some mechanical hazard unguarded, must at times have questioned in his own mind whether he is justified in asking that they should all be guarded or not; particularly so when he is told that so far as anyone can remember, there has never been an accident on one of these machines.

To insist on these guards being put in seems somewhat like arresting a whole community and jailing the entire population in order to apprehend one or two potential criminals!

A few years ago this question confronted the safety man at every turn, and it was about as difficult to answer as the one which was put up to the school boy, when the teacher asked him why lightning never struck twice in the same place. He replied, "Because when it strikes once the same place isn't there any more."

It was pretty hard to show that an accident would occur in a given place until it actually did happen and then of course you couldn't prove that it had been prevented!

I remember how eagerly I used to gather up records of near-accidents, involving the use of a safeguard, to use as sales material on the hard-boiled foreman or superintendent who *had* to be shown, before he would agree to a new safety device. But it is getting easier every year to "sell" safety, because it is being recognized more and more as playing an important part in the modern production programme.

As many of you will remember, it is now more than fifteen years since the first Workmen's Compensation Act was passed, and we have a pretty complete history of accidents in several states from that time on. An analysis and study of the results since the passing of the Massachusetts Compensation Act, which I have just completed, brings out some very interesting facts on the part played by mechanical safeguarding.

Massachusetts affords an especially good field for such a study for several reasons.

It was one of the first states to pass a compensation act, and thus get complete accident reporting. It has had some of the most comprehensive statistical records of any state, extending back over a period of more than twenty years. It is one of the six or seven leading manufacturing states of the country, and its industries, among the most important of which are textiles and machinery manufacture, represent about the average exposure to machine hazards.

There are three state departments from which the necessary records can be drawn. The Industrial Accident Board classifies both the number of accidents and the days lost. The State Insurance Department keeps a complete record of the cost of accidents. The Department of Labor issues "Statistics of Manufacture" showing employees, payrolls, value of manufactured products, etc.

While these reports do not fully correspond in certain details such as the classifications of the various occupations, and they do not all have the calendar year division of time, it is possible to make comparisons between them that are approximately correct and that show the big outstanding changes that are taking place in the industrial accident situation.

The trend of compensation legislation in other states has been similar to that in Massachusetts, hence the results here may be taken as an example of what may be accomplished in any other manufacturing state.

This study is devoted chiefly to the nine-year period covered by the years 1917 to 1926 inclusive. (The reason for choosing this particular period is that the present method of accident classification in use by the Industrial Accident Board, which gives days lost as well as the number of accidents, was started with the year 1918, so a much more accurate comparison is possible for the subsequent years than for the ones prior to that time. The statistical information for the year 1926 was the latest complete year available when this study was made.)

While there have been many cross-currents and complex influences at work during this time, the years 1918 and 1926 both represent prosperous years of high industrial activity. The falling-off in business and other changes that succeeded the war had pretty well worked themselves out by 1926, so that it corresponds favorably in many ways with 1918.

In studying the statistics of these two years, the outstanding item of interest is a gratifying reduction of 23 per cent in the number of "tabulatable" accidents (those causing loss of time after the day in which the injury occurred) and a reduction of 28 per cent in the total number of days lost from these accidents. Still more pertinent to the subject we are discussing, is the fact that during the course of these nine years the figures show a reduction of 60 per cent in the *tabulatable mechanical accidents* and 54 per cent in the number of days lost from these accidents.

Tabulatable Accidents in Massachusetts
(From Annual Reports of the Industrial Accident Board)
Accidents For Years Ending June 30, 1918, etc.

Accidents For Years Ending June 30, 1918, and									Per Cent Mech.	
Year	Mech.	Fatal Non-Mech.	Total	Mech.	Non Fatal Non-Mech.	Total	Grand Total	Fatal	Non Fatal	
1918..	107	331	438	19,533	57,534	77,067	77,505	24	25	
1919..	82	274	356	18,408	48,476	66,884	67,240	23	27	
1920..	58	318	376	15,249	49,863	65,112	65,488	15	23	
1921..	51	245	296	10,006	43,011	53,017	53,313	17	19	
1922..	47	259	306	8,451	42,348	50,799	51,105	15	17	
1923..	63	267	330	11,243	53,317	64,560	64,890	19	17	
1924..	59	277	336	9,424	50,679	60,103	60,439	18	16	
1925..	39	269	308	7,922	50,849	58,771	59,079	13	13	
1926..	45	268	313	7,807	51,368	59,175	59,488	14	13	
1926 Reduc. from 1918..	62	63	125	11,726	6,166	17,892	18,017			
Per Cent Reduc.	58	19.1	28.5	60	10.7	23.2	23.3			

(Fatalities in 1912 and 1913 were 474 and 509 respectively)

Days Lost From Above Accidents

1918..642,000	1,986,000	2,628,000	1,486,823	1,855,177	3,342,000	5,970,000	24	25
1919..492,000	1,644,000	2,136,000	1,212,542	1,732,199	2,944,741	5,080,741	23	24
1920..348,000	1,908,000	2,256,000	1,091,991	1,597,694	2,689,685	4,945,685	15	22
1921..306,000	1,470,000	1,776,000	760,395	1,576,983	2,337,378	4,103,378	17	19
1922..282,000	1,554,000	1,836,000	744,691	1,471,451	2,216,142	4,052,142	15	18
1923..378,000	1,602,000	1,980,000	902,274	1,728,580	2,630,854	4,610,854	19	20
1924..354,000	1,662,000	2,016,000	761,722	1,624,490	2,386,212	4,402,212	18	17
1925..234,000	1,614,000	1,848,000	633,180	1,614,453	2,247,633	4,095,633	13	16
1926..270,000	1,608,000	1,878,000	715,973	1,684,269	2,400,242	4,278,242	14	17
1926 Reduc. Over 1918	372,000	378,000	750,000	770,850	170,908	941,758	1,691,758	
Per Cent Reduc.	58	19.1	28.5	51.8	9.2	28.2	28.3	

Total fatalities were reduced from 438 to 313, or more than 28 per cent, and fatalities due to machinery were reduced from 107 to 45 or a reduction of 58 per cent. (Total fatalities in 1912 and 1913 were 474 and 509 respectively.)

On the face of it this is certainly a splendid showing for a great industrial state with some thirty to forty thousand separate industrial establishments, and employing approximately one million workers.

We have had many excellent records of accident reductions in individual plants, but so far as I know, this is the first time that such a comprehensive record for an entire state has become available, and I think it is a very strong indication of the claims which many of our safety engineers have been making for a number of years as respects the importance of mechanical guarding.

We have heard a great deal of talk about the value of "safety education," and while I believe thoroughly that such work is an essential part of a comprehensive accident prevention program, I think there has been a tendency in some quarters to over-estimate its importance in reducing accidents.

The results shown by these figures would seem to justify that feeling, since although there has been an active campaign for safety education as well as mechanical guarding carried on throughout the state, non-mechanical accidents show a reduction of only 11 per cent numerically and 9 per cent in days lost. In other words, while mechanical accidents were being more than cut in two, non-mechanical accidents showed a decrease of only about 10 per cent.

This total reduction of approximately one-fourth in all injuries and the lost time resulting from them seems the more convincing when one notes the regularity with which it occurred from year to year over the entire period. It does not show rapid fluctuation from one year to another, which might be expected if it were due to some exceptional condition. Also it is noteworthy that the reduction was continued during the years of increasing industrial activity represented by 1925 and 1926.

Such large state-wide reductions sound almost too good to be true, even to an optimistic safety engineer. A number of cross checks were made, however, together with studies along auxiliary lines which would tend to throw light on the main issue, and these have all tended to substantiate the fact that these figures are approximately correct, and *do* represent an actual reduction in the frequency and severity of mechanical accidents particularly, and all accidents as well.

In the first place the thought immediately strikes one that industrial conditions have changed considerably since 1918, which represented almost the peak of our war activity. Have those changes altered the number of employees engaged in manufacture or the extent of mechanical exposure?

The answer seems to be that while there have been material fluctuations within that time, the year 1926, both from the standpoint of number of employees engaged in industry and from volume of production, compares closely with 1918, and that the mechanical exposure if anything has increased during that period.

A study of the payrolls reported to the Massachusetts Insurance Department shows a total of \$800,000,000 for the year 1918, compared with \$1,297,000,000 for the year 1926.

These are "policy year" figures, covering all Workmen's Compensation policies issued during the years 1917 and 1925 and expiring in 1918 and 1926, respectively. They really represent an approximate average for the two years. Over 91 per cent of all accidents reported to the Industrial Accident Board for this period were covered by insurance, so the figures on accidents and days lost correspond approximately to these payrolls.

The average yearly wages for the corresponding period taken from the statistics of manufacture of the Massachusetts Department of Labor and Industries shows an average wage for the first period of \$850.00 and for the second \$1,218.00.

These are average for the years 1917-8 and 1925-6, respectively.

If we divide these figures into the total payrolls it would show approximately 950,000 employees in 1918 and 1,050,000 in 1926, thus indicating that, if anything, the number of employees had increased in the latter year. The records show that while there has been some reduction in manufacturing employees, this has been more than offset by an increase in Contracting work, Clerical Office and miscellaneous classification, such as Chauffeurs, Stores, Stevedoring, etc.

Payrolls in Massachusetts

(From the State Insurance Department Reports, by "Policy Years.")

Year	1917 Millions of Dollars	1926 Millions of Dollars
Manufacturing Industries	496	556
Contracting Classifications—		
(Buildings, Foundations, Construction, etc.)—	40	99
Clerical Office and Salesmen.....	109	249
Drivers and Chauffeurs	19	30
Misc. Non-Manufacturing — (Stores, Restaurants, Theatres, Stevedoring, etc.).....	136	363
	800	1,297

The Clerical Office and Sales Forces should be spread through the other classifications, but no record is available as to how they are distributed.

The contracting employees more than doubled during this period and the accident hazard of the construction classifications is two to three times as great as that of the average manufacturing classification.

Extent of the Mechanical Exposure

Again, we may ask whether the reduction in mechanical accidents may be due to a reduction in the mechanical exposure; here also the answer seems to be reasonably conclusive that such is not the case.

It is difficult to measure mechanical exposure, but it is a well-known fact that during the past decade there has been an increasing tendency to supplant hand labor by power machinery and that seems to have occurred to a considerable extent in Massachusetts.

For example, there has been an increase in the number of electric kilowatt-hours generated in the state, from less than a million in 1918 to more than two million in 1926. The general "horsepower per worker," according to the country-wide reports of the United States Bureau of Labor Statistics, increased from 3.2 in 1919 to 4.3 in 1925, or 34 per cent.

The statistics of manufacture for Massachusetts issued by the Massachusetts Department of Labor show total value of products in millions of dollars in 1918 as 3,851, compared with 3,420 in 1926. While this represents a falling off in the value of products of 431 points, or 11 per cent of the total, it would seem that this reduction is considerably more than offset by a reduction in wholesale prices of 25 per cent (U. S. Labor Dept. Reports), which occurred during this period, so it is a fair assumption that the actual amount of products increased rather than decreased during this time.

The foregoing seems to indicate rather clearly that on account of the increase in production and the increased use of power, without any increase in the number of employees in manufacturing operations, there must have been an increase in the mechanical exposure.

"No Lost Time" Cases

The foregoing discussion has been based entirely on a consideration of the tabulatable accidents; in other words, those causing loss of time on a day following that in which the injury occurred. The close comparison between the reduction in days lost and the tabulatable accidents shows pretty clearly, however, that the tabulatable accident frequency is a fair measure of lost time and, therefore, of accident cost.

No detailed analysis by causes is possible for the "no lost time" accidents occurring during this period because, on account of their relatively trivial nature the Industrial Accident Board did not go through the large amount of work that would be involved in their tabulation.

It is probable that the majority of them were the minor cuts, bruises and abrasions which are necessary accompaniments of handling materials in all kinds of industrial operations. Since they only caused temporary loss of time during the day on which the accident happened, they are not of much interest in a study of this kind, although an investigation of them in the individual plant may be of value as indicating potential hazards.

The total number of accident reports, including these trivial cases, is a little lower in 1926 than in 1918, as is shown in the following table:

Total Accident Reports in Massachusetts

1918.....	170,718	1921.....	155,554	1924.....	164,746
1919.....	178,084	1922.....	139,611	1925.....	155,059
1920.....	193,600	1923.....	176,588	1926.....	162,239

What Has Been Accomplished in the Way of Reduced Accident Cost

Granted that accident frequency and lost time have been substantially reduced, the next important question is, was this reduction in accidents translated into reduced accident cost and did the employer receive the benefit of this reduction in return for his investment of time and money in safety work? Here again the answer is in the affirmative.

The 1926 accident cost per hundred dollars of payroll, excluding medical expense, shows an improvement over that for 1918 of 28 per cent (\$0.51 total, less \$0.128 medical or \$0.382 + 15 per cent increased benefits = \$0.459 anticipated cost, comparing with \$0.332 actual cost in 1926). This cost reduction corresponds closely with the improvement of approximately 25 per cent in lost time and accident frequency already described, and represents as nearly as can be determined the improvement the insurance companies should have enjoyed in their losses if the accidents had been reduced as outlined, and all other factors had remained constant.

(The annual medical expense mounted from \$1,091,519 to \$2,696,565, increasing from 22 per cent of the premiums in 1918 to 34 per cent in 1926. As against this there was some compensating gain to the insurance companies through the increasing level of wages, the amount of which is difficult to estimate since most of the gain from a wage increase is automatically absorbed by the higher benefits that result on account of benefits being based on wages.)

Now as regards the cost to the employers of the state:

The insurance rates collected in 1918 (1917 year of policy issue) averaged \$1.07 per hundred dollars of payroll (\$8,568,000 premiums divided by payrolls of \$799,844,000). In 1926 (1925 year of policy issue) the average rates were \$0.91 per hundred dollars of payroll (\$11,827,000 premiums divided by payrolls of \$1,296,931,000). This gives an average reduction of 15 per cent in the rates actually collected.

In addition to this rate reduction there were changes in the compensation laws between the year 1918 and 1926, increasing the benefits to injured workers by 15 per cent.

Massachusetts employers thus received an equivalent benefit in their insurance rates of 30 per cent, when the rate reductions and the increased benefits are both taken into consideration.

Every time the compensation laws are liberalized an increased cost results which the employers must ultimately pay in the form of increased insurance rates, unless this cost can be compensated for by savings elsewhere. Such changes in the laws were made in *twelve* out of the *fifteen* years that have elapsed since the original compensation act was passed in Massachusetts. These changes include an increasing compensation from 50 per cent of wages to 66 2/3 per cent, increasing minimum payments per week from \$4 to \$9 and maximum payments from \$10 to \$18; increasing total compensation from \$3,000 to \$4,500; reducing the "waiting period" before compensation begins from two weeks to seven days; extending the original two weeks limitation of medical expense, at the discretion of the Industrial Accident Board, and giving the employee free choice of his own physician, etc.

All these changes combined have more than doubled the present accident losses to the insurance companies, as compared with the 1912 cost level.

However, the average compensation rates in 1926 were only \$0.91 per hundred dollars of payroll, comparing with \$0.87 for the period of 1912-14 (Premiums \$9,490,000 and payrolls of \$1,098,808,000. See annual reports of Massachusetts Insurance Commissioner.)

The whole history of this movement, as reflected in these figures which have now for the first time been thoroughly analyzed and evaluated, reflects credit on the employers of this state as well as on the other agencies that have been working for improved safety conditions.

The passage of the Workmen's Compensation Act undoubtedly added much impetus to progress in this direction, through its effect in concentrating attention on the seriousness of the industrial accident hazard, on which only fragmentary and scattering information had been available previously.

The "Schedule Rating Plan" developed by the insurance companies in conjunction with the state insurance department, under which superior safeguarding in a plant was directly reflected in a lower insurance premium for the plant, was also an important factor, through the definite financial return which it offered the employer on the cost of safeguarding.

Massachusetts was one of the first states to pass a Compensation Act, and its record marks a very definite step in the progress that is being made in this country to provide more and more fully for the safety and welfare of its great force of industrial workers.

Summary

In summing the matter up it may be said that the foregoing study of Massachusetts accidents over a nine-year period would seem to show quite conclusively that there had been a reduction of approximately one-fourth in the accident frequency and lost time during these years and that this had resulted in a reduction of about 28 per cent in the accident loss cost. This cost saving has been about equally distributed between the employers in the form of a 15 per cent reduction in insurance rates, and the employees in the form of a 15 per cent increase in compensation benefits.

Accident prevention has unquestionably been one of the chief factors in bringing about this saving, and it is particularly gratifying to the safety engineer that the development of mechanical safeguards has been able, not only to offset the growing mechanical exposure over the past decade, but to bring about an actual reduction of at least 50 per cent in the accidents caused by machinery.

More important by far, than the reduction in money cost, is the indication that over a hundred lives are being saved each year among those who carry on the industries of the state, and in addition there are being eliminated yearly, 18,000 disabling injuries!

CHAIRMAN THALNER: Mr. Beyer, I want to thank you very kindly for your splendid presentation of this subject. At this time, if there are any questions to be asked of Mr. Beyer, I am quite sure he will be pleased to answer them.

I was extremely interested in the percentages with regard to the frequency and the severity of mechanical accidents; although 25 per cent of the number of accidents occur as a result of mechanical or machine failure, that 25 per cent causes a loss of 33 per cent of lost time. Consequently, it is quite important that that particular phase of our work be given strict attention.

The part that any safety program plays in a plant depends upon the sincerity of that program. It is utterly improper to ask men in your plants to work safely and be careful workmen without first having provided the protection which they deserve. It would be foolhardy to try to start any accident prevention program in a plant in any industry, unless your mechanical program was completed. Your mechanical program simply is a demonstration to your working force that the

management is sincere in its endeavors to eliminate accidents and they, of course, must take the first step.

Now, the other step is that of the educational part of the program. We often refer to it as being "The Other Seventy-Five Per Cent." We have heard of a number of means by which educational programs are put on and put across with good results. Today, that particular subject is going to be given to you by Mr. A. M. Williams, supervisor of safety at the Chrysler Corporation, in Detroit, Michigan.

The Other Seventy-five Per Cent

By A. M. WILLIAMS

Supervisor of Safety, Chrysler Corporation, Detroit, Mich.

The heading of this subject assumes the ratio of 75 per cent and 25 per cent between the educational and mechanical sides of safety as being correct.

This ratio has come in for a great amount of study during the last three or four years. It first came to my attention several years ago when I made a study of the accidents occurring in the company I am with. Since that time there have been some variations from the percentage but they have been towards a percentage of 90-10 rather than in the other direction.

If we accept the figures as correct then we should direct the bulk of our attention to the educational side of *Safety* or to manbuilding. With your permission I will coin this expression—"Safety is brains at work."

In our safety efforts in the past we have tried many things and the one we have made the least headway with is that of getting each individual employee to apply his own intelligence to his own *safety*.

If *safety* is to be successful and permanent I am convinced that we must train more highly the intelligence that we have in our shops. We must teach men to be alert, to protect themselves. We must develop or help our employees in developing certain mental capabilities that are becoming atrophied or shrunken up through lack of use.

If safety is brains at work what is the job?

What part of the brain is working?

What is it doing and how is it doing it?

When we get that far we usually stop. The skull is like a stone wall because it stops us and we would do anything rather than climb the wall to get a look on the other side and find out what is going on in there. This talk will not be technical so do not get uneasy.

I like to picture the human mind made up of parts just like our bodies—a muscle for this and a muscle for that purpose.

Let us consider the human mind as being made up of many parts the same as the body is made up of many muscles. We know that exercise of any given muscle will develop it, also that lack of use will shrink it up. It is fair to assume that the same occurs with various mental muscles. Of course there are no muscles in the brain but for the sake of clearness we will assume that up there inside each skull there are muscles that we think with and muscles that we file away this kind of knowledge or that and muscles that we execute this movement or that movement with.

The reason that I want to use the term "mental muscle" or muscles of the brain is to drive home the fact that the brain becomes strengthened by use just the same as the muscles do.

In our physical examination rooms the applicant for employment undergoes a rigid examination as to his physical development. If the muscles of the right shoulder are much smaller than those of the left it becomes apparent to the

examiner that this man has not used his right arm as much as his left. The left through use has grown strong and the right through dis-use has shrunk away.

Fortunately we have two arms to use in comparing but when it comes to that section of the man above the collar—his brain—we have nothing to compare with to determine just how—if at all—he has exercised it. We do not know whether or not the man has been developing those functions necessary to use in guarding against danger—against accidents.

We strengthen our lifting muscles by lifting and our thinking muscles by thinking. We strengthen our walking muscles by walking and our reasoning power by reasoning.

I am reminded of the story of Pete Pare.

Pete was a big lumber jack from the Canadian northwoods six feet, three or four inches and weighing some 250 pounds. According to the story, Jack Dempsey came to Toronto and offered \$500 to any man who would stay in the ring with him for three rounds. Through newspaper publicity this information drifted back through the backwoods to where Pete was employed. His friends and admirers begged him to go down and get this easy money. When Pete left for Toronto he took with him all of the spare change from the lumbering camp to put up on his side. A friend of his went along to insure fair play.

After the affair was over and the two came back to the camp it was up to the friend to explain to the boys just what had happened and he explained it in this way—"When Pete get in the ring we feel proud of Pete—great big arm, great big leg, strong and big. Jack Demp, we feel sorry for Jack—little arm—little leg. And Pete he make a pass at Jack Demp. and Jack he duck and Pete he make another pass and again Jack duck—then Jack made a pass at Pete and Pete, he no duck!"

Regardless of size Jack Dempsey had been taught to take care of himself and to protect himself from injury. That part of his brain had not atrophied through lack of use but had been strengthened. He knew what to protect himself against and was alert. On the other hand Pete had been trained in a kindlier environment. He had not been trained to protect himself every instant of time. True—there are hazards in his work but they have been pretty well guarded against and simplified through the proper annealing of chains, proper design of canthooks, toggle chains in loading logs, spiked skids, proper design of swamp-hooks, etc., so that Pete had had very little mental exercise in developing the thinking section of his brain.

He may have been a giant physically but he was far from being a giant in certain mental sections.

Our problem lies in presenting to the men those things that will develop the very section of the mind that Jack Dempsey's training developed. I don't want anyone to run away with the idea that I am comparing industry with the prize ring in so far as hazards are concerned—far be it. I am using the illustration to prove a point. I am using it as an acid test to prove the correctness of the theory. Interesting bulletins, pictures, etc., are all valuable in teaching safety, but Jack Dempsey had done more than look at pictures. There must be something in each bulletin that will make the individual think for a moment about his own safety and apply the lesson taught in the bulletin to his own case; when he does that he then exercises that section of the mind we are trying to reach.

Suppose we assume that there are three general departments of the brain—receiving or filing—reasoning or imagining—deciding or acting. A man may be well read. During his reading he has been receiving and filing. Some men do little else during their lives but read and study and make little or no application of the knowledge they have received and filed. Another man may be all action, still another only a dreamer or thinker.

I remember back to an old lumber jack who, when I was a boy, gave us an early lesson in safety. He said, "Boys when you hear timber crack watch out for yourselves because when one of these big trees comes down you must be somewhere else and be there quick. We can't tie all of them up so that they won't fall on you. You must use your heads and use 'em fast."

His gospel was "*Learn to think and think fast.*"

A man may read, but that may not make him mentally alert because it apparently does not exercise the right mental muscles. A man may tell another of some important event or a funny story but this does not necessarily mean that he did a lot of thinking about it and that he enlarged his thinking capacity at the time. A man may see a safety bulletin and not get any good out of it because he does not think about it.

The old lumber jack made us boys not only use the receiving departments of our brains but made us develop our thinking muscles by making us think. How did he do it? By appealing to our instinct of self preservation by letting us know we might be crushed by falling timber—pain and even worse might be the price if we were not alert.

In our spare moments we worked out plans of what we would do in case of a tree falling towards us. If it was close we were to run towards the butt or stump because it would be a hundred times easier to dodge it there than near the wide top which was fashioned like an immense fly swatter. If we were farther away then we were to run with the tree or the right or left depending upon other variables. We worked these plans out in the dirt.

The point is that in making these plans we taught ourselves to be alert. We were getting the most valuable safety training ever received. We were not only storing up knowledge to use in an emergency but were training our mental thinking muscles to act and act quickly in an emergency.

I have always felt that we are doing our best safety work when we are getting men to draw rough diagrams of what to do and not to do in any case of emergency. A great many times we hear of men who have exhibited wonderful presence of mind. In extreme emergency they made exactly the right move. After all when the facts were all brought out it was found that they had thought out or thought through and planned out the entire procedure long in advance of the happening—when it did come they merely carried out their original plans.

This brings to mind a story of Von Hindenburg. In his preparation for the defense of Germany. The story goes that for forty years before the Great War he spent a good portion of each year on his country's frontiers and in the swamps, lakes and hills of the countries beyond their border line. He studied the topography of the countries and made his plans of attack. In his imagination he would place his armies in every possible position and then plan against this and that emergency. When war finally did break out his plans were swiftly executed because they were merely a "carry out" of what had been planned years and years before. There was hardly an emergency that had not been thought through years before. The story of Von Hindenburg is also true in the life of U. S. Grant, in some of his important battles of the Civil War.

Safety is getting every man in industry to look his ground over in advance—to "Think about safety." To Exercise His "Safety Thinking Muscles" until they are as healthy and as quick to respond as the ball player's arm.

Against this background we have been doing certain work at Chryslers' for the purpose of developing this safety function in each employee's mind. We first decided that if we were to teach safety we must have some literature to use. We needed safety-first readers. And this called for rule books and the number of different trades involved and the wide range of hazards covered called for not only one rule book but many until today we have eight rule books covering our

eight major activities and two more in the making. The trades covered fell logically into these classifications:

1. Sheetmetal and Punch Press Rules.
2. Rules for the transformation of Castings, Forgings and Bar Stock.
3. Rules for Acetylene, Arc and Spot Welding.
4. Rules for Drivers.
5. Rules for Woodworking.
6. Rules for Maintenance Work.
7. Rules for the Handling, Storing, Transferring and Shipping of Material. etc.
8. Rules for Body Building.

In the preparation of these rules we have the greatest opportunity to start men thinking safety by securing their assistance in preparing the safety rule books.

Questionnaires were prepared for every employee and each questionnaire asked for the four more common causes of accidents in the trade on which he was employed. Many of the employees were unable to give more than one common cause of accidents on their work. The bulk of them however gave four. The questionnaire, when sent to carpenters, electricians, millwrights and other employees using ladders, brought out the fact that there are 31 common causes of ladder accidents.

These were incorporated in the rule books. I believe it is the most comprehensive set of ladder rules ever issued and it came entirely from the men on the job.

When these questionnaires went into the plant we noticed a marked falling off in our accident rate, proving beyond doubt that we are getting some real benefit from the thought being given to safety.

Editing and publishing these rule books was merely a technical job that took a little time and considerable money. The real job came in the practical application of them.

These books were first delivered to all of the employees. Each employee was informed that they were to be rigidly enforced and for his own protection he should familiarize himself with them, otherwise he might be disciplined or even discharged for a violation of a rule that he was not familiar with.

Fortunately at the time these rule books were passed out the labor situation was very favorable for a move of this kind because jobs were scarce and men were anxious to carry out the wishes of management in order that they keep their jobs. As soon as the rules were in effect, discipline followed and it was necessary in almost every department to discipline one or more individuals within the first few days. This was done in all cases, in a very kindly way, by explaining to an offender that we did not wish to keep in our employ a man who did not respect the company's rules. If we were satisfied from the man's attitude that he would respect them in the future and in addition to that assist in securing the respect of other employees, then we re-instated him. Other men more or less Bolshevistic in their make-up were not disposed to follow them. We found in these cases that the rule books were a real service in weeding out of our organization quite a lot of bad timber. All of this of course was with the old employees and did not hit the spot we were aiming at—that of the new and inexperienced employee. However, if we were to give rule books and a safety talk to the man at the time of writing him up for employment—and he were to find these rules ignored in the plant our case would be lost—it was necessary for us to start with the old employees.

Our plan for the new men now consists of contacting with the man on safety at least four times during the time he is being written up.

First: *The man who does the rough selecting at the gate* when the man is accepted tentatively, calls his attention to the fact that the company is interested in knowing his attitude towards Safety and the company's Safety rules.

Second: By the *physical examiner* who calls the man's attention to a few posters on the wall in the Physical Examination room, complimenting the man on his having all of his fingers and his freedom from scars, which are the evidence oft-times of carelessness, and his hope that employment with us will be free from accidents. He also emphasizes the subject of safety by picking up a copy of the rule book that would eventually be given to the applicant and telling him that if he follows the instructions it would be of assistance to him. By all means he should become familiar with all of the rules and not stop with one reading of the book, but read it from time to time after he goes on the job.

The third man's contact with him is the *write-up clerk* who assigns the badge number and gives him the Safety Rule Book and when he hands over the book mentions the importance of it and the fact that it represents the company's policy on safety and that every employee is expected to live up to them.

The fourth man is the *foreman* who asks the applicant for the book, fills out the receipt for him, has the employee sign it and then calls his attention to the fact that the rules are considered part of the man's trade skill. The foreman also explains that while the employee is undoubtedly familiar with a great many of the rules he should make sure that none of them are overlooked—he is expected to familiarize himself with all of them.

It is not so much what is said to the new employee as the *manner in which it is said* that impresses him with the importance of studying the rules and we find they are studying them.

After the man enters our employ—at intervals of say 30 days—we circularize the departments with leaflets, one going to each man. These are slightly larger than a pay check and are given to employees by the foreman. Each sheet carries two pictures that are technical, each showing the right way to do some job. The purpose of this is to bring the man's attention back again to rule book and encourage the reading of it at that time.

Then comes the Safety Committees. It is the Committee plan of stimulating interest in and thinking about safety—in short developing safety mental muscles.

At the present time our safety committees are made up largely of the foremen. These meetings are self inspiring to a great extent and result in keeping the foreman "on his toes" to follow through to the men with all of the educational material we can provide them with.

In our safety bulletins we find that we have passed the point where the inspirational picture is necessary—we are getting to the point where the men are asking for bulletins illustrating the right way to do some particular job. In the beginning of any safety campaign the inspirational pictures are about the only ones that can be used but as interest in the subject grows men become quick to tell us—"Aw bunk, you don't have to sell us on safety—but show us how."

The organization of safety committees is a very flexible thing and some form can be found tailored to fit any form of organization. It is while employees are working in safety committees that they are thinking safety, that they are drawing the plans in the dirt, so to speak, of what to do in case of emergency. They are the Von Hindenburgs and General Grants studying conditions before the unexpected happens.

They are developing their safety mental muscles.

While they are drawing these plans they see the possibility of a grinding wheel bursting and causing a serious accident. Before they are through with it they see that the grinding wheel is guarded. They catch the flaw in a fly wheel hub before it breaks. They see the new employee working on revolving machinery with his sleeves rolled down and correct this condition before the unexpected happens. They stop the reckless jitney driver before he injures himself or another.

They catch the unguarded man-hole opening in a floor before someone falls into

it and in a catastrophe such as an explosion we find them making their way to safety in order and not in panic.

As sure as the safety committee meets and considers accident prevention, just so sure will they bring to light mechanical conditions to be corrected, and if their interest in the safety committee work can be maintained long enough, the plant will be brought to mechanical perfection.

It is educational work, they are exchanging ideas, thinking about safety, and in so doing automatically taking care of the mechanical side of the problem.

Therefore it is in this work that we find our logical place of beginning. We might compare it with a famous paint advertisement—"Save the surface and you save all."

With "the other 75 per cent" of the Safety job, the educational side, at work we find if taking care of the mechanical side and doing it automatically.

CHAIRMAN THALNER: This subject has been very well covered by our good friend Art Williams, and I imagine there are going to be some questions.

I think it was the late Elbert Gary who said that there were three important words to us in running any organization, and those words were, Organize, Deputize, Supervise. And doesn't that bring us right back to the one point which Mr. Williams stressed in his paper, that of responsibility, placing the responsibility on the man's shoulders; giving him something to do? You never put over a community fund campaign unless you get your team workers in and give them something to do. Then, when the week has passed, each man has brought in his quota. Consequently, it is responsibility that is going to do the job we are after.

Another point which he stressed which rather interested me was that of "Right Thinking." I heard a speaker at one of our sessions a couple of years ago criticise our posters. He said, "You have a poster which portrays the idea that a man is thoughtless." He went on to show that while he was coming down the street in a taxicab, another taxicab coming from the right collided with his. Both drivers got out and started to argue about the trouble. This taxicab driver said, "I thought you were going to stop," and the other taxicab driver said, "I thought *you* were going to stop."

He brought out the point that both of those fellows, although they had an accident, were thinking. There was nothing thoughtless in their action, but they were thinking *wrongly*. That is why the idea of right thinking seems to me to be a very important factor in this educational program.

There is no doubt in my mind but what there is a wealth of material right here in this group with means and methods of attacking the educational program. I should like to hear from some of you gentlemen at this time as to what methods or policies you are pursuing to put across this very same program. I see Mr. McLain, of Pittsburgh out there.

MR. McLAIN (Jones & Laughlin Steel Co., Pittsburgh, Pa.): That is hardly fair, Mr. Chairman. I have been sitting here thinking of something else; I wasn't thinking rightly. There might have been an error just at that moment.

These A B C sessions and these thoughts that we bring out here of trying to get a man to do something and do the right thinking are absolutely the A B C's of all our safety work, in my experience. You have all reached conclusions. I met one of my closest associates at noon today, and I looked him square in the eye. I said, "I am going to ask you a question, and don't lie to me."

He looked up kind of funny. I said, "Have you heard a single new thing at the convention this week?"

He began to twist around a little bit, taking time to think about it. "I don't believe I have," he replied, "but I have heard some of the same old ideas put into so many different ways that I am going to go back and think they are new anyway!"

Here is an idea, Mr. Chairman, as old as this Safety Convention that began seventeen years ago—the training of these men to think for themselves. If it is in our own minds as safety engineers, we can think and lead others to follow. If we can't, we don't belong in that job of right thinking and careful thinking. I emphasize this one point, and I am rather childish about it. It is the giving of instruction to the men. You have heard me say before, some of you, that the average man, at least in the steel mills where I come from, has a mind that will rate somewhat under a ten-year-old child. I say the "average." I am not speaking of supervision.

We have a great deal of cheap labor, which of course accounts for it. If you go to Tony and say, "Tony, do you understand?" he is going to say "yes," because he thinks you want him to say that. He doesn't always understand, but he says he does. I have found, time after time, that we have fallen down by not talking to that man in the simple A B C language that he can understand. That is "right thinking" on the part of the foreman or man who gives the instruction. You have to do that if he is going to get this pick and shovel man or the average man to follow him in it. After all, if you can get a man to understand what you are driving at, what you want of him, nine out of ten men will do it that way. That is my little thought.

MR. THOMAS (DuPont Company, Portland, Me.): I have been very much interested in the talks that have been given here this afternoon. I have attended one of these A B C sessions every time that I could. You see, you can't attend more than one session at a time, and today is really the first time that I have heard the point stressed that safety education is really the kernel of the whole matter.

At my plant, we have a number of various machines and a number of various hazards. I will say this just as a matter of information. We started in 1920, and we went for three years without a lost time accident. In April, 1920, we had two accidents, both of which could have proved fatal but did not. They happened within a day of each other. Both of those accidents were absolutely due to the fact that the men did not think. One man was in a place where he had no business to be. Nobody expected him to be there, and he was hurt. The other man was working practically alone, and did an absolutely careless and reckless thing, without thinking. He was permanently injured, but it was not a fatality. I speak of those accidents for this reason: They were investigated by the management and by the safety committee, and after a thorough analysis of them, there was not a single man in that plant that blamed the company for either one of those accidents. They all saw that the company had taken every precaution that could have been taken, and yet the men who were injured stepped into the hazard thoughtlessly.

Since April, 1923, we have gone up to the present time without a lost time accident. That record is still continuing. I believe absolutely that the lesson learned from those two accidents by the men in the plant has been a great thing in promoting the present no lost time accident record. Every man in my plant is a safety man. If he were otherwise, he wouldn't stay.

I had the unfortunate experience of discharging a man who had been there two years. I had taken the matter up with him from the viewpoint of safety, but he would not absorb the idea. There was nothing else for me to do but let him go.

I made an investigation among the different foremen and so forth, to find out if the men in the plant really thought the company was wrong in discharging that man. I have yet to find a single man who does not agree with the management in the matter. That man did not belong with the crew because of his attitude on safety and lack of cooperation with other men. It is certainly true as we have

heard this afternoon that you must train the men to think. When you can get a thinking man, you have a safety man.

MR. WINTERS (U. S. Metals Refining Co., Carteret, N. J.): Mr. Chairman, speaking on accident prevention and making a man think, about three years ago we organized our accident prevention system. We followed the line of trying to determine ways and means of making men think and placing responsibility directly where it should belong. First of all, we organized what we call an "Accident Court." The court is presided over by the assistant manager. A safety engineer investigates all lost time accidents. The report which the safety engineer turns in to the court is based on an independent investigation. The foreman in the shop, of course, must also make out a report, which the department head signs and reviews.

For the first year or so, we found that a great many of our foremen tried to cover up accidents. The check-up which was made on them independently developed a point where those cover-up cases were detected. The foreman was shown he could no longer cover up any accident or the true cause of any accident. We keep a record of every foreman who has what we call a lost time accident. That accident is charged directly against him. There is a difference between an accident which is charged directly or indirectly. Where we can show that the cause of an accident has been through negligence or lack of safety instruction on the part of the foreman, we charge the accident directly against him. Where it is a matter of an ordinary accident which may occur in any department, such as a man's stumbling or slipping, or any hundred of other causes, the case is called "indirect" and that is charged against the department but *not* the foreman.

From our safety work, we came to the belief that the foreman is the man whom you have to educate to prevent accidents. That may not apply to all industries, but it certainly does apply to ours because we have at least a 75 per cent foreign element in our plant, a great many illiterates, and so forth.

You may say, "Why don't you get men who can read and write, or get better men?" That again depends on the geographical direction or location of your plant. If we were in a place where we could get all American labor, we wouldn't have that situation. We have to adjust ourselves according to the conditions as we find them.

What do we do after a foreman has had a number of those direct accidents charged to him? We have a foremen's safety school which is conducted every week. A number of foremen are picked out for the classes, and particularly those foremen who have the worst accident records in their departments. They have to attend the safety school. That is the place where they learn safety. Of course, those foremen who can't adjust themselves to conditions and stay with the safe majority, we have to let go. That is the final analysis. But we have absolutely found that we cannot place responsibility directly on the workmen themselves. We may stand in that position alone, but we have a system which works. I believe that any system that works is the right system on accident prevention. We must adjust ourselves to certain conditions as we find them. We hear of a great many places that say, "We have such a wonderful record, or no accident record." I am sorry that I can't say the same thing. We have accidents, but we are reducing them day-by-day and month-by-month—we are getting better. But, we have had a harder road to travel than the majority of people who have better conditions on the labor situation.

The spreading of propaganda on accident prevention is all educational. We have bulletin boards, safety rallies, departmental meetings, and so forth. But still, we maintain, that the foreman is the man who can put safety into your organization. We leave it entirely up to our foremen.

MR. HOPKINS (Hartford Insurance Company, Hartford, Conn.): Might I

inquire of the gentleman who just spoke, what his method of education for foremen might be? I am interested in that line.

MR. WINTERS: On the matter of educating the foremen, we have 114 foremen in our plants. We divide them into groups of 10. We have these foremen report to the safety engineer once a week for one hour. These meetings are held in a private office, where the safety engineer has a round table discussion with the foremen. He brings up the cause of a lost time accident right with the foreman who is responsible for it.

In addition, we have a plant magazine, that we call "The Safe Worker," which is sponsored by the National Safety Council. We add the necessary literature to this magazine which applies to our own problems. We give every foreman the benefit of five hours of this training or lecture work. We give the foreman opportunity to express himself as to whether he has any objection or whether there is any objection to our "attack," we might say; in this way, we create interest in the accident prevention work. We found that a great many foremen didn't know what it was all about before we started that system.

JOHN BEIT (Schwarzenbach Huber Company, New York): Referring to the gentleman who spoke previously about having no lost time accidents since 1923, I would like to know what kind of business they are in and how many men they employ.

MR. THOMAS (DuPont Company, Portland, Me.): The number of men vary from 35 to 75. I will say though, that the operation is the manufacturing of wood pulp for dynamite purposes. In addition, during the last four years, we have operated a sawmill. My company asked me whether I wished to assume the responsibility of a sawmill on our safety record in addition to the operation of the pulp mill, saying that the sawmill was more hazardous. Being under the same management and the same safety education, I said we would assume the education of those men.

I realize the number of men is not large, but when you figure we have gone eight years with only two lost time accidents, it means that those few men must be thinking pretty seriously of safety.

CHAIRMAN THALNER: That is a very good record, considering the classification of the work.

MR. FULTON (Standard Underground Cable Company, Perth Amboy, N. J.): May I ask what your lost time is?

MR. THOMAS: Lost time, according to DuPont regulations, means time lost away from work other than on the day of accident. If a man is injured in the morning, he may lay off for the rest of the day, but he must be back at the job on the following day, otherwise it is a lost time accident.

CHAIRMAN THALNER: That is the standard tabulation which is used by the U. S. Government. Are there any other questions?

MR. HAYES (Employers Mutual Life Insurance Company of Alabama, Birmingham, Ala.): Some of our insurance companies conducted a no-accident campaign last summer. As a method of getting employees interested in the safety campaign, they offered a prize of five dollars in gold each month for the best safety slogan submitted. Some of those plants have a large percentage of colored help, and you would be surprised to see the great number of safety slogans that some of these Negroes turned in, as well as other employees in the different cotton mills where most of them are rather illiterate. The results of that campaign were most gratifying. I thought I would offer that as a practical suggestion for getting the employees themselves, interested in the safety work.

CHAIRMAN THALNER: The next order of business, gentlemen, is the election of officers. At this time I will call for the report of the Nominating Committee.

Report of Nominating Committee

MR. McLAIN: Mr. Chairman, the President of the National Safety Council appointed three gentlemen, Messrs. Webb, Auel, and Heinrich, as a Nominating Committee to suggest officers for this section. It so happened that none of these gentlemen could be present this afternoon, and I have been asked to submit the findings of this committee. I offer to you as their report, these names:

For Chairman of this Section, George Opp of the Detroit Edison Company.
Vice Chairman, E. F. Blank, of the Jones & Loughlin Steel Company.
Secretary, Mr. C. D. Adair, of the American Rolling Mills.

I therefore move their nomination.

N. E. GREEN (Louisville, Ky.): I second the nomination and suggest that the secretary be instructed to cast one ballot.

CHAIRMAN THALNER: Is there any discussion? It is moved and seconded that the secretary be instructed to cast one ballot for the nominations as submitted. All those in favor signify by saying "aye;" opposed, "no." The motion is carried.

CHAIRMAN THALNER: The second part of this program has to do with "Accident Prevention in the Smaller Plants." I have gathered together a few figures which I want to give to you before going into that part of the program, which were taken from a report which U. S. Labor Commissioner Ethelbert Stewart has written in his monthly review of January, 1928. They are pertinent to the particular subject at hand today. Forty per cent of the establishments in the United States employ from one to five persons. Twenty-eight per cent of them employ from six to twenty persons. Nine-tenths of one per cent employ from 500 to 1,000, and one-half of one per cent employ 1,000 and over.

We all know of the accident prevention methods which are in vogue by the larger corporations of the country; they have special departments, the work is carried on in an efficient manner, and special emphasis is given to that angle of our industrial life. However, there are a large number of small plants, as shown here, who cannot afford to have a full-fledged or full-time safety department.

In spite of the fact that good records are being made by the large corporations, increases in accident rates are being experienced by the smaller fellows. The result is that we have a few plants doing a lot of good work, decreasing their rates, and we have a very large number of plants (practically 90 per cent), who are not having the same experience. Consequently, these two papers which are to be presented regarding the accident prevention programs for smaller plants should prove exceedingly interesting. We are to deal first with "What is a Good Industrial Safety Program in Plants Employing from 150 to 1000 Workers?"

This first paper is to be handled by Mr. Ralph E. Motley, who has charge of plant personnel and employment at the Atlantic Refining Company, Philadelphia. It gives me a great deal of pleasure at this time to introduce Mr. Motley!

What Is a Good Industrial Safety Program for a Plant Employing from One Hundred to One Thousand Men?

By **RALPH E. MOTLEY**

Director Plant Personnel and Employment, The Atlantic Refining Company, Philadelphia

I do not recall the name of that great philosopher, who, when asked the question "how long is a piece of string" answered that it was "twice the length from the center to either end," but I was tempted to use the same kind of reasoning when I first attempted to answer the question which is the subject of my talk.

Accordingly, using the same line of reasoning, the first answer that came to my mind was this; "a good safety program for a plant employing 100 to 1,000 men is

that program which will produce the desired results." But the fallacy in the reasoning behind both of these answers is, that while they both give you a general rule to follow which, unquestionably, is correct, it would be absolutely impossible to determine either the number of inches of which that string was composed or the component parts of the particular safety program in mind. So, just as we must actually measure the piece of string to arrive at our answer in inches, so must we analyze the subject of safety in order to arrive at our answer to the safety problem in terms of actual, tangible lines of procedure.

Before attempting to prepare any safety program which will give some promise of successful results, it is first necessary to analyze thoroughly the subject of safety, and arrive at the actual cause of accidents. To me, these causes seem to be of three general kinds, requiring three fairly distinct lines of procedure. Accidents may be due to mechanical, physiological, and psychological causes.

Under mechanical causes, we find such things as unguarded machinery, dangerous elevators, slippery floors, obstructed passageways, over speeded fly wheels, and other familiar causes for which the worker is in no way to blame. These causes have their cure readily at hand for the management which will apply it.

Under physiological causes we find such things as long hours of work, unhealthy working environment, inadequate lighting or ventilation, and monotonous or arduous tasks. The manner in which the worker handles himself or performs his duties is profoundly influenced by bodily conditions. A worker suffering from overstrain or worry or from excessive fatigue is not a safe person in the neighborhood of any accident hazard.

Psychological causes may be considered as ignorance, inexperience, carelessness, recklessness, and lack of plant discipline or supervision. To cope with these causes is not the responsibility of any one person or group, but of all persons and all groups. The most perfect mechanical preventive devices cannot substitute for personal caution and good sense.

If you please, we may translate these three general causes—mechanical, physiological, and psychological—into more workable terms, so far as our plant conditions and prospective safety program are concerned. Instead of the term "mechanical causes," we may substitute that of "fairness," and by fairness I simply mean the primary obligation industry owes its employees. This primary obligation is merely the providing of safe and properly protected tools and machines for the employees to work with. If this were conscientiously carried out in every shop and plant in the country, we could from this one cause alone notice a material decrease in accidents.

Suppose we replace the term physiological causes with the term "health," or rather the lack of healthful conditions. Too much emphasis cannot be placed on this group of causes. There is no denying the fact that inadequate lighting and ventilation, long hours of work, and monotonous or arduous tasks have a profound influence on bodily conditions which ultimately will render the employee more susceptible to accidents. This is a tremendous problem and one which cannot be solved or corrected in a day's time, but it is one which deserves very serious thought on the part of management. How would you like to work under the same conditions the lowest 30 per cent of the employees in your plant work under?

For psychological causes we may substitute "lack of education." A majority of the causes under this group such as ignorance, inexperience, etc., are the very essence of the lack of education. Do you have any method at all for instructing the employees in the kind of work they are to do, or do you depend upon their past experience in other plants to guide their actions? Education in safety can take many forms, some of which we will touch upon when we actually piece together our safety program.

In addition to analyzing thoroughly the causes of accidents, we must give serious thought to the human elements to be encountered and which must be corraled

before we can go ahead with our program. I have divided these human elements into four main groups; management, superintendents, foremen, and men. Any company which has not the vision to see the benefits to be derived, both for itself as well as its employees, from successful safety activities certainly is overlooking the paramount obligation industry owes its employees: namely freedom from accidents for themselves and their fellow workmen. If the management from the highest executive down is not head and shoulders behind the safety program, then the safety engineer might just as well take down his shingle and go on an extended fishing trip, because he will have far better luck catching fish than he will in reducing accidents. Sell the management first of all on the absolute necessity of an adequate safety program. If you do not have enough facts at hand to do the trick, the National Safety Council will only be too glad to put its entire resources in the form of safety experience and knowledge at your disposal. But sell the Management or your program will probably take a tumble.

The superintendents form the next group in line to be sold on safety in general as well as the particular program in mind. By superintendents, I have in mind those individuals, sub-executives, who have charge of a number of different operations in one department, each operation being in charge of a head foreman who reports directly to the superintendent. This arrangement would probably exist in an organization of 1,000 men, but most likely would not be found in an organization of 100 men. Just as the superintendent looks to the management for his orders and suggestions, so does the foreman look to the superintendent as representing the company, and he looks to him for guidance and advice. Consequently it is necessary that the superintendent be sold on safety in order that he may not interrupt the flow of guidance coming in the chain from the top link to the bottom.

The foreman is the key man in the organization. He is constantly in touch with the men on the job, and consequently is the logical man to be placed with the responsibility of instructing the new men on the job. It is a well known fact that in any new experience, the two points of greatest difficulty are at the beginning and the end of the experience, the foreman being the greatest of the two. Therefore, a most important opportunity exists when the new employee is introduced to the workplace. It is the foreman's job to introduce the new workman to the new work place, to instruct him in the exact manner in which the work is to be done, and to point out any hazards or dangers incident to the job. The foreman should make an example of himself as a 100 per cent safety man in order that the men under him may be encouraged and inspired to work as safely as possible. How can a foreman perform this gigantic task if he himself is not thoroughly sold on safety?

And now we reach the last of the human elements to be encountered; the last link in the chain of successful safety, extending from the highest executive down to the lowest man. "Man"—a conglomeration of flesh and blood, desires and emotions, senses and feelings, is certainly a puzzle to solve. But the puzzle must be solved before the greatest results can be obtained in any kind of activities, especially so in safety activities. Of course, it is unreasonable to suppose that a man can be analyzed as completely and definitely as can be a piece of stone or metal; although it is claimed by some that definite human qualities and characteristics can be determined by such things as the shape of the nose, the color of the hair and skin, the contour of the head, and so on. If this were the case, our job of successfully carrying on safety work would be completely solved by selection. But unfortunately such is not the case, and we must be content with more indirect methods. The result of the program will be determined by the effect on the workmen in the plant. They are the ones who have the accidents; the accidents are dependent to a large extent upon the general "safety atmosphere" created in the plant by the higher ups; the "safety state of mind" of the higher ups is largely moulded by the kind of men actually entrusted with the tangible safety activities, and the kind of safety activities they carry on.

"What Is a Good Industrial Safety Program for a Plant Employing from 100 to 1,000 men?" Having discussed the most important factors which must be carefully studied before preparing a program, I will now answer that question, not with the "piece of string" reasoning but based upon our own Company's experience and observations I have made in companies enjoying considerable success in safety activities.

Just as every nautical ship has its captain who is in command and who really is the guiding and executive power within his own bailiwick, so must the ship of safety be entrusted to the hands of one individual who plans and directs its course. The safety engineer is the name commonly applied to the individual. There are safety engineers, and then again there are people who are not, but merely have the title. This is not said with any disrespect to those worthy individuals who make up that class or group, but there are times when the man holding the job is any but the right type for that kind of work. Maybe the job was thrust on him; maybe he got the job because he liked the title; there are lots of reasons for this sad state of affairs, but the unfortunate part of it is that it exists in that vocation as it does in many others. The success of the safety program will largely hinge on the type of man holding down the job of safety engineer.

To my mind, a good safety engineer should be more interested in safety than any one in the plant; he should be on friendly terms with and have the goodwill of all the men in the plant. He should be honest, firm, fair, and have an understanding nature. He should have unusual energy, be a good leader, and a good talker. I am more and more convinced that unless he has acquired or developed this particular tool i. e. a good talker, he has overlooked one of his most effective approaches to the men. In addition to this, I believe he should have what Dr. Talbert, of Stanford University, terms "Intelligent Openmindedness," which he considers to be, "The refusal to take traditions for granted; the willingness to go contrary to the crowd if the crowd is wrong; the faith that there is an answer to every problem, and that if we haven't found the answer, that is no sign that it doesn't exist. In other words it is simply "Intelligent Openmindedness."

The importance of the safety engineer justifies the few minutes I have taken to express my idea of his qualifications. I realize that we will probably not find all these qualities in many men individually, but I do believe that we should endeavor to find men with as many of these qualifications as possible. The man may be from within or without the plant. I have not said anything about his technical training. Obviously this is very desirable.

To assist him in carrying out the safety program, he should have a committee or committees composed of the men of the plant. Whether these men come directly from the so called working men, or from the foremen, depends largely on the size of the plant and its own peculiar conditions. If the plant is large enough to justify a General Safety Committee and sub-committees, then I would most earnestly recommend that the General Safety Committee be composed of as high type men as possible. General foremen and even superintendents should be members of this committee. This gives the safety committee organization more prestige among the men than if this committee were composed of lower positioned men.

The sub-committees would then be made up of lower grade foremen and men in the plant. The committees should be changed often enough to inject new blood, and give as many people as possible an opportunity to serve. The effect is two-fold. The committees benefit by new ideas and the committee-men benefit from the experience they have gained by serving. The duties of the committee will also vary in different sized plants. The National Safety Council has a pamphlet covering this subject pretty thoroughly, and for that reason I am not going to go into it any deeper at this moment, but will touch upon it from time to time in connection with the rest of the program.

To my mind, education and publicity should play as important a part in the

safety program as any of the other agencies we have at hand; and this agency should be carried on from the executives down. Education should be of two forms; on the job, and in mass form. Separate meetings of superintendents and foremen, and rallies at which the whole plant is present are examples of the mass meetings I have in mind. Individual instruction by the foreman in the proper method in which the work should be done is an example of the education on the job. If the plant is large enough to include a group of sub-executives called superintendents, meetings of these individuals should be called by the manager of the plant at least once a month.

At these meetings, except where a special campaign is to be launched, definite phases of safety work should be taken up and discussed. But let me warn you of one thing; make sure that the person leading the meeting is thoroughly conversant with his subject and that he has the ability to put it across. Nothing will so nearly wreck the purpose of these meetings as a poor leader. The meetings should not be long probably fifteen to thirty minutes will suffice. Make sure you have something to tell them, and have the manager there to impress upon the superintendents the fact that the management is heart and soul back of the safety movement, and that it is looking to them to "bring home the bacon."

If for no other reason, these meetings find their justification in the fact that the individuals are gathered there for a definite purpose, that the definite purpose is the saving of life and limb, and that by virtue of the positions they hold they are the guiding power which will spell the success or failure of a realization of that purpose. The foremen's meetings should follow a day or two after the Superintendents' meetings. Each superintendent should call together his foremen, give them a general idea of what happened at the superintendents' meeting, review the accidents which may have occurred in the particular department during the past month, and discuss ways and means of preventing future occurrences.

Once every three months, an outside speaker should be obtained to talk to all the foremen at one time. The subject should deal with safety in general in order that the foremen may obtain some knowledge of comparable activities in other companies and throughout the country in general. Mass meetings for the entire plant should be held about every three or four months. The size and nature of the plant will determine just what kind of a meeting should be held. A high executive in the company, preferably one who is known to a majority of the men should make a very brief talk outlining the Company's attitude toward safety work, and giving them just praise for any good work which may have been done during the last period. If possible, have a band to play a few favorite numbers. Quite a few companies have bands of their own which can fit in very nicely in this respect.

The time of holding these meetings is a much debated question. It is my firm belief that unless these meetings are held during working hours when the men will consider them as part of their work, the greatest good will not be obtained. I know of several successful rallies which have been held in the evening, but these should, I believe, be confined to a gathering of the entire plant. A good time for the superintendents' meeting would be just after lunch, and from four-thirty to five, or the last half hour before the close of the working day, should be a good time for the foremen's meetings. If properly conducted, I can think of no more effective means of keeping the safety morale at its highest pitch than by just such meetings as these.

Posters unquestionably play an important part in any safety program. The poster is one form of advertising. Not so long ago I read a message on one of the placards in a street car which impressed me very much. I do not remember the exact wording, but the thought was this: "The true value of any advertisement is determined by the degree of confidence it creates. Building up that confidence on good-will is the principal purpose of advertising." When making up your poster program, bear that thought in mind. Select only those posters which will drive

the message home, and at the same time build up confidence in and good-will for the safety program being carried on.

Whether you should have a daily or weekly poster schedule in your plant, that you should decide. The National Safety Council not only will be able to help you on that point, being pioneers in the safety poster game, but they also have a very effective poster service which is designed to meet your needs. In addition to this there are numerous reputable poster and bulletin board companies throughout the country which most probably can help you in fitting this kind of safety advertising to the needs of your plant. But by all means, use some form of good poster advertising.

If your plant is large enough, you may wish to get out a little safety periodical. A little over a year and a half ago, we decided to get out a little safety paper in our own company. Immediate interest was aroused by allowing the employees to suggest names for the paper. From the numerous ones received, that of *The Siren of Safety* was selected as the one best fitting the magazine we had in mind. It started out as 5 by 7 inch eight-page paper, but it has met with so much favor by the employees and we have found so much use for it that it was increased to 12 and then 16 pages. Such a paper does not have to be elaborate, nor do you have to spend much money on it. We publish this paper once a month.

Some of us have a few things in common, and a few of us have a great many things in common; and it is on these things in common that we must depend to a large extent in our safety work. Perhaps the most outstanding trait peculiar to most of us is the "desire to excel." It may be in golf, it may be in swimming, it may be in one of a hundred or more things, but way back in the minds of most of us is the desire to excel in something. The seed is there, sometimes deep-rooted, and it only requires the proper kind of direction and cultivation to reap the rewards of a golden harvest. Competition can be used very effectively as a forerunner to this golden harvest. You should be the judge of just what form it will take. Whether it be individual, departmental, plant, or all of these, you won't go far wrong. Offer some kind of trophy or award for the winners and then keep this award or trophy everlastingly in front of the employees. Most companies with good safety records owe in large part their success to competitive schemes. Competition is the life of the party.

Whether you agree with me or not, I firmly believe that the subject of discipline should play an important part in the safety program. Most games and sports have definite rules and regulations which govern the actions of the players. Failure to observe those rules and regulations means a penalty; sometimes a severe penalty. If at the start of the race the runner gets off ahead of the gun, he is penalized so many yards; a fairly mild penalty. In certain kinds of track meets if the runner steps out of bounds, he is disqualified; a very severe penalty. Rules and regulations to a certain degree are as essential to safety as they are to the games and sports. The penalties should be the same; severe or mild depending upon the particular case.

Safety is no sugar coated pill to be taken and then forgotten. It should have enough sting and pep to be felt all the way along the digestive system. If safety can't be sold to the employees on the cooperative plan, then it should be sold to them whether they like it or not. It is for their own good. But remember this; give the worker a chance; give him two chances if necessary. Then if he just won't come through, there is only one remedy left. Have incorporated in your safety program certain definite rules and regulations regarding penalties, and stick by them. Safety is the cheapest and most valuable thing in this old world of ours; yet some people want to pay the price of an arm or leg before procuring a little of it, and some people won't have it at any price.

I realize that I have only skimmed the surface in attempting to answer the question "What Is a Good Industrial Safety Program for a Plant Employing from 100

to 1,000 Workers," but I have given you what I consider to be the most important factors. Summarizing, I believe that a safety program, to be effective, should be composed of the following ingredients:

1. Definite active interest in safety from the highest executive down.
2. Sound Safety Committee Organization.
3. Good Educational and Publicity Methods.
4. Attractive Competitive Features.
5. Proper Disciplinary Measures.

Since the proof of the pudding is in the eating, I am going to give you one example showing what has been accomplished by a safety program similar to the one I have explained to you. This program is not infallible—nobody's is—but I want to tell you what the company with which I am associated did in reducing accidents by following this program. Our company operates four plants, varying in size from 200 to 5,000 employees. The program at all the plants was practically identical. Compared with 1926, our company reduced lost-time accidents 42 per cent; days lost due to injury 71 per cent; fatalities 70 per cent; and one plant went eight months without a single lost-time accident.

When an accident happens, you can buy new wheels, new pipes, new machinery; but what about the worker's hands, his arms, his very life? That one thought should be sufficient to spur you on to greater accomplishments in accident reduction and prevention; and to establish and put into operation a safety program so thorough in every respect that it ultimately would banish from this earth industry's illegitimate offspring—accident.

CHAIRMAN THALNER: Mr. Motley, you certainly have covered it in a thorough, interesting and instructive manner. I assure you, I voice the sentiment of this meeting when I thank you very heartily for your presentation of this subject. There is one other problem, the problem of a safety program dealing with plants in which there are less than 150 workers. That would fall in the category of this 68 per cent of our industrial establishments employing from 1 to 20 persons.

Without any further ado, I am going to call on Mr. F. E. Town, superintendent of the Manitowoc Portland Cement Company, of Manitowoc, Wisconsin.

What Is a Good Industrial Safety Program in Plants Employing Less Than 150 Workers?

By F. E. TOWN

Superintendent, Manitowoc Portland Cement Company, Manitowoc, Wis.

In preparing to present my ideas of a good safety program in a plant employing less than 150 men, I found myself immediately handicapped when I learned that this phase of safety work was to stand in direct comparison with the program of safety for the larger plant; for obviously we have many points in common and much that is essential of the work in the large plant, is also of prime importance in the small plant. It is unnecessary therefore for me to dwell on fundamental requisites which are of common knowledge to all of us, but rather to mention briefly a few of the advantages which the work in smaller plants has, perhaps, over the more or less stereotyped program so necessary in large industries.

Let us observe the company's attitude toward its problems in the plant and the personnel of the company as well as its employees.

Processes, production methods and capacities, neither require nor permit a machine-like precision of methods. The employee does not lose his identity, but is known personally by the various heads of the business who have at one time themselves stood shoulder to shoulder with these same men at the bench or at the machines, or who have personally inducted the novice into the policies and

purposes of their little industry. And so one of the prime requisites of a successful Safety program, is that the management and its lieutenants each have a keen appreciation of the importance of safe practices being introduced and enforced in their plant, from the standpoint of the employee's welfare as well as from that of purely good business economy. He must believe in every phase of the Safety movement, lest the man in the tanks doubt the sincerity of his purpose, and fail to catch for himself the true significance of Safety and the part it should play in his own life. Especially is this important because very few small plants afford the services of a full-time safety engineer. The management's zeal and sincerity of purpose in the Safety program will therefore be reflected in the attitude of the employee towards these plans, and half of the main objective will have been accomplished.

The employee's attitude toward them, and his reaction to the purposes of the management, is of equal importance, and how best to awaken in him, and maintain a true interest in his own safety welfare, constitutes an ever present task. But how may this be done most effectively?

No game, no task, no undertaking of any kind, can possibly command the same degree of interest of the observer that is experienced by the one who actually participates in that activity himself. This is none the less true of the small plant safety work. If you would be sure that "Safety First" is a live issue in your organization, build a workable plan that may well carry the daily slogan, "Think Safety" into each employee's mind as he approaches each job before him. Give him a personal part in the safety work of his plant. Permit him and require him to assist in carrying out the details of the program, then help to visualize the results.

This calls for a specific plan, which can only be developed as the needs and operating condition of each plant require, or type of industry permit.

I have in mind a company, which from its inception, believed in the teaching of "Safety First" principles, but only dealt with generalities in their safety practices, and much to their chagrin and disgrace, every year brought an increasing number of accidents—and perhaps a fatality or two. At last the management decided it could tolerate conditions no longer, and calling a mass meeting, issued an ultimatum, which carried with it promises of the severest penalties, even to an entire change of personnel, if immediate plans were not adopted whereby a marked improvement should be effected in the accident records of the plant. Such drastic action was not without results of far greater benefit than had been anticipated, all of which were brought about by the adoption of such principles as I have already mentioned. A detailed description of their program will well illustrate such a type of a specific plan as might well be carried out in many small plants. Naturally it is built around a wide awake safety committee, which meets regularly once a week at an hour established as best suited to that plant.

The order of business would be about as follows:

- Roll call.
- Reading of minutes of previous meeting.
- Inspectors reports.
- Recommendations of Inspectors detailed.
- Reading of Safety suggestions.
- Safety suggestions discussed and detailed.
- Appointment of Inspectors.
- Appointment of recorder inspector.
- Report on work detailed previous meetings.
- Report of departmental meetings.
- Reading of accident reports.
- Informal discussion.
- Adjournment.

Every member of the safety committee is required to attend the meeting unless

excused. An attendance record is kept of all members, and the personal written excuse of all absentees is read.

The safety committee is made up of foremen and departmental heads and an office clerk for secretary. Nothing but matters pertaining to safety may be brought up at the meetings. The inspectors are chosen from men in the ranks—and picked by their foremen. The number of inspectors should be limited to only such a number as is required to handle the work properly, without too great an outlay of time. Their written reports are turned in for reading at the meeting by the secretary, though they are expected to be present at the reading of their reports.

Under "Recommendations of Inspectors detailed," the Safety suggestions of the inspectors are discussed, and if allowed, are made a part of the safety program, are numbered and members of committee appointed by the chairman to carry out such suggestions as soon as possible.

Safety suggestions which may be turned in by anyone in writing, through the medium of the safety inspector or the safety suggestion box are next read and discussed, and handled in the same way as the suggestions from the Inspectors.

The item of business covering the appointment of "Recorder Inspector" needs some explanation and refers to a method by which each employee may visualize the results of the concentrated safety effort in his department or plant.

Some means, such as the arrangement of a registering device like a clock, a thermometer, or an actual tally recorder is used, mounted at a central station or bulletin board in each department. A master calendar is displayed, perhaps near the entrance to the plant where every employee may see it on entering. A smaller, but similar one, is placed in each department. Some place on this master calendar, is shown the standing or number of perfect days elapsed since the last lost time accident anywhere in the plant, as of seven in the morning of the current date. Also on the face of the master calendar, or on a nearby bulletin, is posted the name of one employee from each department, who has been selected for that day to operate the calendar in his own department. His knowledge of his appointment is gained only by a close observance of the calendar as he enters the plant.

The duty of the recorder inspector, who is a member of the Safety Committee, is to check up the recorders of each departmental calendar after nine a. m., if another day has elapsed without a lost time accident, to be sure that the employee selected from each respective department has properly observed the master calendar and bulletin, and carried out his duty as instructed by the bulletin. His name may appear at frequent intervals, or otherwise, at the whim of those responsible for his selection, and it therefore becomes obligatory for each and every employee to observe the bulletins and standings *daily*, thus starting the day with a safety thought in his mind.

If the recorder inspector notes a failure of an appointee to properly perform his duties, such failure is reported to the chairman of the safety committee, who properly reprimands the offender and posts his name on the master calendar the next day, as a slacker in the cause of safety. A second failure of an appointee to show the required interest in his departmental calendar and the plant record, must be reported to the Plant Superintendent, who should take summary action by immediately dispensing with this man's services, or giving him time to think over his shortcomings on a vacation without pay.

Such penalties may seem severe, but the careless man who is absolutely not interested in your safety program, is both an expensive and dangerous man to have around, and how better can you test each employee for his zeal in the safety program of your plant.

Each department is supposed to have its departmental safety meeting once every two weeks—for questions, suggestions and very brief discussion of safety matters. This is presided over by the foreman of that department, who permits only safety

matters to be dealt with at that meeting. At the general meeting of the Safety Committee he reports on his departmental meeting, clearing up any questions that have arisen, or bringing in the new suggestions.

When accident reports are read, the injured man is brought before the committee at the first meeting possible, to state particulars of accident, and assist in fixing responsibility for same.

All discussion is brief and to the point. All reports are in writing to save time. Thus what seems to be a most lengthy procedure does not generally require more than an hour, and the meeting is never permitted to exceed an hour and a half.

Permit me now to return for a moment to the personnel of the operating force. Obviously enough, the small plant is never required to employ men in masses or large groups, but rather singly, or a few at a time. They may therefore be privileged to more nearly pick their men, take only the better grade of labor, aiming at the proper ages, experience and sobriety of habits when work is concerned, that will guarantee to the management a regularity in the performance of duty, and a maximum interest in the plans, whether they pertain to production or safety.

Insist on knowing the physical fitness of the new employee. At least have your plant physician check him over for major conditions, such as sight, hearing, heart condition and hernia, and record the doctor's findings—it will save many a worry later.

Acquaint the new man with the safety plans and purposes of your organization. Establish a safety code and explain it to him before he is permitted to work. Watch the new man—protect him—educate him—he constitutes the greater liability on your safety program; the greatest hazard to your safety record. Beware of the drifter—he has no interest in the welfare of your organization, nor the safety of his fellow employees. I would not place an embargo, so to speak, on any class of labor. All able-bodied men must seek honorable, legitimate employment if they would maintain their self-respect. But the man of your community with a wife and children should have greater consideration from you for your vacancies, than that man who has only himself to provide for, and his greater sense of responsibility, both at home and on the job, may guarantee for you a better safety record. Check up on all illnesses—they may be lost time accidents in disguise, or potential future accidents. Establish one or more first-aid teams—the more the better—well distributed among the departments. Competitive drills by them will build up an efficiency that will make their assistance indispensable in case of accident. Then rule that after the arrival of the first four "First-Aid Experts," all other men are to return to their work. It will surprise you how much this will benefit the injured and reduce production losses usually arising, through either the sympathetic or morbid interest of the fellow employees. The majority of the men in your plant should know something about producing artificial respiration, checking the flow of blood, applying emergency bandages for broken bones, and especially know how to pick up a wounded man and put him on a stretcher.

Maintain a well equipped first-aid room and see to it that it is used. Immediate attention to slightest scratches and cuts requires such facilities, and is one more step toward creating the safety habit. A carefully kept record of first-aid administrations will surprise you at the number of cases arising daily, and convince you that you have a large number of potential lost time accidents, unless these precautions are rigidly enforced.

Perhaps the greatest single requisite, therefore, in a well-planned safety program, is education. Just as one's life's education is never completed—so we learn as we progress in this business of saving lives and reducing suffering, that Safety education must be uppermost in our minds, to ever observe the new type of accident, and by proper analysis, gain the lessons that can be imparted to our committees, from the committees to the foremen, and from the foremen to the men in the ranks. By constant study, similar types of accidents can be reduced in number.

The greatest aid to education is statistics. Unless you know where your accidents are the most frequent, what kind of accidents are the repeaters, what class of men are the greatest offenders, you are indeed working in the dark. Unless you know how your own safety records compare with those of similar industries on a man-hours basis, both for frequency and severity, you will miss an incentive that can do more to promote a healthy safety standard than any other one device. As competition is the life of business and industry, so it may also become the main-spring that will keep the wheels of industry turning safely. For what department of a plant will not resent the insinuations that some other group is showing better records than its own, in any line of endeavor, and statistics properly compiled may show its own standing on safety matters as compared with any others, or possibly that of the entire plant, with the average of other plants of the same industry.

This spirit of competition, combined with a visible emblem of their objective will also command the support of each employee. The sight of our nation's colors never fails to arouse a stir and thrill of patriotism and loyalty within us, and so it seems that once we raise an emblem, pledged to the significance of a true and lofty purpose, the sight of it floating to the breeze arouses a somewhat similar thrill. And if that purpose be the maintenance of a perfect safety record, exemplified by keeping the safety pennant flying only as long as the record is unspotted, every employee will jealously guard that pennant, and make every effort to see that he is not the one to bring it down.

Much could be offered as suitable plans and programs of safety in the small plant, and perhaps in each case they would be more or less individualistic, but I think not least of all fundamental general requisites is the personal touch; and I am reminded of an impression which came to me one time in Chicago as I boarded the "Twilight Limited" for Detroit. It is a beautiful train—every car of nearly uniform design, the very latest ideas in furnishings and equipment, and all carrying the atmosphere of solid comfort, luxury and safety. A well-groomed porter waited at every platform to assist the passengers. The train officials stood alert, with a thought on the schedule of the trip, as the time of departure drew near. Busy men and women hurriedly sought their reservations, said farewell to a friend, sent a belated message, or settled themselves to read the latest issue of the daily news. On every hand one was made aware of the fact that he was aboard a popular high-class train, and felt a certain sense of satisfaction and security.

I chanced to look over on another track near by—and there stood another train, probably made up for a second section of the train I was on, as it had the same type of cars and equipment. But not a train official or employee, nor a passenger, was to be seen in or near it—it was simply an assembly of cars. It had no appearance of going any place—apparently not scheduled—no warmth—no life—no appeal to the imagination of the traveler—and what was the difference between the two assemblies of equipment? There was absolutely no difference except in the purpose—the schedule—the personal contact—the human touch. And since I was on my way to attend a state safety conference, the analysis of the thought brought to me a striking parallel to the comparison of the conditions in some plants with those in others.

That small company which cannot put the human touch into its Safety program and which will not establish personal contacts with its employees on at least one or two stated occasions each year in behalf of safety, such as through mass meetings or banquets, is destined to fall short of the true aim of its safety program. After all, to quote P. B. Juhnke in his splendid thoughts on Safety—"the end is that the workman shall live to enjoy the fruits of his labor; that his mother shall have the comforts of his arm in her age; that his wife shall not be untimely a widow; that his children shall have a father, and that cripples and helpless wrecks, who were once strong men shall no longer be a by-product of industry."

CHAIRMAN THALNER: Mr. Town, we have thoroughly enjoyed this paper, particularly so, because it has been delivered by a superintendent of a plant. We safety engineers get together and give our papers, but it does my heart good to have a superintendent or operating official other than a safety man come into our meetings and give his viewpoints and ideas on a safety program. We thank you, very kindly.

Now, is there any discussion which you want to bring up?

MR. GREEN (Louisville Car Wheel Company, Louisville, Ky.): I would like to ask the men here who represent plants of 150 men and under to please stand up.

(Eight members arose)

MR. GREEN: Will those who are in plants of over 100, but under 150 sit down? (That leaves 3.) Thank you, gentlemen. The reason I ask that is, when the first program was sent out for this National Safety Congress, I saw that we were to have this topic and then a discussion of plants having 150 men and under. Incidentally, I might say our own plant is under 100. I wrote to Mr. Cameron and told him the big problem, as I saw it, is the plant of about 50 employees and under. I don't know whether that bunch of statistics you have there, Mr. Chairman, gives the average of plants all over the United States or not, but I was shown by the Secretary of our Board of Trade, Government statistics which showed that the average number of employees in the plants is 42.

Now, of course, that means that a great many plants must be very much less than 42, as you have shown here in your figures. In four of the meetings I have attended at this Congress, the point has been brought out that, practically speaking, the large plants, the large employers, have gotten past this problem of safety; that is a thing of the past because they all believe in it and the managers and superintendents believe in it. But the fellow we have to go after is the little fellow like myself.

We have been working on this thing with the National Safety Council since 1916. When I got in it, if anybody had told me they could go a year without a lost time accident, I think I would have laughed at him, but we did that thing last year, and we have gone so far this year without a lost time accident. The point, though, that I want to bring out is this; when we go back home, we ought to get started on some kind of a program. I have been the vice-president of the Louisville Safety Council for some time, and I want to make that one of the features for the coming winter. We must interest the employers in the small industries in safety work. It doesn't matter whether the place is a foundry, paper mill, pulp mill, or what. The problems are the same. The small employers must be interested in the safety movement, and I think we are the fellows who have to do it.

MR. OLER (American Ice Company, New York): I happen to be an officer of the American Ice Company. We operate approximately 75 factories all over the Eastern seaboard, from Boston down to Washington. It is peculiar to our type of manufacturing that even though some of our plants occupy nearly a square block and are sometimes two or three stories high, still we will not employ in that plant over 50 men. I would like to ask if any gentleman here can give me (it is not necessary to take up the point here) any suggestions on how we can (we are compelled to operate our plants 24 hours a day on 3 shifts) effect a workable safety program in those plants? I can take his name, and I should be glad to get in touch with him later. It is a difficult problem.

GEORGE McLAIN (Jones & Loughlin Steel Co., Pittsburgh, Pa.): I shall be glad to get in touch with that gentleman.

CHAIRMAN THALNER: Any further discussion? I wonder how many of the representatives here employ from 150 to 1,000 workers; will you kindly stand up?

(About 17 members arose)

CHAIRMAN THALNER: How many employ over a thousand?

(Fifteen members arose)

CHAIRMAN THALNER: The fact that we have a count of this representation here may aid the committee for next year in formulating a program toward getting a man interested whom we feel should be more interested in safety work—the smaller manufacturers.

MR. GREEN: The other problem we have, of course, with the small man is to get him to attend these meetings. He feels that the expense of coming to the National Congress is more than he can afford. He may have 45 employees. If he comes from Louisville, the cost would be around \$125 or \$150. The expense per man is about three dollars. If we could sell the idea that three dollars a man per year for safety work is not very much, we may be able to reach him, but ordinarily it just looks like \$150 out of pocket, and he says he can't afford it.

W. W. WILLIAMS (Employers Reinsurance Corp., Kansas City, Mo.): It would be manifestly unfair to say that the small man, or rather the small plant, is a small plant because it has a small man at the head of it. But, from an insurance standpoint, gentlemen, it is the small plant that produces the bad losses. Their loss ratio is invariably bad. The larger plants, because of their greater facilities, greater capital, and possibly more brains, are able to get into the safety game, and get out of it as much as they possibly can. But the small plant, whether they have a small man at the head or not, is in a different position. If they have a small head, it will always be a small plant. They never will get anywhere in the matter of safety because that man hasn't the time even to think about safety. He is only two jumps ahead of the sheriff in trying to get his payroll together. He is really the man we ought to work upon. There are literally thousands of small plants employing from 10 to 50 men which have never made a move towards organized safety. There is where we should spend a lot of time and effort.

MR. GREEN: Some of these small plants do not have small men at the head of the plant. That is to say, that man is able to reason. There are some, of course, that we never are going to get. They are small and they are going to stay small. However, many of the other small plants are simply waiting for somebody to help them develop and grow up.

MR. GILMORE (Columbia Casualty Co., New York): The fact has been stated that you have a severe problem in the small plant. I think, if you will stop to reason, if you take the plant at the present time employing from five to ten men, you will find that it is an outgrowth of one man's brain; the man at the head of it is a man who has worked himself up through the trade. He has gotten a little bit of money together and has gone into business. He worked at the bench probably in the old days, when ship loads of fresh immigrants came over, flooding the labor market. Those were the days before the safety organization. That man still has the idea in the back of his mind that, "I always worked with an unguarded saw, I never had any guards on a punch press."

You run up against a lot of opposition in that respect. While that man may agree with you if you try to interest him in the subject, he has a mental reservation back of it. The men working with him also take the same attitude. I find in going around (my work takes me occasionally into different types of industries) that where it is an organized business with 10 or more employees, the condition is different. The men at the head of it, as a general thing, have some appreciation of what can be saved in dollars and cents by safety work. That business probably has grown over a longer period of years, and their experience has been greater. The larger the plant, the less opposition you get to any recommendation based on the sound knowledge of sound engineers.

CHAIRMAN THALNER: It seems to me that the problem of the small plant with regard to getting the man interested would be reflected to a certain extent in his bad experience. The time is going to come, or probably has come when, if he isn't interested in safety, through a bad experience, he will be forced to pay higher rates for his compensation insurance. Then he will wake up to the fact that he

should do something for accident prevention. Of course, that isn't the proper way to bring the thing about, because we know through experience that safety work is not only economical, but humanitarian as well.

If we can get this fellow interested, much gain can be made, through this representation here. When you go back home, see if you can't interest yourselves in one or two of these men, and through your local Safety Councils or your State meets or regional meets, bring them into contact with the subject to the extent that they will be thoroughly saturated with it. We undoubtedly can make some strides in attempting to solve the problem of the small plant.

ROBERT M. BOON (DuPont Co., Portland, Me.): One thing that interested me (this is the first time I have had the opportunity of attending these meetings), is the number of insurance men we have present here. I think we must face the conclusion that the greatest incentive in safety is an economical one. We can get ourselves into believing that we are doing this entirely for the altruistic or humanitarian side of it. We may pat ourselves on the back and grow a few wings on our shoulders when we get that idea; but I believe that safety first and safety programs are put on from an economical standpoint. There are so many insurance men present that I am led to that belief. They are interested in reducing these accidents so that the rates can be better. Some times the risk is so great on some of these plants that they can't take it. They want to reduce accident risk so that they can take insurance on a reasonable basis. I don't say they are here solely from an economical standpoint, but I think that is the first consideration.

After you get into this safety work, you will find it gets to be not a religion with you exactly, but it is something that gets right down deep into your hearts. The economical saving that we can stress, I believe, from the viewpoint of the small manufacturer, is what we need to get him interested. I don't think you will reach these men by preaching a sermon about doing good toward their fellowmen. I think if you show the small manufacturer the hard dollars and cents side of it, he will see that it is a good proposition to put a safety man in his plant. After you get him that way first, sooner or later, you may make him a disciple of safety.

MR. McADAMS (Columbia Casualty Insurance Co., Boston, Mass.): Of course, this may ultimately materialize into a debate between his point of view and the point of view of the insurance men represented unless we are cut off very shortly. Unfortunately, the example the gentleman cites is too frequently found among the employers of labor. I maintain nothing greater than to stress the fact that every man who has somebody working for him has a deep moral obligation toward that man, *irrespective* of the economic situation.

CHAIRMAN THALNER: Whether we consider it as economic or humanitarian, the fact that a man can earn a full day's wages is economic and also humanitarian. Is there any further discussion on the subject?

MEMBER: I do not think it fair or scientific to assume that the reason why the small plants produce the largest or worst accidents is because the superintendents or managers of small plants are less intelligent or less earnest about safety than the managers or superintendents of large plants. The manager of a small plant has duties for which specialists are hired in the large plants. He must be shown how to accomplish a safety program under different conditions. He therefore must be educated as to how best he can accomplish this work. I believe that is the object of these small plant meetings. I hope they will be continued. I might say, as representing eight small plants, that one of them has not had an accident for four years. We do not feel that we are small men, although we hold a small position.

ADJOURNMENT

*SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL*



Group Plant Safety Supervisors Session

October 2, 1928

W. H. WINANS, Chairman

Manager, Industrial Relations, Union Carbide Company, New York City

The Group Plant Safety Supervisors session at the Seventeenth Annual Safety Congress was called to order at two-ten o'clock by the chairman, W. H. Winans, Manager, Industrial Relations, Union Carbide & Carbon Corp., New York City.

CHAIRMAN WINANS: We are going to change the order of the program slightly. Major Reninger has another meeting that he really must get to as soon as possible, so Mr. Hoyman has kindly consented to permit him to read his paper first; and we will have a short discussion immediately following it so that he can get away to the meeting of the Cement Section, which he has to attend.

Those of you who know anything about what the cement industry has done in recent years in promoting safety, and particularly what the organization that Major Reninger has been connected with has done, realize that some worthwhile things have been accomplished. I don't know just how much he is going to tell us but under the subject that has been assigned, it ought to be possible for us to get something from the experience of a large organization with branches operating over the country, that will help us put this game across. Without taking further time, I have the pleasure of introducing Major Reninger, of the Lehigh Portland Cement Co., Allentown, Pa.

Sowing Seeds of Safety in the Major Departments of a Company

By HENRY A. RENINGER

Special Representative, Lehigh Portland Cement Company, Allentown, Pa.

Twenty years ago safety in industry was practiced by very few concerns. Ten years ago the National Safety Council was becoming established and known. Many people, even at that time, felt that safety was a theory and not practical, but the Compensation Laws compelled them to make necessary revision in equipment and design, to guard the dangerous parts of machinery which had in the past been responsible for many serious and fatal injuries. Large sums of money were spent, and while accidents were reduced they were not reduced to the extent which had been looked for and we began to realize that the guarding of machinery

was not the most important part of safety work. The education of the executive, department heads, superintendents, foremen and employees, was the big problem.

In giving you this informal talk I, perhaps, am bringing out some of the problems that I ran up against in my own organization, but I believe they will be of interest, for it will give you a general idea of what group plant supervisors are up against in a fair sized corporation, with plants scattered in various parts of the country.

We had more or less carried on safety work and had organized committees in 1915. From 1916 to the end of the war there was no general supervision of the work, but the safety committees functioned and did certain jobs, as protecting and guarding machinery and complying with any rules and regulations issued by the insurance company or State inspectors. However, the results had been more or less unsatisfactory and after the war, upon my return, I was told to carry on this work and organize it and see whether we could not cut down the toll of accidents which cement plants were then having.

Perhaps the simplest way to get a department started is for the president of the corporation to issue a letter to all departments and plant superintendents, announcing the creation of a safety department and instruct all departmental heads to cooperate. By so doing all officials know that this work is approved by the head of the organization. From then on it is the duty of the safety director to sow the seeds of safety among all departments and persons directly affected by this new program. It means that the Safety Director must keep a full and complete record of all accidents and the cause of the same; that he must put this information in such shape that it can be read by the chief engineer, the executive officials of the company, plant superintendent and department heads.

Sowing seeds of safety can be done in many ways and I don't believe that just the sending of reports to these various officials is the best means of bringing this to their attention. Personal contact with the various department heads and executives, the telling of the story of an injury to an old employee or the fact that an employee was killed, leaving his wife and several children to be taken care of by others.

Naturally the treasurer or comptroller of a company will be interested in safety from the financial standpoint and reports showing cost of accidents, cost of compensation insurance, etc., will interest him because that is his particular duty.

After years of experience we are able to compare one year's cost with another and where you show a saving and accumulate a surplus they will begin to realize that safety is not a fad but is a real saving.

I think you men have all had that same experience, that it was pretty hard to get the treasurer or the controller interested in safety; and when you brought up a bill for \$300 or \$400 for some certain thing for the safety department, they very often questioned whether it was a worth-while expenditure. However, after you can show them these reports of several years' experience and where your insurance premium is coming down and your compensation is coming down, then the treasurer or controller begins to sit up and take notice.

How can we interest the principal departments in a big organization? The Engineering Department, for instance, I find that the material of greatest interest to the Engineering Department is reports and charts showing accidents, days lost; also man hours and days lost per 100,000 man hours with a curve showing production.

A ten-year report that has just been worked out showing all these figures has proven very interesting not only to engineering but to all departments. However, reports of this kind do not mean very much to sales, traffic, advertising, and they must be reached in a somewhat different way. Our Engineering Department ap-

preciates reports and charts and it is also the duty of the Department of Safety to keep them advised on any new laws and regulations in various state departments; to furnish them with copies of any new codes. Our Engineering Department receives a copy of every Safe Practices Pamphlet issued by the National Safety Council, and we find that they make use of these safe practices many times in the designing and construction of new buildings. We also keep them advised in regard to anything new in the way of fire protection and fire prevention. Any new inventions that will improve the safety of any machinery in use are also furnished to the department.

Operating in nine different states, we take very particular care to keep in touch with the different factory laws and Department of Labor laws that may affect in any way our plants, and particularly to see that the engineering department gets a copy of these laws. We furnish them with copies of any new codes.

We take it upon ourselves to see that they are furnished with anything new, whether it be a newspaper clipping or an advertisement from a magazine that may be of interest. We shoot that down to the vice president and chief engineer who, I am glad to say, takes a very keen interest in all of this work.

In regard to the Purchasing Department, we also try to keep them advised of anything that is new and the Engineering and Purchasing Departments work with the Department of Safety in seeing that new machinery being purchased has all the proper safeguards. Any help that the safety engineer can give to any of these departments is appreciated, and after gaining the confidence of these departments you will be called in from time to time to make recommendations.

The Traffic Department's interest and cooperation was aroused through the report of the Safety Department showing the number and bad order in which cars were received at the various plants and which were hazardous in unloading. Every accident, where a man is hurt in unloading cars due to faulty equipment, is referred to the Traffic Department, and this report, through them, is forwarded to the railroad. By having our Traffic Department take an active interest in this work we find that the rolling stock coming into our plants from the mines is in better condition than ever before.

Up until we started this particular means of keeping them advised of accidents, they never did show any great interest in the safety department; and it was really through the vice president and general traffic manager, who came to me and wanted to know why any dealings with railroads in this particular line were not taken up with the traffic department, that we got their interest. He said, "We will do it. We will be glad to do it, and it is our place to do it." I was perfectly willing to shoot the stuff over to him and they handled it from there on, I am glad to say, very satisfactorily.

The Sales Department, in many ways, has no connection with the Safety Department. They are employees who are not exposed to the hazards of a plant and their main job is in selling. However, they recognize the Safety Department for the simple reason that every employee's registration card must be made out and sent to the Department of Safety, who also handles personnel records. Interesting bits of information are sent to them from time to time. Every salesman on the road driving a car was furnished with a set of Safe Driver's Practices, with a letter accompanying the set advising them that, at the request of the vice-president, this was being forwarded to them for their information and study. All accident reports, of course, are handled by this department and all minor injuries to office employees are treated in the department; all departments call upon us in emergency cases, whether sickness or accident.

We are called in from time to time to help them out. Many times we have taken over the matter of funeral arrangements and things of that sort, where these different employees, no matter in what department, call us in and ask us for advice, and we are only too glad to give it to them.

The sales department about three months ago organized a class of student salesmen, put them all through a training course, and part of the course now consists in sending these men out into material dealers' yards. They seem to feel that a salesman, by visiting the various material dealers' yards, will be better able to help the dealer talk on the subject if he knows just how a material dealer's yard is run. So today we have 20 men taking a two-months' course in various yards throughout the United States; going in there and reporting at six or six-thirty, and working as a laborer in the yard, loading or unloading lumps, breaking cement or anything else.

When the class of student salesmen were about ready to go out on the road and to spend a certain number of weeks in dealers' yards, the Sales Department asked our help and to talk to these men on the hazards they would run up against in the material dealers' yards. We were only too glad to give them a forty-minute talk, and found all of the salesmen very much interested in the subject, so much so that many of them have written in for further information on the subject of safety, fire prevention and housekeeping in yards.

The handling of all accident reports for the salesmen on the road has tied in these men, with the result that, from time to time, this department is able to render a service here or there for them and receives due recognition.

The personality of the safety director must be such that he is on friendly terms with all officials and department heads and he must take advantage of every opportunity to tell the officials interesting stories of things happening in and around the plants. This must be done in such a way that it does not become tiresome. He must have at his fingers' ends the facts and figures—number of man hours worked, number of man hours lost, cost in dollars and cents; also the amount of savings. He must remember at all times, however, that these various department heads have problems of their own. The superintendent and manufacturing departments have their daily problems and safety is just another one that is added to the burdens which they already have; therefore, he must sell this idea in a way that will bring them to feel this job is one that must be done, not under compulsion, but because they have been shown it is of benefit to them in their production work. He must not assume the attitude that he can command attention and conformities to the rules, because the chief executive has issued an order that safety must be carried on—if he does he will not get very far.

I attribute my success to personal contact with the superintendents, with the department heads, with the foremen, and I believe that all the work that has been accomplished in our own organization has been due to our getting around and meeting with the foremen, sitting down and talking to them and going over that old story that we hear; getting to know them and finding out what is on their minds, and letting them know that the boss is interested and that you are going out 200, 300, 400, 1000 or 1500 miles just to see them from the main office. I believe that is the one thing that has helped us as much as anything.

The chief engineer, the chemical engineer and the sales manager are not hired to help the safety director—they are hired to work out their own problems and carry on their own work, but it is necessary that the safety director so interest them in his department that they will be only too glad to work along with him.

Sowing seeds of safety is like sowing seeds on a field with a very high wind blowing. They do not always land where they are intended to, but are scattered sometimes to the four winds and many times take root and grow where least expected.

There is no question in my mind that the safety director has one of the most difficult jobs in a company. He must show the Sales Department that safety helps them in selling the product; also the Advertising and other departments that it is helping them in their work.

Accidents are expensive and they do not make profits for the company. Many companies do not know the cost of accidents because they do not keep accurate records, but where these costs are known and by safe practices accidents are prevented, the work of the Safety Department is shown to be a benefit to the company in a financial way and its recognition is assured.

When a report can be shown where a plant was spending from five to ten thousand dollars for compensation, medical and hospital each year for a period of five years, and then for the following five years a report shows they only had three lost-time accidents, with one compensation case, with the saving running into tens of thousands of dollars, all department heads will sit up and take notice.

Reports should be made interesting, simple, and not tiresome. If they do become tiresome they will not be studied.

There is no question in my mind but that in every organization we have different problems—different types of department heads to handle, and every safety director must work out his own problems. Every safety director must be a lifter, not a leaner. It is his job to be of help wherever possible to any department at all times; the less favors he asks and the more help he can give, the better his reputation with the various departments.

I never had any order issued by the president of our organization, but when I came back from the Service and reported back to the company, they gave me a desk and chair and said, "There is your office. This safety work seems to work out all right; it went along during the war and it helped some. We don't know anything about it. Now, there's your corner. Go to work." Those were the only instructions that I ever had in the work we have built up, and the work that we have accomplished has just been a gradual building up of this department which, by picking up the odds and ends that you find in a corporation—such as fire prevention, fire protection, personnel, reports on labor turnover—has become a self-insurer in most of our plants. The safety director, to my mind, has an opportunity of building for himself in any organization, if he is willing to work and keeps his eyes open. If he just goes along the line of least resistance, he will not get anywhere. You can't force safety down the throats of your department heads but you must interest them and be of service to them. Regardless of whether it be called the department of safety, welfare, industrial relations, or what not, let it be a "service department" for any and all departments covering almost everything; and if you once can give them a service in one line, you can gradually draw in safety and get them interested.

CHAIRMAN WINANS: Thank you, Major Reninger. It is very obvious from the approach which the Major has made to this subject that it is assumed that those of us who are here are confronted with the problem of accident prevention in branches of a main office organization. His paper has gone at the proposition from the standpoint of getting the general departments which come in touch with all branches, all working toward the same end.

We will take five minutes, if you want to use it, for discussion of this paper or for questions at this time. If you don't use it, we will go to the next paper.

DONALD SHAW (Hercules Powder Co., Wilmington, Del.): I would like to ask the Major if any attempt is made on his part to show his directors or his management the indirect costs? For instance, you show the direct costs, but are you beginning to make a study of the indirect costs in line with the study recently made by the Travelers Insurance Company?

MAJOR RENINGER: We are doing that, but we don't have enough information to make it worth while over a period of only one year. However, as time goes along, I think we can accumulate more data to make it pretty worth while. You

know it is pretty difficult to show the executives the total cost of accidents or the total cost of labor turnover or the actual saving that you can effect through your safety work. We do know how much we have saved each year on our compensation insurance but we can't say just how much we have saved in other ways, such as labor turnover and machinery spoiled, and things of that sort. We are trying to get that information, however, according to Heinrich's way of keeping track of it, of the Travelers.

G. A. ORTH (American Car & Foundry Co., New York City): Mr. Chairman, Major Reninger made reference to the attitude of the sales department in his safety work. I just happen to have a letter in my pocket from the sales manager of our concern, and I think it is quite appropriate that I read it to you. It is food for thought, I think, for everybody here. This letter is addressed to me and reads:

"Permit me to express my appreciation of the fine showing the safety department has made in the minimizing of accidents in our shops.

"Aside from the humanitarian feature, which of course is the big consideration, everyone realizes that a smooth running organization and continuous performance is productive of the best results in the time of delivery, as well as in the maintaining of the lowest possible labor costs, both of which are of vital importance in our work of selling the company's products.

"In these days of keen competition, every little detail has its bearing in the awarding of business and were we to suffer a delay on a contract, due to some accident in the shop, it would work to our detriment when that customer was next in the market for equipment, if indeed they did not penalize us for the delay in the delivery of that particular order.

"Any reduction that is shown in the cost of accidents naturally has the effect of reducing our production costs, better enabling us to meet competitive prices and provide work for our shops.

"As stated above, we are fully appreciative of your past efforts and wish to assure you that every member of our sales organization is interested in the work. If there is, at any time, anything that any of us can do to advance the cause of safety, we will be only too glad to do so.

(Signed) Vice President in Charge of Sales."

CHAIRMAN WINANS: The next subject is to be presented by Mr. M. G. Hoyman, Staff Superintendent of Service, Kimberly-Clark Company. We have all heard a good deal about what Kimberly-Clark has accomplished in safety and I know it will be of a good deal of interest to hear from Mr. Hoyman as to how it has been done.

How We Keep Safety at Work in Our Distant Plants

By M. G. HOYMAN

Staff Superintendent of Service, Kimberly-Clark Corporation,
Neenah, Wisconsin

Several pulp and paper mills of the Kimberly-Clark Corporation are located within twelve miles of the general offices in Neenah, Wisconsin. Another group of mills may be called "distant plants." One mill in this group is 130 miles from Neenah; another mill is 700 miles away; another mill is 1,400 miles away.

My frank opinion is that the administration of safety work in a number of outlying mills differs but little from the administration of safety work in a single mill or in a number of mills situated near each other. Each mill has its own risks and problems. Before safety can function in any given plant a program must be built around the plant's needs.

There are few devices or procedures specifically designed for "Keeping safety at work in distant plants." The fact that some of our plants are separated from others by many miles has not been a large determining factor in our choice of safety organization and safety methods. Nevertheless, we feel that our safety organization and methods have been successful in keeping safety at work not only in our near by, but also in our distant plants.

Therefore, I shall describe some of our safety methods which seem to work particularly well in our distant plants. I shall point out all their characteristics which are results of the distant location of the plants. Then I shall attempt to generalize upon our experience. I hope that from these remarks and from the ensuing discussion you may get some ideas on adapting our findings to your own needs.

Before describing our safety work in distant plants, we might see how well that work has succeeded in reducing frequency and severity of accidents. The proof of the pudding is the eating. Allow me to give you some data upon safety results in a mill which is 130 miles from our Main Offices.

During the four years, beginning with 1914, this mill had an average of 105 accidents per year. As a result of these accidents an average of 1,401 working days were lost each year. During the four years beginning with 1924 this mill had an average of only 11 accidents per year. As a result of these accidents an average of only 593 working days were lost each year. The days lost in the later period were less than half the days lost in the earlier period despite an increasing pay roll.

The progress of safety in this mill may be shown in another way. During the four years beginning with 1914 there were 16 accidents per year for every 100 men on the pay roll. During the four years beginning with 1924 there were but two accidents per year for every 100 men on the pay roll.

During the four years beginning with 1914 the lost time caused by accidents in this distant mill amounted to two days per year for each man on the pay roll. During the four years beginning with 1924 the lost time caused by accidents amounted to but one day per year for each man on the pay roll. During this ten-year period the accident frequency rate was cut down to about one-eighth (12 per cent) of its original value. The accident severity rate was cut down to less than one-half (47 per cent) of its original value.

In another large mill the last decade has seen the accident frequency rate reduced to 11 per cent of its original value and the accident severity rate reduced to 36 per cent of its original value.

What are the safety devices and procedures which have accomplished these results in our Distant Plants?

One of our favorite devices is the safety contest. The contest is serviceable in creating the proper feeling and attitude in the employees. The contest develops that group emotional state in which each man in the mill feels himself participating in a big worthwhile campaign. The contest itself does not produce lasting results. Emotional states quickly wear out. However, with employees stimulated by the contest, the safety director can build permanent safety foundations.

Our contests are not forced affairs. The contest is not put on until some mill or department is anxious for it. Contests are arranged only on request. Usually the contest is suggested by some department or mill that feels pretty strong in safety, and is looking for a fight with some other department or mill.

The fact that mills participating in a contest are many miles apart is no handicap. We maintain interest in safety in distant plants by a rather elaborate system of bulletins. These bulletins bring each mill in close contact with other mills. Early in our safety experience we found that it was necessary to have some definite information as to progress made in safety work, and as to the results obtained from specific action taken. Adequate information on safety progress in all units of the company is the key to keeping safety at work in distant plants.

We first had a weekly bulletin. This bulletin merely gave information on the number of accidents in the different mills each week. We have constantly added to the information contained in the bulletin so that it now shows the names of all departments, the foreman of the department, the number of employees in each department, the frequency of accidents, the days lost from each accident, and the cause of each accident.

These bulletins are posted in each department every Monday morning. Each superintendent receives one. Bulletins are exchanged between all plants in the company and a bulletin from each plant comes to the central office each week.

When the contest is at its height we frequently use the telegram to broadcast the standings of the competing mills. A typical telegram reads thus: "Niagara had an accident, Alfred Gercu, construction laborer, while getting off truck wrenched knee, lost one day, Tuesday, June eighth."

At this point I would like to ask two questions. Why is it that mill managers, mill owners, insurance companies, doctors, and social workers were the originators of safety campaigns when they were not the people who were getting hurt? Why is it that the workmen who lose their eyes, their hands, and their lives seem to be least concerned about accident prevention?

We think that the answer is this: The mill manager, mill owner, insurance company, and doctor are so situated that they see accidents in the mass. The individual worker personally comes in contact with few accidents. We have found that the greatest single factor in reducing accidents is to give to the average worker the mass-view-point of accidents. When he sees accidents not only as an industrial problem but also as a personal problem it is surprising how soon he becomes interested in safety work.

One of our most effective safety devices we call the "One Hundred Year Safety Man Award." During the last five years this device has been used with success in all our mills, and with especially great success in our distant mills.

The essence of the "One Hundred Year Safety Man Award" is this: By working safely a certain number of man days, every man in a department from superintendent to sweeper receives a brand new five dollar bill.

To illustrate: There are 310 working days in one year. One hundred men working one year would work a total of 31,000 man days or 100 man years. The five dollar award is made when the "Safety Man" in the department is 100 years old. For instance, a department of 100 men working safely one year, or a department of 50 men working safely two years, or a department of 200 men working safely one-half year would receive the award. Deductions are made from the age of the "Safety Man" for accidents and for days lost.

We have tried to keep this "Safety Man" award from entering the ranks of commonplace things by making a great deal of it. We close down the department for five or ten minutes to make the award. We have an official of the company speak briefly congratulating the men on their fine record.

We make no secret of the fact that safety means profit for the company as well as profit for the men. We explain to the men that by working safely they help us to carry our compensation insurance. Five hundred dollars is a low premium to pay on the safety of 100 men for one year.

A certain construction crew at one of our distant mills affords a good illustration of the effectiveness of this plan. In the days before the plan was adopted this crew had many accidents. After the plan was adopted this crew made the then unheard-of record of going four calendar years and receiving the prize four consecutive times without a single accident.

I said "construction crew," which you construction men all know is rather a dangerous term to use. I just received a report, before I came down to this meeting, of a department that became eligible for this award. It was the fifth consecutive time without a break. If there are any paper mill men here, you

will understand what I mean when I say a Groundwood Department, where they grind up the wood. There are all the way from sixty to eighty and ninety men, and sometimes even as many as one hundred, engaged in that work. Five consecutive times took them over five years.

Our safety suggestion system is another device which helps to keep safety at our distant mills. Excellent safety suggestions have been made by employees. A man whose suggestion is adopted acquires the sense of company citizenship. He feels that he is a part of the company as a whole even though he is employed in a plant which is a thousand miles from other plants.

I know that happens to be the problem of a great many people; that is, how to get safety suggestions carried out and have the suggested repairs made. We probably went through the same thing that many of you have. A man makes a suggestion down in the mill to his foreman, and if the foreman sees fit to carry that out, well and good. If not, he tells the man, perhaps, to forget it, or at any rate he forgets it, and a good safety man is spoiled in the making and becomes discouraged.

We overcome that somewhat by getting out a safety suggestion form. It is made out in triplicate. Every foreman carries a book of these. Our Council representatives have a book and we have some books in boxes put around through our mills on purpose to keep these in, so they might be available to the men. The idea is that if a man comes to his foreman and makes a safety suggestion, it is the foreman's duty, which he well understands now, that he is to take out his book and make out this recommendation or suggestion in writing, giving the man a copy of that to show that he has made it out; keeping one in his book, and sending one to our "Service Department." The man delegated to that work in our service department goes over the suggestion with the foreman and the man who originated the suggestion. This service man, if he deems that the suggestion is worth while, is authorized to write out an order to have that work done. If they find that it is not feasible, he is instructed to inform the man, giving him the reason why. Until we worked out that scheme, we had the same trouble that a good many of you have in getting Safety suggestions carried out.

Safety cannot be kept at work either in outlying or in nearby mills without the intelligent cooperation of the foreman. It is not the foremen's function to arouse emotional interest in accident elimination—that is done by the contest. It is not the foremen's function to educate the workman in the causes and results of accidents—that is done by the bulletins. It is not the foremen's function to give a monetary reward for safe work—that is done by the One Hundred Year Safety Man. It is the foremen's function to unite safety and work. Safety must not be looked upon as a thing separate from work. Safety is a method of working, a method which in the last analysis is under the control of the foremen.

We put the safety responsibility squarely up to the foremen, especially to the foremen in distant plants. These foremen feel that accidents are their own fault. We do everything to encourage that feeling.

I have touched upon here only those safety devices and procedures which in our experience seem to have been successful in "Keeping Safety At Work In Distant Plants." I have not mentioned our methods of introducing the new man to the job, and training him in safety ways. These things and all the other orthodox elements of personnel administration obviously do their part in "Keeping Safety At Work In Distant Plants."

CHAIRMAN WINANS: Thank you, Mr. Hoyman.

With your permission, we will ask you to keep your notes of the questions you would like to ask Mr. Hoyman—I know you have some—until we have given the other two men scheduled on this program a chance to present their side of the

story, and then we will come back, go after Mr. Hoyman on his subject, and Mr. Beck and Mr. Lundrigan on theirs.

At this time I will ask Mr. Ed Quesnel, of the Commonwealth Steel Co., to take care of this next item on the program, which is the election of officers for this section.

E. G. QUESNEL (Commonwealth Steel Co., Granite City, Ill.): Mr. Chairman, Ladies and Gentlemen: You heard your Chairman request a discussion on Item No. 3 on the program, Election of Officers. This is a rather unusual departure from our previous practices. Those of you who have been attending previous Congresses know that we have not been electing officers. They have been appointed. The section has been unusually successful. Our meeting today testifies to that point. Those in the front, if they will turn around, can see how successful it really is. It is not the largest, but I think it is one of the largest in attendance at the Congress.

In previous years the officers have been appointed by the National Safety Council staff; subjects have been assigned and speakers secured, but the section has become so important and so valuable to industry at large that they feel that it should be self-supporting and that even more interesting subjects could be selected if officers were elected by this section who were identified directly with group plants and who could pick out subjects which would be interesting to the largest number. So that they have this year asked us to take up the reins and elect our officers.

Just a word in regard to the duties of these officers. They will have no committees to appoint; they will have no sectional meetings during the year to arrange for. The sole purpose of these officers will be to get up as strong a program for the next Congress as possible. So, in order to start it off, the President of the National Safety Council, Mr. Homer Niesz, appointed a Nominating Committee for us. These gentlemen are Mr. John Gibson, Chairman, of the Western Electric Co., Mr. George E. Sanford, of the General Electric Company, and Mr. T. O. Messenger, of the American Can Company, all very splendid gentlemen whose judgment we can rely upon for picking first-class men.

If Mr. John Gibson is present, will he please come forward and give us the nominations for Chairman, Vice Chairman and Secretary.

Report of the Nominating Committee

JOHN GIBSON (Western Electric Co., Chicago, Ill.): Mr. Chairman, the Nominating Committee has had several hectic sessions which have culminated in a harmonious selection of three individuals whom the committee now wishes to place in nomination as follows:

Chairman of the Section—Carl B. Auel, Manager, Employees Service Dept., Westinghouse Electric & Mfg. Co., East Pittsburgh; Past President, National Safety Council.

Vice Chairman—R. T. Barker, Director of Health and Safety, Western Electric Co., New York City.

Secretary—R. E. Colville, Manager, Insurance Department, U. S. Gypsum Co., Chicago, Ill.

Mr. Chairman, I move that the report be accepted.

(The motion was seconded by Mr. Ernest W. Beck.)

ASSISTANT CHAIRMAN QUESNEL: Is there any discussion? There being none, all those in favor of this motion will indicate by saying "aye;" contrary "no." The "ayes" have it, and these gentlemen are elected to their respective offices.

Is Mr. Auel in the room? (*No response.*) Is Mr. Barker in the room? (*No response.*) Is Mr. Colville here?

Gentlemen, this is Mr. Colville, the Secretary.

You can anticipate a very interesting and instructive session next year, I can assure you.

CHAIRMAN WINANS: Our next subject will be handled by Mr. John Lundrigan, Industrial Superintendent of the International Paper Company, New York City.

Status of the Group Plant Safety Engineers in Industry

By JOHN LUNDRIGAN

Industrial Superintendent, International Paper Company, New York City

MR. LUNDRIGAN: Mr. Chairman, Ladies and Gentlemen: I would very much like to discard this prepared speech and devote my time to some of the things that seem to me particularly important, that I have noticed or that came under my observation during this Congress so far. Unfortunately, or perhaps fortunately for you people, it is printed and I guess you will have to take it as it is. As a matter of fact, it is made up very largely of the actual rules and regulations under which the International Paper Company carries on its organized accident prevention work. I might add here that it is only what we call the Magna Charta or Constitution. In other words, it is the minimum of the company's requirements by actual, positive rule and regulation, under the sanction, approval and order of the executive management of the company. It is necessarily uniform because of this element of distance which enters into our plants, situated, as they are, from the gulf of the St. Lawrence to the lower part of Louisiana and extending somewhat into other parts of the country.

I want also to explain that those rules are not the caprice or whim or theory of any individual or set of individuals. A good many people give me a large part of the credit for having been their author, and everybody gives me all of the criticism for the things they don't like about them. As a matter of fact, when we undertook organized safety work, we had been somewhat fed up with the sentimental side of the question. We all believe in that. We were participants in, and probably leaders in, the general discussion of the need for getting rid of accidents and illness as well. We all know that until it became a plain, every day matter of actual money cost, it was a good deal in the same category that the weather was, in connection with Mark Twain's famous remark; that is, a good deal talked about but not very much done about it. Therefore we decided that the only place to prevent accidents was on the job where the accidents occurred, and the only people who could do the trick were those who were in authority and operating on the job.

We also recognized that there were opportunities for keeping step with not only the old industrial conditions that were exacting their toll of human suffering and cost, but with the tremendous advance in means of transportation power and operation, which required that they be given help, that they be furnished with necessary, positive information as to what constituted a hazardous condition and what constituted a bad practice, and some reasonable method of getting rid of it. Therefore we decided to virtually make this activity a part of the company's executive management and just as positive a part of the operating management of each individual plant of the company, no matter where it was located.

In another thing we have been most fortunate, namely, that we have not only had the benefit of the wise counsel and leadership and sympathy of men like our president, Mr. Graustein, and his predecessor, Mr. Dodge, but we have had their positive encouragement in the matter of spending real money where it was necessary. Of course we believe and we know that we have shown them over and over again, in plain facts and figures, that we have returned that money not once but several hundredfold. So that with us, so far as its operation is concerned, it is a plain every day cost proposition and it is so treated in our organization.

I know of no better way to define our judgment of what should be "The Status of the Group Plant Safety Engineer in the Organization with which he is connected," than to reproduce practically verbatim regulations under which our company operates this part of its business. Our plants are so large in number, widely separated, with a large variation in number of employees and product, that we consider it fairly representative of both a large industry and a group of separate small industries. In other words, we believe our plan can be applied to any type of industry, number of plants of the same industry or groups of plants of various industries in the same localities.

The character of our business as indicated, requires both general and local supervision of this work, including uniformity of method, reports, etc., so far as any part of the plan applies to its individual units. Our general supervision not only checks up and compiles a record of individual performance, but acts as a clearing house for education, information and cooperation of the whole. It might be well to explain here the industrial superintendent is responsible for many other personal activities of our company, in some of which he acts more or less independently, reporting to the executive responsible for that feature of the company's business, whereas in the matter of accident prevention and its auxiliaries he is in practice an executive.

In the case of the local plant or individual unit, the general policy of our company is to consider the plant manager as the International Paper Co. in his jurisdiction, subject, of course, to rules, orders and practice laid down by the general management, so that we locate the authority and responsibility of the plant safety supervisor as being the direct representative of the plant manager in carrying on this work at the plant. So far as his relations to other department heads at the plant are concerned, he is rated neither above nor below any of them. In our judgment the two features that must be entirely divorced from his work are dictation on the one hand and subordination on the other.

The following rules govern this entire organization:

The Safety Organization shall consist of:

- General Supervisor of Safety and Sanitation
- Local Supervisor of Safety and Sanitation
- Local Safety Committee
- General Supervision Committee

The local supervisor of safety and sanitation shall be stationed at the mill, under the direction of the manager or superintendent. Included among his duties shall be the following:

I must stop here to explain that phrase "or Superintendent." When those rules were written eleven years ago we had small individual plants where the title of the man in charge was Superintendent, in order that this might apply to those plants as well as the larger plants where the fellow had a larger title of manager. Hence we had to repeat that phrase, "Plant Manager or Plant Superintendent." We want to get into your mind the fact that no matter what plant it might be, great or small, there is no one in authority or control between the safety man at the plant and the man in executive charge.

1. Keep informed on all national and state laws dealing with safety and sanitation in the territory where the Mill is located.
2. Recommend the installation of safe-guards wherever, needed. Inspect and report on the condition of all safe-guards, danger signs and absence of proper lighting of any part of the plant or premises.
3. Report all dangerous conditions, wrong and unsafe practices, lack of cleanliness of plant and premises to the mill manager or mill superintendent.
4. Look after proper disposal of the plant of waste and reusable material.

5. Report on improper, insufficient or wasteful lubrication in any form, including overheated bearings.

6. Act as Secretary of and keep a record of all proceedings of local safety committee meetings.

7. Call attention of department foreman to dangerous and unsanitary conditions or wrong practices and arrange for the elimination of these conditions; either through the department foremen, or personally supervise the work if ordered to do so by the mill manager or mill superintendent.

8. Report all conditions that might have resulted in an accident had there been employees in their usual place, such as fallen material, broken supports, etc.

9. Make frequent inspections of all mill departments and premises. During such inspections he may be accompanied by the superintendent or foreman of the department inspected. He shall be accompanied by the department superintendent or foreman in charge of a department where an accident occurred, when making investigation of such accident.

10. Personally accompany all persons who, from time to time make regular or special inspection of plant, including Labor Departments and State Factory Inspectors, Compensation Insurance Rating Boards, and special inspections in connection with fire, boiler, fly wheel, elevators and other forms of insurance carried by the company. Make memoranda of any wrong conditions called to his attention by such inspectors or inspections.

11. In cooperation with department superintendents and foremen give special and continuous attention to observation and instruction of new employees. When directed by the mill manager or mill superintendent he shall arrange to keep a list of applications for employment and of employees available for transfer from one Department to another, which information shall be available to each department superintendent and foreman.

12. He shall keep a separate file of all reports, documents and information dealing with safety and sanitation, including general and special instructions, mill accident history; literature permanently assigned to his mill; and all correspondence in connection with the general subject of safety and sanitation.

13. He shall be in charge of and responsible for the safe keeping proper circulation, and display of all safety literature, including posters and bulletins, together with their movement from one mill to another as may be directed by the manufacturing department.

14. He shall make such reports, as may be now or hereafter required, to the mill manager or mill superintendent and through him to the manufacturing department.

15. He shall keep an accurate list or card index setting forth: Name, date of employment in such position and salary of the local supervisor of safety and sanitation, and the plant nurse where one is employed.

The name, occupation and actual or approximate period of service with the Company of each member of the local committee. This record is to be kept up to date and corrected according as there is any addition or change in any of the positions named. The original is to be sent to the New York office and a copy kept in the mill safety files.

16. Whenever any construction, installation, replacements or repairs are being carried on in or in connection with any part of the plant or premises by any person, firm or corporation other than the local Mill Management, all of the foregoing duties and responsibilities of the supervisor of safety and sanitation shall apply so far as maintaining safe conditions, the prevention of accidents and making proper recommendations and reports to them, are concerned.

All reports or recommendations made in connection with the foregoing shall be in triplicate, one copy to go to the Mill Manager or Mill Superintendent, one to the person in charge of the work and one to be filed by the supervisor of safety

and sanitation. Regular accident reports shall be made on Form 339 of all accidents that occur in connection with the foregoing operations and shall have noted on them the name of the employing person, firm or corporation in order to distinguish such accidents from those occurring to persons in the employ of this company.

Whenever for any reason there is no safety supervisor assigned to or on duty at a mill, the mill manager or mill superintendent will arrange for the making of all reports and keeping of records designated herein, the same as though a safety supervisor were on duty.

The local safety committee shall consist of the mill manager or mill superintendent, as chairman, the local safety supervisor, as secretary, the resident engineer, all department superintendents and foremen, plant nurse and one or more workmen from each department. The workmen's representatives on this committee may be selected by the employees in that department.

Should the employees fail to select a representative for any department, the mill manager or mill superintendent may designate a representative to serve for such department until one has been selected.

In addition to the foregoing each of the special traveling inspectors representing the manufacturing department shall be considered to be members of the local safety organization at each of the mills whenever they are personally at such mill. They will be expected to call the attention of the mill management and safety organization to any hazardous condition or unsafe practice that comes within their knowledge and, in addition thereto, take up and discuss such conditions together with recommending remedies for them at any regular or special meetings of the local safety organization.

Mills or divisions having separate units at a distance from each other should have a local safety committee for each. The mill manager to be chairman and the safety supervisor secretary of all local safety committees.

At least one regular meeting shall be held in each calendar month of which minutes shall be kept in such a manner as to be available for reference at any time.

The duties of the local safety committee shall be as follows:

1. To discuss all dangerous and unsanitary conditions or wrong practices coming within their knowledge and to make recommendations for remedying same.
2. Review and investigate accidents that have occurred, and make recommendations to avoid their recurrence.
3. Discuss and make recommendations on accident prevention and general safety and sanitation.
4. Assist in putting into practice recommendations made by the manufacturing department, including the circulation and distribution of educational matter having for its object accident prevention.

The general supervision committee shall consist of the general supervisor and all local supervisors. The general supervisor shall be chairman of this committee.

Meetings of this committee will be held at the various mills of the company, alternating so that a meeting will be held at each mill in turn. The local supervisor at the mill at which each meeting is held will be the secretary of such meeting and shall keep the minutes thereof in such manner as to be available at any time.

The meetings as far as possible will be arranged by general localities or River Divisions. It shall be the duty of visiting supervisors to inspect the plant in connection with the local supervisor.

All suggestions made by employees whether members of a committee or not shall be made known to the mill manager or mill superintendent and the general supervisor and local supervisor of safety and sanitation.

It was necessary to clarify or make more easily understood the foregoing rules for which reason the following memoranda becomes virtually a part of them:

Suggestions in addition to any other instructions on the subject of installing and operating an organization for mill and premises, safety and sanitation.

1st—The individual designated as local supervisor must understand that one of his principal functions is to work toward more harmony and cooperation between the local managements themselves, and between them and the mill employees. He is neither above nor below the standing or authority of Foreman, except as specific duties are prescribed.

The most important point that both the manager and supervisor must keep in mind is that his duties relating to safety and sanitation take precedence over other duties he may be assigned to, in order to relieve both of the excuse that such matters were deferred owing to press of other duties or responsibilities.

2nd—He should become familiar with all existing laws relating to sanitation and safety in the state where he is located. He should be put on the mailing list of state department, charged with enforcement of same, which can be done without cost by making application. He should become personally acquainted with the State Inspector and accompany him on all inspections. This also applies to inspections of all kinds by representatives of insurance companies or other interests.

3rd—He should become thoroughly familiar with the structural and other conditions of the plant equipment and premises, and personally acquainted with the employees particularly those who are leaders or officers of the employees' organizations, and when non-English speaking help is employed, men who can speak their language and English as well. The importance of this lies in the fact that the vitality of the workman's safety committee, and the securing of suggestions from employees will depend largely on the interest taken by the local supervisor along these lines.

4th—It is of equal importance that he establish a working system and friendly cooperation with all department Foremen, and Headmen below the grade of Foremen.

5th—It is vitally important that all reports, recommendations, suggestions or criticisms, scrupulously avoid anything of personal feeling or bias, a good way to overcome or avoid this, where any individual or set of individuals appear to be directly affected, is to talk the matter over with the parties directly, pointing out the necessity for remedying or changing the condition then existing, when it often will be found that instead of having to report an individual, he will probably concur in your action. This does not apply to violation of laws, rules or agreements, as such are distinct matters calling for discipline, except when certain things have been a common practice, good judgment must be used in doing away with same, usually by order or personal act of the Mill Manager.

6th—Keep in mind that cleanliness of plant and premises is of great importance in reducing the causes for accident, sickness and loss of waste material.

It may be found the present facilities of the plant and premises are not adequate, or are not of the proper type or location for taking care of new, used or waste material, or the raw material and supplies used in our manufacturing operations. The remedying of these conditions so far as possible, or at least making recommendations to that end, is a very important part of the duties of the Local Supervisor.

7th—Improper or insufficient lubrication is not only costly from the standpoint of excessive use of lubricants, but very often more costly owing to overheated or burned out bearings causing breakdowns, and sometimes accidents to employees. Careful inspection of lubrications in all parts of the plant should be made frequently and at irregular periods, and all wrong conditions called to the attention of the man or men in responsible charge, as well as included in the written report of the supervisor.

8th—In cooperation with the foremen concerned, advice and instruction to new

employees and old employees who do not appear to fully understand the correct method of doing the work assigned them, is a very important part of the duties of the Local Supervisor. It will often occur that foremen have not the time to devote to this work and it may be of such character that the Supervisor is not sufficiently familiar to do so himself; in such cases he should cooperate with the foreman in securing some other employee to instruct inexperienced men.

It will be found many times that help employed for a specific position or duty are not fitted or qualified to perform the work. When this is the only objection to such employee, it may be there are other departments or occupations where he could be acceptably employed. The local supervisor should keep informed on this subject so that a transfer might be affected, instead of as is often the case dismissing the individual and possibly having the same experience with the next new employee secured to fill the vacancy.

The same principal should always be applied when it is necessary to reduce help on account of low water or other conditions, that is, permanent help who are competent and willing to transfer to other departments during temporary shut-downs, should be so transferred instead of new help being hired. To accomplish this it is necessary that complete knowledge of the labor requirements of all departments be in the hands of some one who will take the initiative, as we know oftentimes the workman laid off takes it for granted there is no other employment for him, and does not always return when his department resumes operation, which means you have lost a more or less experienced employee and are likely to have to break in an inexperienced man in his stead.

9th—Owing to the fact that the supervising inspector will be making continual inspections, which will necessarily take him to all parts of the plant and premises, we are of the opinion he can at the same time perform the duties and make the reports now done by the fire inspectors, and at the same time and for the same reason act as an inspector of lubrication, making such reports on that subject as are now or may be hereafter required.

10th—Whenever in doubt as to whether or not a particular condition should be reported, include same in your report.

11th—Each mill has a copy of Bulletin No. 77 of the New York State Department of Labor on accident prevention, which is also helpful in this work.

12th—Suggestions, recommendations and criticisms are always in order, so do not hesitate to make them, as future instructions and additions or changes in plan of general and local administration will depend very largely on them.

13th—Desk room should be provided for the local supervisor with facility for the creation of a local unit for an industrial library, made up of the various laws, rules, regulations, and publications, on the subject of sanitation and safety, that may now or hereafter be available.

14th—The establishment of the safety and sanitation organization, and the duties of any person connected therewith, in no way alters or interferes with any regulation between this company and its employees, neither does it in any way change the system of discipline.

While the rules make some provision for cooperation in the employment and location of help, a few years' experience taught us the necessity of adding what we term an "Employment Service" and because of its direct connection with accident prevention and health promotion, we couple its administration with that of the accident prevention work. In other words, the same individual is in charge of both.

The rules governing our "Employment Service" follow from which it will be noted, the same principal is applied as in the accident prevention work. The man in charge neither hires nor fires. His mission is to provide sources from which to draw new employees and to cooperate in proper location or transfer of those already on the payroll:

Beginning January 1, 1924, all mills shall establish an employment service for the purpose of providing for a more adequate supply of labor and diminishing the labor turnover.

Where local Supervisors of Safety are employed they shall administer the details of the service, including the keeping of the records, except that (with the approval of this Department) the mill manager or mill superintendent may designate some other employee to do so where conditions make it advisable.

It shall be the duty of the one in charge to keep in constant touch with the department superintendents and foremen both as to the immediate and future needs for help and as to the possible reductions in help in each of the mill departments.

He shall furnish each new employee with a copy of General Instructions No. 14—RULES and General Instruction No. 74—SAFETY ORGANIZATION, instructing him particularly as to the safety provisions, including first aid and nursing service provided at the mill.

He shall personally introduce the new employee to the department superintendent or foreman, advising as to whether or not the new employee claims experience in the work he is to do, and in either case recommend to the department superintendent or foreman that he be given adequate instructions as to the nature and hazards of the occupation.

When an applicant is not hired and desires to be considered for future employment, he shall make a record of all the information the applicant is willing to furnish, on Form No. 287 "Application for Employment and Record of Service," the same as though the applicant were actually hired, including whether he will be available when a vacancy occurs or whether he will accept a position other than that applied for, entering the acceptable occupations by name on Form No. 287.

Form Letters (see Mill Form Instructions No. 304) shall be used to notify such applicants of a vacancy when it occurs, accompanied by an addressed stamped envelope for reply.

The Employment Service shall have up to date information available to both applicants and employees covering at least the following subjects:

1. Rates of wages paid by this company for each occupation the applicant is willing to accept.
2. Up to date lists of boarding and rooming houses, with locations and actual or approximate rates for weekly board, for rooms and for meals.
3. Means of transportation and fare back and forth from the principal points in the mill town or vicinity to mill.
4. Location and rental cost of various types of dwellings.
5. Location of schools and kindergartens, including denominational schools.
6. Location and denominations of churches.

When for any cause the number of employees in any department is reduced the Employment Service shall keep informed as to whether other employment is available at the plant.

When employees are laid off for any reason, their address shall be determined and recorded on Form No. 287, so that when vacancies occur in any occupation they are capable of filling, immediate communication with such employees will be possible.

Generally speaking, when additional help is needed, former employees (not dismissed for cause) shall be given preference, particularly residents in the mill locality and those having dependents. When this supply is exhausted local and out of town waiting lists shall be utilized.

In filling occupations above the classification and rate of common laborer, persons then in the Company's employ shall be given preference by being transferred thereto when they possess the necessary qualifications; such qualifications shall usually be based on the recommendation of the Department head under whom the

employee is working and that of the Department head where the vacancy exists.

The Employment Service shall not in any way supplant control of method of employment as it now exists. Its main function is to provide for important additions thereto and it shall cooperate with the department superintendents and foremen and others of the supervising force.

The records and other information connected with the Employment Service must be kept in such a manner and so located that they will at all times be easily available to the department superintendents and foremen for their information and use.

From time to time we gradually installed a plant and community nursing service which now exists at all of our pulp and paper manufacturing plants and except at the smaller ones provides for a separate nurse for community service as well as the service at the plant.

The immediate direction of this service is looked after by a supervising nurse from the general staff and so far as the local plants are concerned, while there is no question of jurisdiction that can be raised between the Local Safety Supervisor and Plant Nurse, it is not only understood but a practical fact, each of them is expected to and do work in cooperation with the whole system as herein outlined.

The original plan was put into practice in 1917 and added to as herein mentioned. The mere fact that we have never had any occasion to take any important provision out of the plan must indicate to you that we consider it the best we are capable of devising and I believe it pretty fully defines the questions we have been asked to answer here.

MR. LUNDRIGAN: I realize from the length of time that it has taken to read this lengthy document, that you think this is a somewhat complicated proposition and requires a tremendous organization to carry it on. I just want to reassure you on this fact in the presence of probably fifty supervisors of the International Paper Company and the lady who has charge of the nursing service of the company, and I might add also the lady who has charge of all of us and keeps track of the records. They are all in the room. Therefore I must watch my step in stating this proposition and I want to assure you that not one single person was added to the pay roll of the International Paper Company's organization to carry this work on, and it does not involve any greatly complicated machinery. It was just a matter of consolidating things that everybody had a little hand in doing. It was simply a matter of centering all the information so that all the information flowed through one channel.

I want to make a little comment on this word "engineer." To the man in the street an engineer probably means a fellow who drives a locomotive; maybe it means the fellow who drives an automobile. Of course, if it does, we hadn't better be proud of that type. But I believe the better informed man looks upon the term "engineer" as meaning a man who has nearly all to do with the designing of structures, machinery, power, and their operation; in other words, inanimate things; whereas, if I understand the vital point in this whole matter, it is the successful dealing with human beings. And while a man might be an engineer without any handicap to him and do this work, I say that the best engineer in the world can't do it unless he has got a lot of horse sense and human sympathy mixed up with it.

That is the point I wanted to make, so far as the title is concerned; and it is the very reason why the International Paper Company did not use the term "engineer" in designating the man in charge of this work. However, we believe, in fact, we know that the men we have designated to carry on this work have got common sense enough, and in this document they have authority enough, to enlist, and they do enlist the active service and the friendly cooperation and all of the volunteer help they can get from engineers and all classes of trained or informed

persons. So we have no reflection whatever on the engineer except this one thought which I want to leave with you, which doesn't happen to be in the paper and may be a little bit foreign to the particular subject assigned me.

It will be a wonderful thing for the human beings who suffer accidents, and for society and business which pays for accidents, when we can get a little more positively into the minds and into the practices of the engineer the need and importance and operating value of specifying safe construction in the structures and designs that he is furnishing to the public and to industry. Those of you who have practical experience in plants know that the usual practice today is to purchase a piece of machinery or a piece of equipment and then tear your maintenance crew apart building guards around it; whereas if you had specified that, had your engineer designed that, in his original proposition to the manufacturer, the manufacturer would have been very glad to comply.

CHAIRMAN WINANS: Thank you, Mr. Lundrigan.

Now we will give Mr. Beck a chance to go the last lap on this. Mr. Ernest W. Beck is Supervisor of Safety of the United States Rubber Company, which at the present time is operating something over thirty plants, with something over 30,000 employees.

The Elements of a Successful No-Accident Contest

By ERNEST W. BECK

Supervisor of Safety, United States Rubber Company, New York City

It is generally known that the majority of our accidents are not due to mechanical or physical conditions, but to the human factor. We can see and handle the mechanical and physical hazards, but the human problem is not so easily solved. There are no two of us alike, therefore, we must give this human problem our serious thought and try many different means and methods to solve it. The average individual likes competition, and we should take full advantage of this element when promoting and maintaining an interest in safety. No doubt, the success of the large number of No-Accident Contests being conducted today is due to the friendly spirit of competition that is aroused on the part of the contestants.

It is surprising the large number of safety contests that are being conducted throughout the country today. Large industrial companies, I believe, took the initiative, and showed what could be accomplished. We now have several of our industrial sections and a number of trade associations conducting well organized safety contests. The New Jersey Department of Labor and the Industrial Commission of Ohio have started a statewide inter-plant safety contest. There is no question but that a well organized safety contest will accomplish a great deal of good and justify many times over the small expense of time and money. Inasmuch as this is a meeting of group plant safety supervisors, I am going to talk on the subject assigned to me as applied to the large company operating several plants at distant points.

There are many different kinds of contests, some lasting for a twelve-month period and others conducted for a week or a month. However, there are certain common factors and I will do my best to outline certain elements which I believe enter into any successful no-accident contest.

Plan All Details in Advance

In order for a No-Accident Contest to be successful, all of the details must be well planned in advance of the contest period. Make sure that you leave no stone

unturned, for it is surprising how many embarrassing questions may arise if your plan is not complete. Consider every possible factor and consult several others in the organization who may be concerned.

When a large company is about to start a contest, circular letters in the form of questionnaires, suggesting a No-Accident Contest should be sent to each plant. Tell the factories that the contest is their party. Ask them for their ideas and get as many suggestions as possible from all, but do not depend too much on getting enough ideas from your subsidiary plants to make your contest a success. My advice to the safety supervisor is to draw up his complete plan and then where possible apply the best suggestions received.

Decide on the most appropriate time to conduct the contest. There are certain periods of the year when such a contest can be handled more effectively than at others. The summer months are a poor time. I believe the best period of the year is May, October or November. When the plant has an unusual peak in its production is a poor time to start as the supervisory force who can make or break a contest are usually very busy. Of course, it is obvious that all the plants in a large company should conduct their contest at the same time.

After laying out your plans it is very essential that you should draw up a budget covering in detail each activity that you expect to carry on; such as printing, prizes, posters, etc. The purpose of a budget is to secure an appropriation to carry out the plans for the contest.

Sell Executives on the Idea

Before submitting your budget for approval, you should gather a few facts and figures that will assist in placing before your executives the advantages to be gained by conducting such a contest. Give a few illustrations if necessary of what others have done, and if you have conducted a No-Accident Contest before, give a few facts and figures of what was accomplished. Arrange for your president or your general factory manager to send out a general letter to all plants, announcing the contest, and encouraging cooperation on the part of all.

Safety, in order to receive the proper support, must be sold to the management. Management is accustomed to dealing in figures and it is surprising how simple a job it is to sell safety to the busy executive by showing him a well prepared set of accident figures. By all means keep accurate records and when you get them, use them.

Responsibility of the Central Safety Office

The central safety office should advise the local plants well in advance of complete plans regarding the contest. All printed material should be in the hands of the local plant committee several days in advance, so that they may plan their own method of distributing, handling and posting same. The central safety office should stay out of the picture as much as possible, so that the plant may conduct the contest according to its own ideas—following, of course, the fundamental principles laid down by the central office. It is very essential that the central safety office organized an efficient system for reporting all accidents.

In order to make the contest as fair as possible, a large group of factories may be divided according to the number of employees or to the nature of production.

The Importance of a Local Committee

Have a local committee organized at each plant. This committee will head up the campaign at the factory; think up and carry out the various ideas suggested and stimulate interest during the period of the contest. Be sure to select the right person as chairman of this committee, as so much depends upon him.

Encourage the subsidiary factories to promote original ideas. It is surprising the number of good ideas that will originate through a local safety committee and can be carried out at their point. So often these ideas cannot be carried out at another plant, due to the nature of production, location of factory, type of help employed, etc. The factories get a big "kick" out of some special idea they may put over. It is advisable to advertise among the other plants the special stunts that all factories are carrying out. If possible, get photographs for future use.

Outstanding Contest Feature

Among a large number of things that you do during the period of the No-Accident Contest, it is advisable to have some outstanding stunt—such as a picture contest of some kind; a puzzle or a written contest, which will arouse the greatest interest on the part of all men and women. Give prizes and have the contest open to wage workers only. The idea of featuring a special scheme is to encourage every one to participate. If you just go out to reduce your number of accidents, you never know how much effort, if any, was exerted.

It is essential that proper judges be selected in advance of beginning of contests. The local plants have a splendid opportunity here of getting some good local publicity by having as judges of their contests about three prominent men in the community in which the factory is located. We have had as judges at our several factories the following type of men:

- Mayor of the town.
- Deputy Commissioners of Labor.
- Presidents of local business associations.
- Representatives of the local press.
- Managers of local safety councils.
- The Clergy.
- The school superintendent or principal.
- The Chief of Police.
- Fire Captain.

Of course, you should also have a few judges for deciding the grand prizes in the contest. Such judges should be nationally known, and men who have won their spurs in the field of accident prevention. For the contest which we conducted last year—we were fortunate in securing three past presidents of the National Safety Council to serve as judges: namely, Arthur H. Young, Louis De Blois and Walter King. I believe the judges should not be employees of the company. This holds true especially when selecting the judges for the grand prizes. Keep the work for your judges at a minimum as the best judges are busy men.

One of the most successful elements in our No-Accident Contest was the large amount of excellent local publicity that we received—especially in the smaller towns where we operate. The local merchants entered into the spirit and placed posters in their windows. Large banners were stretched across the public highways, announcing to the public that a No-Accident Contest was in progress. The local newspapers printed daily articles and in some cases, we had several half pages and even a full page ad donated by the local merchants. The subject was mentioned in the schools and in the churches, and of course, was talked of in the homes. I cannot overemphasize the value of general local publicity. You all remember this same element of publicity was very effective during the Liberty Loan drive. Every safety man should consider himself a sales manager and an advertising manager. He has the finest commodity in the world to sell, but like other commodities, it has to be advertised and preached about if he is going to sell his goods.

Feature a Special Stunt Every Day of Week

During the period of the contest, it is necessary that the interest be maintained. This can be done by having a special feature for different days or weeks. One day could be "Fire Day," at which time you could hold a fire exit drill and also have a fire brigade drill, demonstrating the use of fire extinguishers, and have a fire inspection at the plants. Another day could be "First Aid Day." A demonstration of the Schaefer Prone Pressure Method of Artificial Resuscitation could be given. You could have a day for signing "Safety Pledges"; also a "Home Safety Inspection Day." Another period could be devoted to speakers. Have a day or a week for safety inspection of the plant. Have a safety slogan for each day. In other words, don't let the interest drag.

One of the best methods of putting over the safety message is the use of safety motion picture films, even better than a good safety talk. I believe you can appeal to the eye much better than you can to the ear, and you are leaving a more lasting impression as each one draws on his own imagination and applies the picture to his own experience and living conditions. The story in the motion picture also goes over big among the foreign help, especially those who may not understand a well prepared safety address.

Post Accident Records

Daily records of accidents and results of other activities during the No-Accident period should be given extensive publicity. In addition to giving the plant executives and supervisory force an up-to-date record of all results accomplished, be sure to post records on the bulletin boards about the plant. The employees should be kept advised of the results being accomplished. This can be done in many ways. When possible show results in the illustrated manner, by thermometers, clock dials, automobile races, and the like.

Encourage competition between departments and plants. Men and women are like grown up children. They like to play and enjoy competitive games. We should take advantage of this characteristic and encourage competition between departments and also between plants. It is surprising the amount of good that can be accomplished by encouraging healthy competition.

Among a large number of companies participating in a No-Accident Contest, you are sure to have some factories showing more interest than others. You will find yourself busy with the active factory because they are keeping you advised of what they are doing, while the factory that is not doing very much is not taking much of your time. You should watch this situation closely and endeavor to stimulate the interest of all factories by telling them just what the other fellow is doing. Endeavor to get the interest of all departments and plants. It is usually the department or plant that shows the least interest that needs your attention the most. Give your accident statistics wide publicity in your organization in such a way that they will cause the negligent to do better and further encourage those who are doing good work.

The foreman can make or break a No-Accident Contest. If he is lukewarm and shows a lack of interest it is to be expected that the men under him will feel the same about the matter. In order for a No-Accident Contest to be successful, the foreman must take a personal active part. He should give out the material personally; he should speak to his men about the contest and if he takes his part seriously and conscientiously, the contest will be a success.

Hold Safety Meetings

Of course, it is necessary in any well organized safety contest to hold meetings. When conducting such meetings, be sure that the big boss is there, in fact, he

should always have a few words to say on this subject at any safety meeting. I have heard of factory managers and superintendents who said that they were too busy and did not have the time to be present and speak at a safety meeting. Such factory managers are passing up an excellent opportunity to put over safety at their plant. As a matter of fact, they may not know it, but their very absence hurts the safety movement at their plant as the employees, foremen and others are going to do their own thinking and in the majority of cases, they will think that the factory manager is not interested enough in safety to be present.

Accident prevention is a responsibility of management. In large plants, we may have safety experts, but if the *big boss* at the top *does not come out* for safety and *does not* pass the word down the line and does not do *what he can* to sell the safety idea, *we are not* going to accomplish the desired results. Safety meetings should be held on company time and I believe should not last over one hour. At such meetings accident records and the results accomplished should be mentioned, together with a story of what the other fellow is doing. The meeting should be snappy, unusual experiences should be mentioned, and the meeting should close with the feeling on the part of all that it is possible to do even better.

Use National Safety Council Posters

Something in advance of the contest period, draw up a form for all factories to fill out, recording the number of safety bulletins wanted and the kinds desired. This selection should be made from an analysis of the accident causes. Be sure and order plenty of National Safety Council posters. You might arrange for a home made bulletin contest. Suggest that you also print safety slogans on large signs three feet by seven feet. They can be read the full length of the yard or shop.

I stated at the beginning of my talk that the highest executives in the company should send out a letter asking all plants to cooperate in conducting the No-Accident Contest. While the contest is in progress, it is advisable that follow-up letters be written by factory managers, superintendents and foremen, encouraging the continued effort on the part of all and thanking them for their cooperation in the past. Such letters not only stimulate the interest of employees, but I believe help to further sell safety to the supervisory force signing such letters.

Presentation of Prizes

Prizes should be given as soon after the close of the contest as possible. Have one of the higher executives present the trophy and take pictures of the occasion for publicity in local and trade papers. When prizes are given for the best replies in written contests, I believe it is advisable to give special recognition to factories turning in the greatest number of replies in proportion to the number of their employees. My reason for saying this is that a large plant may exert a great amount of energy to get all of its employees to respond to a request, and may not win a prize,—while the smaller plant with only a few employees may win a prize.

We have purchased an additional prize as an honorable mention on account of the excellent work which a particular factory had done. Do not skimp on the prizes as it is poor economy. A successful No-Accident Contest will not only pay for itself many times over, but so often accomplishes things that money cannot buy.

There are a large number of trophies that may be given as prizes, and they vary from loving cups to gold pieces. For three years the company which I represent has given large bronze plaques artistically designed, which were hung up and required very little attention. We believe this is better than giving a

loving cup or some other article that needs periodical attention or that soon wears out. Two years ago we tried out a scheme of presenting the original oil paintings, photographs of which are used on the National Safety Council calendar. These paintings were very well received by the factories winning them. They were placed in a glass case with special illumination over the frame,—and hung in a conspicuous place where all the employees could see them. They are a beautiful piece of art and tell a safety story.



Four of these trophies were presented by the U. S. Rubber Co. to winners in its 1927 Annual Safety Contest.

When your contest is all over and the prizes have been awarded, I believe it is advisable to write the complete story for publication and distribution to all the employees. Show a large number of photographs of prize winners and safety rallies taken at factories. Publish the results accomplished. All this stimulates further interest.

Secure Comments and Criticism

At the close of your contest, I believe it is a good plan to write to all factories and ask for their comments and suggestions on how to improve the contest when conducting it again. Ask several questions, and it is surprising what you will learn even after running contests for several years.

There are many other elements, but time does not permit me to mention them all.

When conducting safety contests, where you want the employees to know and

follow the details closely, it is advisable to have as few rules as possible. Avoid complicated formulas and if possible, say nothing about frequency and severity rates. As the employees become educated to figuring accident rates and using formulas, more details can be used. The basis of conducting safety contests varies. Some people use the best severity rate,—others the best frequency rate, and some both. Some plants arrange for the largest reduction in severity and frequency rates,—while others take the longest period without a lost time accident. There are a few who use other adjusted methods.

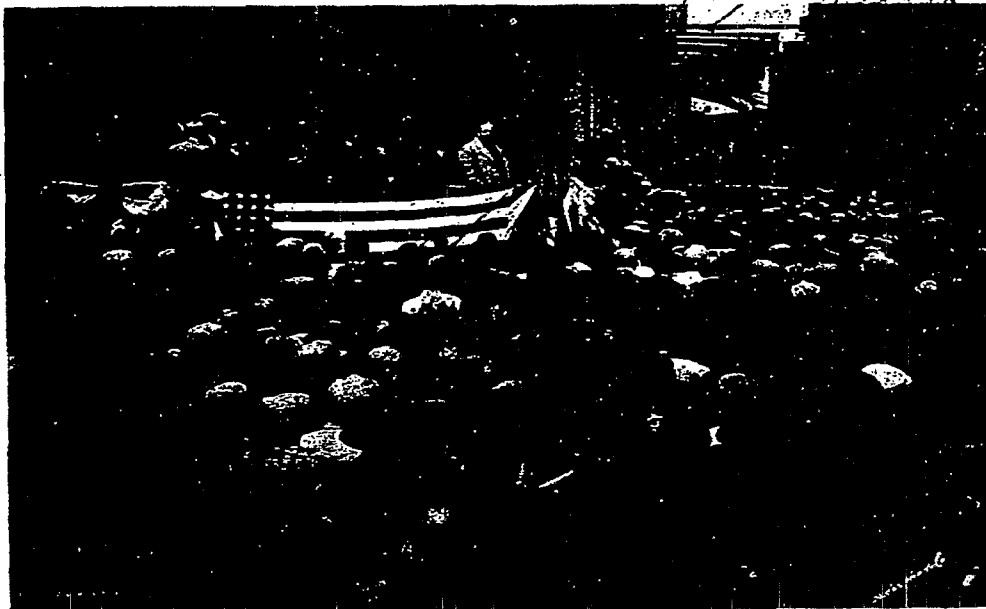


Photo killed 8/35

Presentation of trophy to the Indianapolis plant, U. S. Rubber Co.

United States Rubber Company Formula

The formula which the United States Rubber Company uses is quite different from any which I have seen, but it is designed to accomplish the same purpose.

Before explaining our method, I would like to state that if I were starting a safety contest in a company among factories where little or no safety work had been done, I would most certainly start with a simple plan, such as the best frequency rate.

In a large company like ours, where the subject of safety has received attention for many years, the various factories object to using a frequency rate alone or a severity rate alone, and some of our factories have objected to the use of both, so in order to satisfy every member of our large family, we have drawn up what might appear to many to be a very complicated formula, but the "proof of the pudding is in the eating."

We have made but one change in our safety contest formula during the last five years, and that change pertained to death cases only.

We agreed that four factors should enter into our contest, namely, severity rate, frequency rate of lost time accidents, frequency rate of all accidents and a cost factor. We do not use the cost per \$100 of pay roll, as there is quite a fluctuation in the wage rate at our several locations. The wage rate in South Carolina is quite different from the rate in Michigan or Massachusetts, so we use the cost per 1000 man hours worked, which gives us the cost per exposure to accidents. After settling upon these four factors, we of course, realized that they did not carry the same importance and should not carry the same weight in determining a safety contest formula. Consequently, we weighed them as follows:

Severity	50%
Frequency (lost time)	25%
Frequency (of accidents)	5%
Cost per 1000 Man Hours Worked	20%
	100%

We have a complete simple manual covering all accidents and compensation records, so it is not difficult for us to get an accurate record of the number of accidents, days lost and cost involved. All factories, of course, use the standard manual and a record of every accident that happens at any of our plants is sent to a central office, where the final records are compiled and recorded.

You will note in our formula that 5 per cent is the maximum weight for all accidents. Our reason for placing this so low was to not discourage the reporting of minor cases. A factory in our contest can double its number of minor accidents and yet not be penalized more than 5 per cent. We find this low rate works out very well and the factories appreciate our keeping it low as we will always have a number of minor accidents and we should not discourage the reporting of minor accidents by placing a heavy penalty on them.

The United States Rubber Company contest is based on the percentage of improvement shown during the current year over the average experience for the past three years. The factory showing the highest percentage of improvement wins the prize.

Our compensation paid for injuries has steadily declined in spite of the more liberal laws which have been enacted in practically every state where the company's factories are located.

This contest has brought about some wonderful results, in fact, it has surpassed our expectations as during the last five years we have shown an improvement over each of the preceding years. The following table shows the percentage of improvement each year over the average experience for the previous three years:

Improvement for Company as a Whole—Year 1924	7.22%
Improvement for Company as a Whole—Year 1925	12.54%
Improvement for Company as a Whole—Year 1926	10.95%
Improvement for Company as a Whole—Year 1927	29.02%
Improvement for Company as a Whole—First 6 Months 1927	32.44%
Improvement for Company as a Whole—First 6 Months 1928	43.42%

As time goes on our contest will become keener and keener as all factories will be trying to show an improvement over a good record. We have been surprised to see some of the factories with very good past records come through with an improvement.

As time is limited, I have purposely avoided mentioning the details of our contest formula, but if any one present would like to have our method explained in detail, I have come prepared to place in his hands the complete story. At the close of this meeting, I will be pleased to give anyone a typewritten story of our

method. Or you may write to me for a copy of same at my New York Office, 1790 Broadway.

Don't think that a No-Accident Week or a safety drive will inject enough enthusiasm into the workman to last six months or a year. It is not the spasmodic outburst of fireworks, a brass band and a big splash that will accomplish the desired results.

All these methods mentioned, and many others, have their place, and if seriously carried out, will have a certain favorable effect in selling safety to the man on the job. But those of us who have devoted several years to the cause of accident prevention, know it is the every day plugging away that counts in the long run.



Presentation of trophy to the Passaic, N. J., plant, U. S. Rubber Co.

CHAIRMAN WINANS: Now the fun begins. It is going to be your chance to do some of the talking and we will take half an hour for it if you want to.

Now we will go back to the first subject which was presented by Mr. Hoyman and give you a chance to ask him questions on his subject, "How We Keep Safety at Work in Our Distant Plants." Is there any comment or question on that subject?

W. C. REIRLING (American Tar Products Co., Chicago, Ill.): I would like to ask Mr. Hoyman whether they give any compensation or prizes or awards for accepted suggestions from a suggestion box?

MR. HOYMAN: No, we do not.

CHAIRMAN WINANS: Why?

MR. HOYMAN: The reason probably is because we never thought that that was the desirable thing to do. On contests in a few individual cases we have given prizes for a slogan or for a suggestion but not for the suggestion of the regular Safety type that I spoke of in my paper.

MR. REIBLING: I think it is a very important point. We want to give money prizes in proportion to the saving. We have seen a certain danger in giving money to men who make suggestions. For instance, if they save us by a new process or new method or new device \$10,000 a year, we like to give them \$1,000, say, for that, but there has been so much objection to it and so much danger in starting a thing like that that we are very anxious to get suggestions on it.

CHAIRMAN WINANS: Is there any other experience on this question of money awards for suggestions that are accepted?

MR. WHEELER (Union Carbide Co., Niagara Falls, N. Y.): We ran a contest on suggestions at our Niagara Falls plant and we got very good results on it. We had over 1,500 suggestions in one month. The contest was open for one month, and you would be surprised to see all the things that were brought in. It was very educational and very good for the men. There was money paid for those suggestions in our contest.

EDGAR G. QUESNEL (Safety Engineer, Commonwealth Steel Co., Granite City, Ill.): I have two questions here which I would like to ask Mr. Hoyman. First, do you find any tendency on the part of the branch plants to conceal a bad record?

MR. HOYMAN: That is rather a difficult question because if you found a tendency of course you would try to curtail it. You know, as well as I do, that the dividing line between a lost time accident and one that is not a lost-time accident is subject to considerable variation, depending upon the person who decides that. In other words, if you arouse a considerable interest in safety or safety records in your plant, of course you are going to have men work with injuries which very likely are important enough or severe enough that in other plants they would lose time.

In answering the question, however, I don't believe that we have noticed any tendency toward concealing accidents, because in order for a man to work in our plant we have either nurses or doctors on hand at all times and every accident of any description whatsoever is reported. A very hard penalty is placed on a man who conceals a scratch; for instance, if it becomes infected later on, it very likely will cost him his job. We go according to the doctor's experience as to whether a man can work or not.

CHAIRMAN WINANS: What is your experience on that, Mr. Beck, in your contest?

MR. BECK: I have been very much pleased with some of the questionable cases that have come up as the result of our contest; in fact, a year or so ago we had one of our prize winners change their figures, which you can see might be possible with a case that might develop into a permanent partial disability; and the particular manager of that plant wanted it distinctly understood that he did not want that prize unless he was entitled to it. I think there is a very fair spirit among our factories on that score. They may question some of the smaller lost time cases, but when it comes to the big questions of right or wrong, I think that they don't want credit unless they are entitled to it. Then again, it is so easy for us to catch it. We have close supervision. We have a very complete manual of accident and compensation cost figures, and so forth, which they have to follow closely, and they certainly don't want to have it understood that they didn't play fair. We all like to play fair and we like a man who does play fair.

CHAIRMAN WINANS: Mr. Quesnel, do you want to comment on that yourself?

MR. QUESNEL: My thought in this connection was that in any accident safety contest there are a certain number of cases that must be estimated. If you have a close contest where two or more plants are running close together, would there be any tendency on the part of one plant to underestimate the extent of injury in order to lower its experience? For instance, a man is injured. You estimate that he will be off eight weeks. At that time it may look to you as though eight weeks would clear up the case, but later it develops that there is going to be some perma-

nent disability, such as stiffness of the fingers, or whatever the injured member might be, which would involve an additional loss. Would there be a tendency on the part of that plant to send in a revised figure or allow its previous estimate to stand, and should they win a prize on a close margin, and if this addition might make them lose it, would there be a tendency on their part to say nothing about it? That was my thought.

O. D. FREDERICK (Dirkes Lumber & Coal Co., De Queen, Ark.): What are you going to do when the manager doesn't even know of these injuries? We had a case in 1926 of a large sawmill employing 700 men, operating the entire year without a lost time accident, and they were awarded the prize. Six months later we had some lawsuits on our hands and we found out that the men were making up "pots" and giving it to the injured party in order to keep him from reporting the accident. In 1927 their record wasn't so good and this year it is very bad. Of course we are discouraging that as much as possible. That is a point on which I would like to hear if someone else has had any experience in that line.

HAROLD MOORE (Willis-Morrow Co., Elmira, N. Y.): I would like to ask if in any safety contest that you are running whether it is necessary for you to consider the extent of a permanency on a finger? We are out to prevent accidents. Does it matter from the point of view of an accident whether a man's finger is cut off at the first joint or the second? The accident is the same and we are trying to prevent accidents, so that in a safety contest it seems to me that the permanency should not be regarded at all.

There is another point. Let us take this question of hernias. That is always cropping up. In the case of a hernia you may have some predisposing condition with a man which may make the usual eight weeks totally inadequate to cover the lost time. Should you or should we in running a perfectly fair safety contest penalize that department where a hernia is sustained, where you have a permanency or an extended disability which has nothing to do with the case itself at all but is dependent upon it?

CHAIRMAN WINANS: Mr. Moore, may we take that up when we get to Mr. Beck's paper as to the rules of the contest? Mr. Beck has his formula here and we will take that up as a part of that general subject. We are talking now about keeping safety work up in the distant plants. Is there any question on this point that Mr. Quesnel brought up, of a tendency to misrepresent the records?

V. D. SUTTON (Postum Co., Battle Creek, Mich.): Mr. Hoyman said, in answer to Mr. Quesnel's question, that they penalized the man who had a trivial injury which later developed seriously. How do you penalize him?

MR. HOYMAN: We have a very strict rule that every accident, no matter how small, must be reported to the foreman and to the first aid room. The first occasion like that very likely would be a warning; on the second occasion we would lay him off. With the facilities that we afford for every accident to be reported and taken care of by having nurses in the plant full time, there is no excuse, and we accept none, for not reporting accidents of any description, no matter how small.

J. W. MYERS (Standard Oil Co., New York City): I would like to ask Mr. Hoyman whether that One Hundred Year Safety Man is weighted according to the hazard of the department?

MR. HOYMAN: No, it is not, excepting by the fact of only as to size of the department. Otherwise as to the hazards in the various departments we do not recognize that.

MR. MYERS: Doesn't the department with the relatively small hazard cash in on an unfair share of the prize money then?

MR. HOYMAN: That may be. I described in my paper a construction department or maintenance department that had gone four consecutive years. The thing that I was trying to prove there was that the hazards in the various departments cannot be judged by what a man might think about the hazards. The work is just as

safe as the man who is doing it makes it. In other words, the so-called hazardous work is not where our accidents happen, because the man who is familiar with that fact, who knows or thinks that that is supposed to be dangerous work, is more careful in consequence and is hurt a fewer number of times than our fellow who is walking around and drops something on his foot in non-hazardous work.

MR. MYERS: Mr. Chairman, we would like to hear from Mr. Beck on the question of hazard rate.

CHAIRMAN WINANS: Mr. Beck, will you please give us the allowance for variations in hazard in your different plants and departments as outlined in your contest formula, when we come to you.

Now, gentlemen, are there any other questions to ask Mr. Hoyman?

L. A. LADOWSKY (Pullman Co., St. Louis, Mo.): Don't you think a safety supervisor is better than just relying upon the foreman? You say, Mr. Hoyman, that you don't have a paid safety supervisor in your department. Don't you think it would be better to have a safety supervisor who would take care of those things and not rely upon a foreman for that?

MR. HOYMAN: What I said was that we have no safety man, engineer or supervisor, who puts in full time on that. We have a man in our "Service Department" who takes care of the safety work along with other duties. These things on safety naturally come to him, but he is not a full-time safety man.

CHAIRMAN WINANS: Are there any other questions for Mr. Hoyman?

J. J. WELINGTON (Brown Co., Berlin, N. H.): I would like to ask Mr. Hoyman if they have nursing service for the three eight-hour shifts?

MR. HOYMAN: No; perhaps I misinformed you there when I said "full time." We have our foreman trained in first aid to the extent of night service and facilities available for taking care of nights and a foreman to whom they must report everything that they take care of.

J. C. CAMPBELL (Reserve Gas Co., Clarksburg, W. Va.): Mr. Hoyman, under suggestions, I would like to know how you handle them. You say you make them out in triplicate. Who acts on them? Also do you have anything that is hazardous reported immediately?

MR. HOYMAN: I take it that what you are trying to find out is how we get action on safety suggestions. I said the foreman must make it out because he is in the line of authority and things should come through him. The so-called safety man that I spoke about, who works part time on that and to whom these suggestions come, in investigating the suggestion determines as to how soon that should be done; and he in turn in making out his requisition states their either "immediate action" or "can wait for some time." By the way, that goes back to our main office and the manager puts his okeh on it, which means that he also is informed, and it goes through as written.

CHAIRMAN WINANS: Mr. Hoyman, do you want to say anything in your own defense before we close your part of the story?

MR. HOYMAN: I don't know. I hope I don't need any defense. However, the things that I enumerated are only a small portion. I was trying to give you a little picture of just a few things that you might want to use and on which I would be glad to give you further details in a personal talk with you. I believe I can make myself more intelligible and even appear a little bit more intelligent in talking to one person rather than in talking to a crowd.

CHAIRMAN WINANS: Now Mr. Lundrigan will take the stand. His subject was, "What Should Be the Status of the Group Plant Safety Engineer?" How many of you disagree with the idea of close central office control over your plant safety operations? You don't need to tell me. I want you to tell him. If you have any questions to put to Mr. Lundrigan or any comments, this is your opportunity.

J. W. MYERS (Standard Oil Co., New York City): Mr. Chairman, I didn't quite understand what I thought was going to be the main point of his paper. Do the local plant sanitary inspectors or safety inspectors report direct to Mr. Lundrigan, or does his line of authority go through the management?

MR. LUNDRIGAN: As I understand the question, the gentleman wants to know whether the local safety supervisor is a part of the general office organization at New York or a part of the local plant safety organization. Is that it?

MR. MYERS: Not exactly. I want to know whether the local safety man reports direct to you or whether you act in an advisory capacity through the management.

MR. LUNDRIGAN: He reports direct to me through his plant manager. We refuse to read a report that his plant manager hasn't signed.

MR. MYERS: Do you give orders to him direct?

MR. LUNDRIGAN: His orders are the written rules of the company.

MR. MYERS: If you think some change should be made in a safety code do you order that thing done or do you recommend it to be done to the management and the management orders the safety man to put it into effect?

MR. LUNDRIGAN: Those orders are printed instructions of the International Paper Company, and have virtually the authority of the president of the company. He, of course, isn't bothered with the detail of their application or carrying out. They are printed as "General Instruction No. 74," for instance, signed by the International Paper Company. They are a part of the operating policy of each local plant, just as the question of blowing the whistle at a quarter to seven is a part of it, if that is what you are getting at.

MR. MYERS: I don't think you have quite answered my question. Do you have a direct line of authority through your local safety man?

MR. LUNDRIGAN: Through the local manager to see that he carries out those rules and makes the report required under those rules. We check him up constantly. We have two traveling supervisors, both of them are in the room, whose principal duty is to study the weekly reports of the safety supervisor.

MR. MYERS: If you want to correct a condition do you make a recommendation or do you issue an order?

MR. LUNDRIGAN: If we want to correct a condition provided for in our rules or a condition that has been recommended by the safety committee at the plant and approved by them, or a condition that we have found at the plant that comes within our rules, we ask the mill manager why he hasn't done it. The mill manager is the sole authority; he is the International Paper Company, as I tried to say, in the territory where he operates, in so far as our organization is concerned. We issue a supplementary instruction in which we say to the mill manager that he must endeavor to meet the date of a local safety committee meeting at which he should personally preside, unless of course he is ill or on his vacation or something of that sort, when common sense governs, and the man in authority takes his place. He is the chief executive and chairman of our local safety organization. He is positively controlled to the minimum of responsibility and performance by these written rules which I realized were somewhat tiresome reading.

Those rules, as I said before, or intended to say, are virtually prepared and approved of by every plant manager, every safety organization in our company, before they are ever put into authoritative form, so that a favorite expression, challenge or boast, or whatever you want to term it, of those of us who go out from New York is to say, "Those are your rules. You said they would work. You went farther than that and said that they would help you; that you wanted them, and you now have them and we are here to see that you live up to them." Then we go still farther and we say that we can personally come into the plant and apply any one of those rules or any supplementary instructions connected with them, not only without any difficulty but to the betterment of your condition and

particularly your cost. That is our position and of course it sounds somewhat egotistical, boastful, and so forth. We seldom have to use it, but if we ever do have to, so far after eleven years of performance we have been unanimous in proving that we were right.

DR. ETHELBERT STEWART (Commissioner, U. S. Bureau of Labor Statistics, Washington, D. C.): Mr. Chairman, the statistics we get from all industries of all sorts, wherever this matter comes up, show that about 85 per cent of the accidents occur to men who have been less than 30 or less than 60 days on the job, and an enormous percentage occur to the men who have been two and three days on the job. All of these companies have a high labor turnover. What do you do with the fellow who comes in and can't read your rules? The single manager in your shop can't get hold of every new man who comes up and teach him what to do; and after all haven't you got to have some scheme by which you can reach your accident rate that comes from the turnover, and must not that come from the bottom instead of from the top?

MR. LUNDRIGAN: I thank you, commissioner, because you gave me a chance to finish reading a part of my report.

Here is the answer: Beginning January 1, 1924, all mills shall establish an Employment Service for the purpose of providing for a more adequate supply of labor and diminishing the labor turnover.

Where the local supervisors of safety are employed they shall administer the details of the service, including the keeping of the records, except that (with the approval of this department) the mill manager or mill superintendent may designate some other employee to do so where conditions make it advisable.

It shall be the duty of the one in charge to keep in constant touch with the department superintendents and foremen both as to the immediate and future needs for help and as to the possible reductions in help in each of the mill departments.

He shall furnish each new employee with a copy of General Instructions No. 14. Rules and General Instruction No. 74, Safety Organization, instructing him particularly as to the Safety Provisions, including First Aid and Nursing Service provided at the mill.

He shall personally introduce the new employee to the department superintendent or foreman, advising as to whether or not the new employee claims experience in the work he is to do, and in either case recommend to the department superintendent or foreman that he be given adequate instructions as to the nature and hazards of the occupation.

When an applicant is not hired and desires to be considered for future employment, he shall make a record of all the information the applicant is willing to furnish, on Form No. 287 "Application for Employment and Record of Service," the same as though the applicant were actually hired, including whether he will be available when a vacancy occurs or whether he will accept a position other than that applied for, entering the acceptable occupations by name on Form No. 287.

Form Letters (see Mill Form Instructions No. 304) shall be used to notify such applicants of a vacancy when it occurs, accompanied by an addressed stamped envelope for reply.

The Employment Service shall have up to date information available to both applicants and employees covering at least the following subjects:

1. Rates of wages paid by this company for each occupation the applicant is willing to accept.
2. Up to date lists of boarding and rooming houses, with locations and actual or approximate rates for weekly board, for rooms and for meals.
3. Means of transportation and fare back and forth from the principal points in the mill town or vicinity to mill.
4. Location and rental cost of various types of dwellings.

5. Location of schools and kindergartens, including denominational schools.
6. Location and denominations of churches.

Does that answer your question?

DR. ETHELBERG STEWART (U. S. Bureau of Labor Statistics, Washington, D. C.): How many languages do your employment men speak?

MR. LUNDRIGAN: In the United States we think we can point somewhat with pride to the efforts that we make to Americanize and educate our help. We have in four district schools today, that started the day after Labor Day, a Labor Accident Hazard Course being taught at the expense of the International Paper Company, and in one or two instances it took a year to induce the Board of Education to permit it.

CHAIRMAN WINANS: Thank you very much, Mr. Lundrigan.

It is Ernest Beck's turn next. There have been a couple of questions asked already. The first one was about the weighting of the accident hazard.

MR. BECK: In any well planned safety contest it is necessary to have a set of rules; you must have a set of standards. When you are operating 30 factories in 12 different states, you have got the compensation laws of all those different states which you might think would disturb you in operating a contest, but it doesn't. We accept the standard scale of time losses as agreed upon by the Industrial Accident Boards and Commissions and the National Safety Council, and that is what we base our contest on.

It makes no difference whether I lose that finger or this finger. I am not so much concerned with the number of days that the man may stay out when he loses this finger or that finger. In some cases he may come back within 10 days after losing all of that finger, while another man may be out two months with that finger. We charge 600 days, or whatever it may be, for that finger, regardless of where it happens, when it happens or how it happens, because it is a loss to society of the right index finger, and that is the standard procedure in all 12 states in which we operate. You have to do that or you won't get anywhere, because you are going to have one plant say, "We have a clever doctor. He gets the men back in 15 days after the loss of an index finger." In another plant the doctor isn't so good and he takes a couple of months. As a matter of fact, the one man may not be in as good health as the other man. You must have a set of rules to govern you.

I believe your hazards are already determined in the base rate. If you take the average experience over the previous three years and hit an average, I think you have got the hazards at that particular plant pretty well weighted. Then, you see, you have another year on which to show an improvement on that particular average, which is a three-year average. We have plants where we have more women than men, where women stand and make footwear. We have plants where men stand at heavy motors and conveyors, handling motors weighing 500 pounds. After three years of exposure in that plant where we handle heavy motors and conveyors, we are bound to have more disability than where we have women working on light-weight footwear. But over the three years' average the factory with a bad experience has to try equally as hard to improve its experience because it has a high rate and it takes a big percentage of reduction to show a large percentage of improvement.

While I am talking on that score, the proof of the pudding is in the eating. In the five years that we have been conducting our contests, I have been dumb-founded to find each year that we have shown an improvement over the previous three years' average.

These are the figures:

In 1924 we showed 7.22 per cent improvement; in 1925, 12.54 per cent improvement; in 1926, 11 per cent improvement, and in 1927 we showed a 29 per cent improvement over the average previous three years, each year of which showed

an improvement over the previous three-year period. For the first six months of 1927 the improvement shown was 32.44 per cent and for the first six months of 1928 it was 43.42 per cent.

CHAIRMAN WINANS: That's fine. We have no opportunity for more questions if we are going to close this meeting on time and if it runs any longer you are going to say so.

DR. ETHELBERT STEWART: I would like to make one statement. I am not sure that this is true but it sounds like a good many other things that I know of, that are true. A railroad company in a contest was accused of having cut off a man's leg and put him in a chair and it took two men to wheel him down so he could be a watchman at a crossing and it wouldn't be counted as a lost time accident.

Just how much do you protect yourselves in these contests against the schemes of the fellows who are going to get the premium for winning the contest?

CHAIRMAN WINANS: I believe, Commissioner Stewart, Mr. Beck's previous answer covered that, namely, that the established schedule for permanent disability penalties applies throughout all of their plants and they can do the very thing you illustrate and still the penalty would go against that plant for the permanent disability caused by the loss of that man's leg. So I think the incentive for misrepresentation there is removed.

Are there other questions?

C. W. SCHEIHING (Oxweld-Acetylene Co., Newark, N. J.): Mr. Beck says to get a contest started that you must have it well planned in advance. We all know the foreman is the key man in the plant. In what way does Mr. Beck educate the foreman so that the contests go over efficiently?

MR. BECK: The president sends out a letter declaring the contest, which goes to the factory manager who in turn sends out a letter, and then there is a committee appointed and they organize the plans and work with the foreman, and the thing just grows.

(At the close of the session Mr. Ernest Beck displayed a number of lantern slides, illustrating safety trophies and scenes at safety rallies, some of which are reproduced with his paper delivered earlier in this session.)

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Special Session For Industrial Executives and Engineers

October 3, 1928

ROBERT ADAMSON, Chairman
Vice-President, Bank of the United States, New York City

The Special Session for Industrial Executives and Engineers was called to order by Mr. Charles P. Tolman, Consulting Engineer, 111 Broadway, New York City.

MR. TOLMAN: Gentlemen, it becomes my pleasure to open this meeting on behalf of the National Safety Council and to introduce the chairman, who will preside during this session. Before doing so, I would like to say that this meeting, in my opinion, is one of the most significant meetings held during this Congress.

For a period of seventeen years, the National Safety Council has been steadily developing the cause of the prevention of accidents. The movement started out of the bigness of heart of a group of men, but as it developed it proved to have a broader and deeper meaning from the standpoint of industry.

For a long time, accident prevention was regarded as more or less of a charitable, kind-hearted thing to do. We all know that executives are not privileged to extend charity in the name of their stockholders. Not until it became known that safety activities are a necessary feature of good management, profitable to management, and that the failure of adequate safety activities means bad management and loss of profits, did it become possible for the industrial executive to do as an executive that which he wished to do as a man.

This meeting, largely of business executives, in a city which is the executive city of the United States, is today significant of the importance of this movement in industry and in banking and in all of those things that go to make up the economic structure of our country. It is a particular pleasure to me to introduce as Chairman to preside over this session, a man who has had extensive governmental activities, and who is known as one of the leading bankers of this country, Mr. Robert Adamson, Vice-President of the Bank of the United States.

CHAIRMAN ADAMSON: It is a very great pleasure to me to address a meeting of the National Safety Council, because it recalls a delightful experience of a good many years ago when I was officially connected with one phase of the work which you are doing. During that time I had the pleasure of attending two of your Congresses. It is remarkably significant to see the wonderful growth in the attendance, in the interest and in the comprehensive breadth of the subjects you are discussing, since the last time that I sat in at one of these Congresses.

Mr. DeBlois told me that I was the second banker who had ever presided at one of these functions. I don't know whether that would be regarded as a good thing for the safety movement or not, because last night I heard a story illustrating the general character of bankers. A man applied for a position in a kitchen of a hotel. They asked him among other things whether he could shave ice or not. He replied, "I ought to be able to because I was formerly private barber to a banker."

I leave it to you to judge whether it is in the way of progress to have a banker as one of your speakers.

For many years I was the head of the Fire Department here in New York City. One of the most interesting things to me, and one of the most constructive things we were able to do was the work which we undertook in the way of fire prevention. It was comparatively a new subject at that time and we encountered great indifference and great apathy. We found it was a work of education. But one of the most significant things that I found, and it is a fact that applies to the work which you gentlemen are doing, was this: that the greatest number of fires did not occur in the places of greatest hazard, in the places where combustion was the easiest to start. The figures showed that the smallest percentage of fires occurred in the highly dangerous but well regulated industries, and that the great majority of the fires occurred in the homes of the people, where with the proper education and care they were preventible. That was a difficult matter to reach, because you couldn't reach it by enactment or ordinance. It was a matter of education, and that we undertook to do as well as we could.

I notice that a great deal of emphasis is placed in your literature on the word "accident." Strictly speaking, I think there is no such thing as an accident, because the things that we call accidents are merely the working out of the law of cause and effect. The great majority of those accidents are due to the human element. It seems to me that it would be an awfully good thing if we could coin a new symbol for this word "accident" which might bring into it an implication of the responsibility of the individual, because so many of them regard an accident as merely an act of Providence or something that they can't prevent. If you could find a word that would imply the human responsibility, you might do a great deal to correct the mental attitude toward this great subject.

Of course, the economic side of this question is one of vast importance. You only need to read the line on the first page of your prospectus here, saying that the economic loss in this country from accidents is five billion dollars a year. That is a stupendous thing, and when you say this you merely state a part of the problem, but a very great part of the problem which is before your Congress to solve.

I was encouraged when I read the other day the program for this convention, and saw how fully almost every phase of this subject has been covered. I know the wonderful progress that has been made along those lines. It can be solved only by the expert and by study and by education.

One of the most encouraging signs, too, along this line is the recognition, the growing recognition of industry of the importance of this subject. Your budget and the amounts of money which are now being spent by industries to prevent accidents is the most eloquent evidence of that.

I think that the cause of safety can be congratulated on the fact that in these industries there are many able, splendid men who are devoting their time, energy and thought to the solution of this problem. There are a great many in that work because they love it. I found in my contact with them that those men were devoted to this subject. When you get men who work with that enthusiasm and devotion and self-sacrifice, you are going to get somewhere in the solution of the problem.

This afternoon the program is going to follow along the lines of a given subject. Each of the four speakers here is to discuss, as an expert, some phase of that

subject. They are going to create for you a mosaic along that line, each one contributing to some part of it. It is planned that at the end of the speeches we are to have the discussion. It was thought better not to interrupt the continuity of their addresses by having the public discussion as the speeches proceed.

For the handling of the public discussion which will follow these speeches, the committee has thoughtfully provided an associate chairman, who is an expert along these lines, as I am not. I have great pleasure in presenting to you, as the first speaker, Mr. H. W. Heinrich of the Travelers Insurance Company.

The Origin of Accidents

By H. W. HEINRICH

Assistant Superintendent, The Travelers Insurance Company, Hartford, Conn.

An undertaking of great scope and value—such as the prevention of accidents undoubtedly is—depends largely for its success upon the soundness of the basic principles upon which rest its necessity and its method of operation.

We have long since passed the stage where the necessity for preventing avoidable accidents that result in death and physical injury needs defense. The mutilation of flesh and the spilling of blood are violations of nature; they are blots upon the perfection of a peaceful and industrious existence. Humanity bids up to prevent accidents. Even those skeptics who have argued that accidents should be considered an inherent part of profitable industry, seem to have been silenced by the discovery that accidents affect profits to a material degree—a discovery that resulted from the substantiation of the theory that the total cost of accidents to the employer is at least five times the visible cost as measured by payments for compensation and medical treatment.

We are not upon so firm a footing, however, when we analyze the basic principles which govern our methods of procedure.

I would like to make use once more (but perhaps in a different sense) of the oft-drawn simile between the prevention of accidents and the prevention of disease.

Necessity largely determines the sequence of action by the medical fraternity in treating a patient. Three steps are always considered and quite generally taken.

First—the immediate and outward evidence and result of the trouble is treated. For example, the flow of blood is stopped, the fever is reduced, the heart action is stimulated, and so on.

Second—the cause of the trouble (as shown by the diagnosis) is removed, if possible. If climate is at fault, a change is prescribed. If failure of organs to function caused the ailment, these organs are treated accordingly. In a broader sense—as in the case of fevers and plagues—wholesale action is taken, such as by quarantine, by oil treatment of swamps, by fumigation of ships, and so on.

Third—the patient is fortified, if possible, against recurrence; diet is prescribed to build up the system to reduce susceptibility, or exercise is recommended where it will assist in warding off a repetition of the trouble.

And so, too, with accident prevention we have the same three steps to take. Of course, we must treat the injury which is the *result* of the accident. Of course, we should guard against recurrence, if possible, by fortifying the patient—by which I mean providing goggles, gloves, leggings, and other protective devices, installing guards on machines, and taking other appropriate action to correct dangerous physical conditions; *but above all*, as in the case of bodily ailments, it is vital that we find and treat the *cause* of the trouble—in this case the cause of the accident. This, to a regrettable extent, we are not doing today.

We confuse the injury with the accident in our search for cause. We confuse causes and types and are therefore misled in our corrective action. The sequence

of events when an injury occurs is as follows: First, the cause; second, the accident; and third, the injury. Let me illustrate.

A person slipped and fell and sustained an injury. At the time he slipped and fell he was carrying an object of such size as to interfere with his view of the walkway surface, and as a consequence misjudged the location of the first step of a flight of stairs. Trucking and elevator facilities were provided for the transportation of these large objects, and the employee had disregarded instructions. Referring again to the sequence of events that exists in connection with all accidents, we have in this particular case first, the cause, which is non-enforcement of instructions; second, the *accident*, which is the slip and fall; and third, the injury, which is the result of the accident. Prevention of such accidents as this is obviously possible only through the determination of the *cause*. It helps us but little to assign this accident to an erroneously named cause—such as “slips and falls” or “contusions.” Nevertheless, this is just what is being done generally throughout industry. It is true that “slips and falls” is a cause. It is a cause of the *injury*, however, but not a cause of the *accident*, inasmuch as the *accident itself* is the slip and fall. It cannot but be obvious, therefore, that we, as accident prevention engineers, when referring to causes in connection with accident prevention, must above all things have in mind the cause of the *accident itself*.

This is so simple a fundamental that it must come as a shock to hear the statement made that industry in general is not now assigning accidents to true causes. You may perhaps doubt that this is actually so, and it may be interesting for you to check or test the validity of this statement. If you care to proceed along this line, I would suggest that you begin at your own plant and see just how far you have gone in the way of assigning accidents to *real causes*, keeping in mind that the cause of an injury is not the cause of an *accident*, and keeping in mind also that types of injuries, location, nature of injury, name of machine upon which the accident occurred or the department in which it happened, and other incidentals of this kind are not causes of accidents. You may also be interested to the extent of making a further check of the statement that I have made, which can be done by a brief study of national, state, and city tabulations of accidents and their causes, or by a study of data upon accident causes as provided by individuals and organizations throughout the country.

We are gathered here in a common cause and, needless to say, a worthwhile cause. We want results. We want to make progress. We are earnest in our desires. We spend much time in the discussion of ways and means to create and maintain safe working conditions. We use known hazards as a basis for our discussions, but we lack specific information bearing upon the relative severity of these hazards one to another. We are not even sure that the situations into which we inquire themselves actually produce accidents in great number. All we know is that accidents do happen and that hazards exist. We work faithfully and hard and are making commendable progress: but in a measure we are working in the dark—feeling our way along—retarded in our efforts to accomplish real and speedy results by the fact that we are not concentrating upon known causes and major issues.

Inasmuch as we do not know actual causes we, perforce, cannot know effective remedies. We know that education is good, and we apply it. We know that morale is a factor, and we work at that to some extent. We know that unguarded machines and other physical conditions present hazards, and we try to guard them; and we do other things of this kind that are worthwhile and that should be continued. Nevertheless, our efforts cannot bring the results that we desire until we know what we are doing and where we are going and have means to check our progress. These things can only come about through actual knowledge of accident causes and through what follows as a natural result, and that is, actual knowledge of effective remedies.

Criticism of the kind of accident prevention methods in general use at present, although friendly and sympathetic, is nevertheless non-constructive unless followed by something else. Progress has been made. Through painstaking research Travelers engineers have proved to their own satisfaction (and I believe it can be said to the satisfaction of others) that 98 per cent of industrial accidents are actually preventable, that 88 per cent of all accidents are due to supervisory causes, and that 10 per cent of accidents are due to physical causes; and they have determined what these causes are. Because the existing system of reporting accidents has not been so planned as to provide reliable data upon real causes, the task has been made difficult. We have, however, been able to obtain the complete stories of 75,000 individual accidents, and the results of an analysis of them have proved interesting and instructive. This is shown graphically by the accompanying chart.

Charting the Causes of Accidents

The circle at the top represents 100 per cent of all industrial accidents. The small black wedge, in the upper part of the circle, represents 2 per cent of all of these accidents that under practical working conditions may be termed unpreventable. The remaining white portion of the circle is the 98 per cent of all accidents that are actually and practically preventable. From this circle run two lines, right and left. The one at the left leads to a blank rectangle representing 88 per cent of all accidents that can fairly be assigned to causes other than material or physical. The smaller black rectangle at the right shows the 10 per cent of accidents that are truly caused by unsafe physical conditions.

Both lines converge at the bottom to a single point indicating the root-remedy. I have shown as a secondary root-remedy the employer-executive who has it within his power to enforce proper supervision—and, of course, to provide physical protection. Going still further, I have indicated in the lower rectangle that the employee is a root-remedy—as of course he is. An employee need not go to work in a physically unsafe plant, and if he is the proper type he may safely perform his work even under unsafe conditions and without proper supervision.

We all know, however, that it is not practical to expect the average employee to be perfect in these respects. He must be guided, supervised, instructed, and watched over. The employer-executive, however, can through the exercise of the very methods that promote production, efficiency, economy, and plant profits, control industrial accidents through the elimination or amelioration of actual basic accident causes, such as those listed in the following chart. There are seven items under supervisory accident causes and also seven items under physical causes.

These are noted in the graphic chart above described; and in further explanation of this chart the following points may be emphasized:

1. Both supervisory and physical causes may be controlled by the employer. It is apparent that in the last analysis the employee also may avoid accidents, even though he is exposed to unsafe conditions.

2. Accidents due to mechanical or physical exposures should be assigned to causes in the supervisory group, where the foreman had authority to install or maintain guards. In such cases we consider that the chief cause is laxity in supervision. By following this line of reasoning, we arrived at the total of 10 per cent shown in the "physical" group. As ordinarily analyzed, we found the physical total to be 25 per cent.

3. The value of analysis by the causes listed in the chart, as compared to the existing method of allocation as slips and falls, eye injuries, and others, is apparent. It permits concentration upon the things that count. It directs attention to supervisory responsibility or to physical hazards, both of which are controllable.

4. In supervisory item 2, we refer to *chronic* poor judgment, ignorance, and lack of skill, since *temporary* inability in these respects sometimes applies to properly qualified employees and would therefore be more likely to come under items 3, 4, or 5.

5. Terms such as carelessness, poor supervision, and improper selection of employees, have deliberately been omitted because of ambiguity.

6. An unpreventable accident (one of the 2 per cent group) may actually be due to one of the causes listed in the chart, yet the circumstances may prohibit assignment as a preventable case.

7. Some of the causes appear to overlap (unskilled and ignorant, for example) yet there are occasions when an accident is clearly chargeable to only one of the items, consequently all causes have been included in the foregoing list. Contributory causes should be shown as of secondary importance.

8. The necessity for brevity permits merely a condensed outline of causes. If the intent of each item is understood, however, the list will be found to be complete within the limits of practical application to existing industrial organization.

All the Conditions Should be Under Control

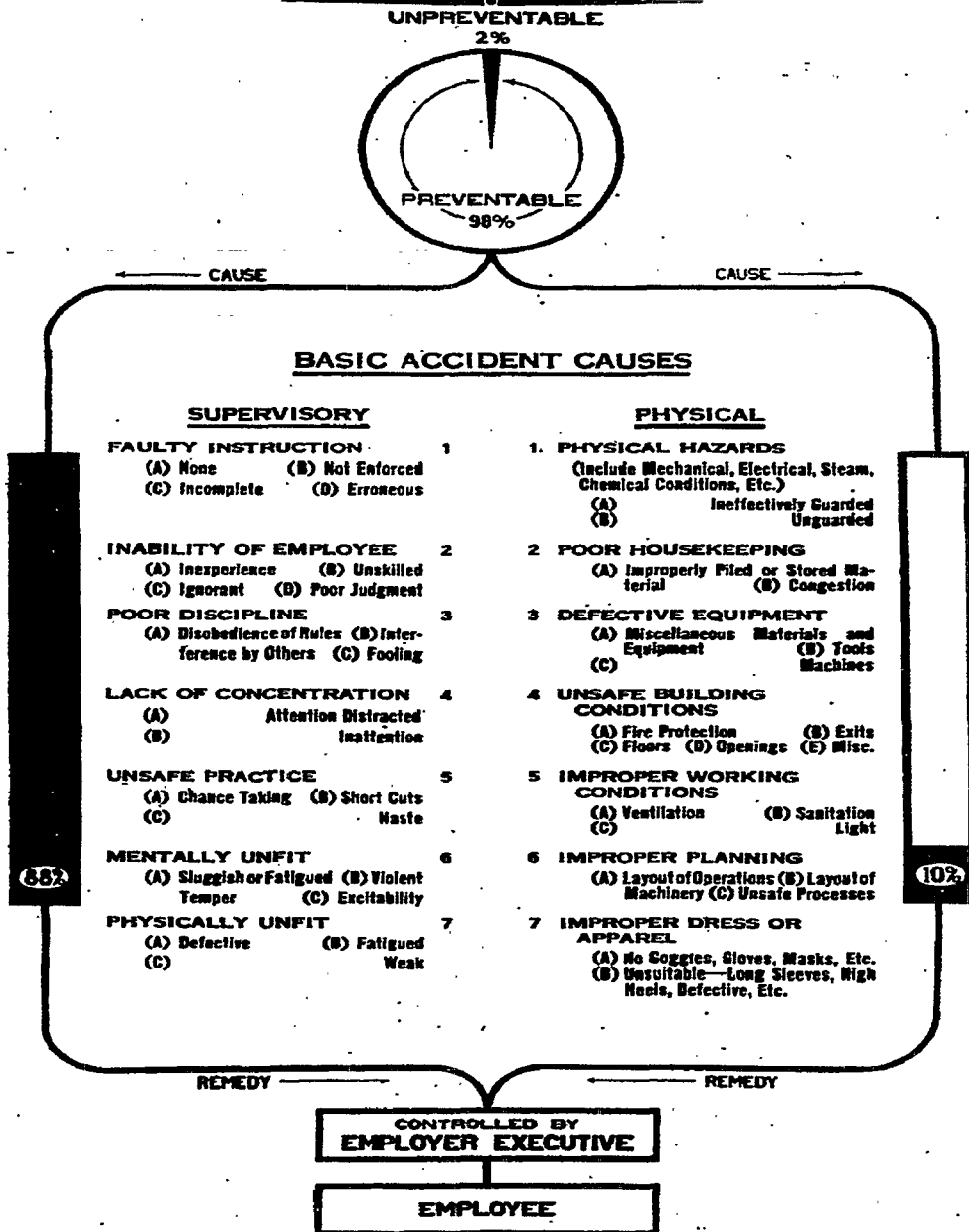
An employer will hardly deny that in a properly operated plant all of these fourteen conditions should be under the control of himself and his supervisory staff; and it also is apparent from a study of these conditions that they may be controlled by the very methods that are now used by employers generally in effecting economy, efficiency, greater production, and increased operating profits.

In addition to the humanitarian reasons for safety work which, in themselves, should be (and are) all-sufficient to compel us to eliminate preventable accidents, we know that these accidents cost industry approximately five billions of dollars annually. We have therefore a well-rounded-out incentive to our efforts. Without question, the frequency and cost of accidents in industry can be reduced speedily to 50 per cent of their present volume. I have said, however, that this reduction will come about chiefly through the recognition of the principles herein advocated, and I emphatically recommend the revision of present accident-prevention practices. I urge that the term "accident cause" be clarified; that a more systematic and determined effort be made to obtain the complete story of accidents from which the real causes may be more readily determined; that we set up a list of probable accident causes such as I offer you today (or another list, if a better one can be found); that we establish in our plants the practice of assigning accidents to such causes; and, finally, that throughout the various plants in industry and in the individual city, state, and federal bodies, we work out a uniform list of real causes and rearrange our method of tabulating accidents by causes, so that industry may have the benefit of nationwide data to which it may turn, to find and correct the predominating conditions that cause the industrial accidents of today.

CHAIRMAN ADAMSON: Gentlemen, it seems to me that your committee has been as happy in the wording of the topics to be discussed as it has been in the choosing of the speakers who are to discuss them.

We pass on in logical order to the next subject which is a part of this general subject, "Safety and the Individual." And to discuss that, we have a gentleman who needs no introduction to you. He was for many years supervisor of the fire prevention activities in the great Du Pont industry. He is an author of a very interesting work, "Organizations for Accident Prevention." He is a Past President of the National Safety Council. Since leaving the Du Pont organization, he has become widely identified with the whole safety field. In fact, we might say that he is a post graduate of the college of safety and conservatism. I have great pleasure in introducing as the next speaker Mr. L. A. DeBlois.

INDUSTRIAL ACCIDENT CAUSE ANALYSIS



Safety and the Individual**By LEWIS DeBLOIS**

**Director, Safety Engineering Division, National Bureau of Casualty and
Surety Underwriters; Past President, National Safety Council;
Chairman, New York Safety Committee**

I shall begin, not where Mr. Heinrich left off, but at a different point. I think you will find, however, that I shall come out on the same road eventually and that together we shall carry the subject along further, stopping for the other two speakers who are to follow us.

There have been in the past few years two outstanding contributions to accident prevention knowledge. One of them is not well known, at least in this country; the other, I fear, is not well recognized. The first is the work done by Miss E. M. Newbold for the British Industrial Fatigue Research Board and published as Pamphlet 34, "A Contribution to the Study of the Human Factor in the Causation of Accidents."

What Miss Newbold did was essentially this: She set up machinery for collecting the first-aid accident case experience of approximately 9,000 factory workers in relatively stable groups in ten different industrial undertakings. Some of them were men and some were women—but within each group all workers were subject to relatively the same hazards.

First-aid reports were the subject of the study because the period was not sufficiently long to permit the accumulation of sufficient data on lost-time accidents. Since every first-aid report was considered, you will see that the study was based on frequency and not on severity. There were 16,000 first-aid cases reported in the periods of observation which varied for the different groups from a few months to two years. The actual distribution of these reported cases among workers was then compared with the theoretical.

Most of you might conjecture, I think, that accidents in a given group would be fairly evenly distributed so that there would be a general averaging up of these unfortunate occurrences. This, however, is not necessarily the case. If accidents follow the laws of chance; that is, if we assume that accidents are solely chance occurrences, and if no one accident affects the occurrence of any other accident; that is, predisposes the injured person to a second accident, in very general terms the distribution should be, roughly: One-third of the persons in the group should have no accidents, one-third should have one-third of the accidents and the remaining third should have the remaining two-thirds of the accidents. This is a very crude method of expressing the working-out of a precise law, but it will suffice here.

Miss Newbold's observations of the distribution of accidents among individuals indicated in every case a marked deviation from what would be expected if accidents were chance occurrences. She found that a much larger proportion of persons than normal had no accidents, while a very small proportion had many more accidents than was to be expected. This latter class were the so-called "accident-prone." Let me add, also, the interesting fact that these accident-prone people seemed also to be those who reported oftenest to the first-aid stations and hospitals for minor sickness treatment.

If you stop to think about it, we in this country have reached, in a general way, about the same sort of conclusion about personal accident proneness. In regard to automobile accidents, for example, we admit that there is a small group of reckless chance-takers who cause most of the trouble. At the same time, we admit the existence of a very large group of drivers who operate their cars with no—or relatively few—accidents.

Now let us leave the British researches, retaining in our minds, however, the fact that it has been proven that an extreme accident proneness exists in a small proportion of each industrial group, and consider the second of the two outstanding contributions to accident prevention knowledge, which is, I think, our American experience in no-accident records.

We have been interested in no-accident competitions chiefly as a means of increasing interest in the safety movement; we have regarded as wonderful some of the no-accident records that have resulted; but have not we very largely missed the deeper lesson contained in this experience? I shall not take your time to give examples of conspicuous no-accident records, for our safety literature is full of them. They are to be found in all sorts of industries, in all sorts of plants and, naturally, for varying lengths of time. In terms of man-hour exposure, which is, of course, the proper basis for comparison, we consider that a half-million man-hours constitutes a significant record. From that figure, records go up to ten million man-hours, which is the highest I know. During these no-accident periods, there are no lost-time accidents.

What are the lessons to be derived from our American no-accident experience? First, let me say that I have studied a great many, but have never known one to occur except after months and sometimes years of painstaking, consistent effort. These no-accident records are not accidental; they are the result of human endeavor, and are accomplished only in plants where the entire personnel, from the manager to employees, is united in a determined effort to wipe out lost-time accidents.

Secondly, these records have been made in a wide variety of industries and sometimes in the face of extremely hazardous industrial conditions, foreign labor, high labor turnover, antiquated equipment, lack of safety devices, and, in fact, of practically every obstacle with which the safety man has to contend, except only lack of sympathy in the executive management of the plant. This latter is an obstacle which inhibits the making of a no-accident record.

The third point is the perfectly obvious one that during no-accident periods, not only are there no *avoidable* accidents, but those accidents which we have heretofore been pleased to call *unavoidable*, cease also. This is a paradox to which there is but one answer: there is no such thing as an *unavoidable* industrial accident. Mr. Heinrich, in his analysis of accidents, tells us that two per cent are unavoidable. If you ask me how about earthquakes, typhoons and hurricanes, I shall simply say that they cannot properly be termed *industrial* accidents.

We may now bring together the conclusions from Miss Newbold's researches in England and those derived from American experiences. On both sides of the water there is belief in an individual susceptibility to accidents; in other words, a varying degree of accident proneness varying, if you please, within wide limits—from zero to sixty, or higher. Our no-accident experience in this country, however, shows that each worker's individual accident proneness, no matter at what figure it started, becomes zero during a no-accident period and remains zero as long as the period continues. It seems probable, therefore, that the accident proneness of all men can be made equal or relatively so. This, in fact, is just what a no-accident effort accomplishes. In other words, we discover an ability to control individual accident proneness, almost without knowing that we were doing it.

You can see at once that this places our problem of industrial accident prevention on an individualistic, educational basis. If we are to succeed in national accident prevention, we must learn how to make mass effort reduce individual accident proneness to zero, not only within the industrial field, but among motor drivers, school children in the schools, people in the home and elsewhere.

Let us then turn back to our no-accident experience and see what it is that we actually do. Of course, during these periods we stop accidents. That is obvious.

But what is going on? What is the process in respect to each of these individuals at work in the factory in question?

I think the answer is so simple that we may have missed it. I am inclined to believe that it is nothing more complicated than the destruction of an old set of ideas (concepts) and their replacement by an entirely new set. We eradicate the old idea of accidents sent in upon our lives by God, by Providence, by "luck," by "chance," misfortune, or by whatsoever or howsoever you wish to speak of it or personify it. We commence to recognize that the accident, however sent, is humanly controllable. We recognize that the time has come for controlling it. That is all.

I do not know what may have happened to you as a child, but I escaped punishment many times because Mother said to Father, "Don't punish him; it was only an accident." There you have it: accident=excuse. We have grown up with it. It has been part of our lives. We spare men from the gallows or the electric chair because "it was an accident." Implicitly believing it to be something sent in from the outside and beyond our control, we have made it the excuse for anything and everything. But we are discovering now that, after all, it is within our control, so that accidental homicide practically becomes murder in greater or less degree. With the growth of the safety movement and the enactment of compensation laws, we lost the old defense of assumption of risk, fellow-servant and contributory negligence; we now lose the great human defense of "accident."

We have taken the groups of men in our plants and have sold them what we call safety, which is the "preventivity" of accidents. Incidentally, we have helped them to learn how to prevent accidents. We have placed behind their effort a body of public opinion which catches up the most reluctant, slow-to-act man in the plant and says to him, "We do not care whether you share our belief, but you must prevent accidents in this plant. Otherwise you will spoil our record, and woe to him who causes an accident and undoes what we as a group have set out to do." I have seen men who have broken these records go out the gate for the last time. It has happened in many, many plants.

Mr. Heinrich stresses very properly the great importance of accident analysis and the discovery of true cause. I see another great value in it, which is the value of the investigation as an educational means. If safety committees and safety inspectors will do what Mr. Heinrich has recommended here today, they will be undergoing the finest form of self-education in accident prevention. It is applicable also to the superintendent and to the manager of the plant. There is no better way to learn that accidents are preventable, that they are not mere misfortune, than by digging in to find their basic causes.

We have had trouble in reaching and selling the small plant manager an active interest in safety work. Although some good records have been made in small plants, the record of the average small plant is far from good. The attitude of the small plant operator may be expressed by his saying to the insurance or state inspector, "Safety first is all right. I am for the movement. But we don't have accidents here. We haven't had an accident in the last two or three years. I suggest you go across the street to Bill Jones' biscuit factory, where they have a thousand men and a lot of accidents. I've only twenty men and they've been with me for the past twenty or thirty years. We don't have accidents."

The truth is that he does not know whether he has a bad accident record or not. He sees too few accidents to alarm him. If this is true of the small plant, how much truer of the single individual! In all seriousness, I ask you how many accidents a year it takes to make an unsafe man and how few to make a safe man? You are safety engineers and executives interested in accident prevention. Do you know? Do you know when your men individually are safe, accident-free men? Do you know what the standard of comparison should be? How many years of

accident-free record should you have to render you eligible to the title of a "safe man"?

Let us figure it roughly. There are thought to be about ten million time-losing accidents a year in this country. In round figures, there are one hundred and twenty million people. We may assume that forty million have no accidents; forty million have 3,333,000 accidents; forty million have 6,666,000 accidents. If eighty million people have 10,000,000 accidents, it does not mean that one in eight has an accident. I may be only one in twenty—which keys in pretty well with our ideas of accident frequency, though it should be remembered that we have included children and women. At any rate, I arrive at the general conclusion that if I have not had a time-losing accident myself for five years, it may not mean anything at all—next year I may have three or four!

In this safety movement, you and I and the National Safety Council and everybody else have been trying to sell safety to the individual very largely on the basis of making him realize that he is a hazard and is likely to be injured. Against this is his own personal experience of years in which no injury has occurred. There is an internal resistance to our sales argument because the individual's experience (in nineteen out of twenty cases) appears to deny the truth of our statements that he is in danger. There is another basis, however, upon which we can sell him very well. We already employ it to some extent. We can sell him in the belief that his brother, his fellow employe, is in danger of being injured. He may not have seen himself injured, but he has certainly seen other employes injured. Sell him then an unselfish interest in their welfare and the realization that to help them he himself must set an example of safe conduct.

And, finally, may I point out that if we adopt this attitude of unselfishness in our teachings and in our conduct, it will soon cease to be an attitude and become our belief. Through it we can make of this safety movement the greatest humanitarian and altruistic movement that the world has ever seen—with one exception: the spread of Christianity. Indeed, it will be a movement of applied Christianity. I have always believed that the success of the safety movement came only through unselfishness and, to a certain extent, through self-sacrifice. I believe now that our future success in making it truly effective lies in our ability to believe and spread the belief that each man is in truth his brother's keeper.

CHAIRMAN ADAMSON: The next branch of this afternoon's subject which we are to hear discussed is "Safety and Production." We are to hear from a well qualified expert, a gentleman who is an engineer and distinguished in his profession. He is a Past President of the American Institute of Electrical Engineers and is the present President of the American Engineering Council. He belongs to many prominent engineering societies. He has had an active experience not only in engineering but his particular field of work has been in the management of industrial organizations. He is a combination safety engineer and engineering expert. I take great pleasure in announcing to you as the next speaker, Mr. A. W. Beresford.

Safety and Production

By A. W. BERESFORD

President, American Engineering Council, New York City

Purely from the basis of reason it is evident that the creed of the safety engineer—A safe plant is an efficient plant—is well founded.

That the reduction of personal hazard should automatically increase performance rates is evident. That the decreased interference of the unforeseen with orderly procedure must result in added hours of such increased performance is

equally evident. The accuracy of the reasoning is obvious and has resulted in the acceptance of the conclusions, but there has been little or no data to determine the degree in which the correlation made itself evident in the industrial fields.

A beginning was made toward collecting such data in the report entitled "Safety and Production" by American Engineering Council, and made possible by the National Bureau of Casualty and Surety Underwriters. There is no thought to quote that report save to say that the conclusions, as might be anticipated, justified the creed and put some measure of fact behind the theory enunciated. That added data over wider fields will emphasize these conclusions and amplify the proof seems certain. We therefore stand in the position of having expended considerable amounts of money and effort to demonstrate the existence of a relation already accepted, and question may well arise as to the justification for such expenditure.

This justification lies in the frequency with which facts and relations are accepted, but accepted without realization—without instinctive incorporation in the consideration of the problems of which they are a part. Anything which promotes that instinctive incorporation is of value; and the conclusions evolved by methods of reason, and their importance may, by physical picturing, be presented in a way which more definitely fixes them in the mind and results in realization and use. Actual data transforms the abstract generalization into concrete fact.

Today therefore, it may be stated as a fact and not as a generalization that in the industries thus far examined, efficiency in production goes hand in hand with betterment in safety record, and that this condition exists in major degree.

That this betterment in safety performance is an end to be sought and sought diligently is a tenet of modern thought, quite aside from any economic benefit that may result. Plain considerations of humanity demand it and, with the past record of accomplishment to indicate the possibilities of future performance, will continue to demand it.

It is a fair statement that that which intelligent public opinion demands and continues to demand, will ultimately come to be. There is therefore no reason to doubt that this demanded betterment in safety performance in industry will surely be attained, either through the understanding effort of industry, or failing that, through compulsory measures. The records accruing from understanding effort make evident what can be accomplished, and nothing short of that accomplishment will be accepted.

But added to the humanitarian pressure there is the provable economic consideration that this betterment, intelligently obtained, not only costs nothing but pays dividends; and where betterment is not in evidence it can be assumed only that there exists lack of realization of the fundamental conditions or lack of understanding of what is necessary to attain it.

It will be attained only by the exercise of the same procedure which must be employed to obtain any desired industrial advance, for instance, high production rates.

The desire for high production rates is bred of economic pressure, personal gain or professional pride. It is effective when it becomes the animating impulse of the operating head of a concern and receives his continuing intelligent attention and effort. He instills it in his immediate subordinates, leads them in the measures necessary to accomplishment and rewards them in the degree in which there is accomplishment. With them he evolves the plans to secure it, and with their help he builds the organization essential to the carrying out of those plans. He continually fosters within that organization the morale which binds it into a unit whole with a single major purpose and keeps alive the incentive to achievement.

Through personal contact and report he is continually in touch with that achievement. He is acquainted with the problems which arise daily and knows and appreciates the men and the means through which those problems are solved.

In the minds of no one contributing to the final result is there left any doubt as to his aim or his willingness fully to cooperate in the attainment of the desired end.

Betterment in safety performance requires the same procedure. Primarily the operating manager must possess a keen desire for accomplishment. This desire he must press on his lieutenants. He must show that continuing interest in the attainment of the end which will leave them in no doubt of his earnestness of purpose. He must plan with them to the desired end and must with them evolve the organization and measures to accomplish it. By personal contact and report he must know the progress in accomplishment and the men and means responsible for that accomplishment. There must be no doubt in the mind of anyone in the organization of his attitude toward the work undertaken, his vital interest and his willingness to cooperate. As in all other activities only such singleness of purpose will be effective. A mere concession that the work is desirable and a consent that it be carried on will accomplish little,—no more in fact than would a similar half-hearted attitude toward the securing of high production rates.

If then there be found in any concern a progressively deteriorating condition in safety accomplishment, or even a merely negative or permissive attitude toward betterment, no conclusion is possible other than that the operating head of the concern is either content to permit recurrent casualties, or does not realize, or is unwilling to assume his responsibility toward reduction of those casualties.

But whether due to lack of realization or unwillingness, the responsibility is his, and to his account must be charged the happenings, certain to occur, resulting not merely in loss of money, but in human disablement in varying degree and even in loss of life. No one else can adequately initiate and maintain effective the measures essential to their reduction.

Legal responsibility there may not be, for only in minor degree can the problem be solved by statute, but morally he must personally accept the burden.

This is true because more is required than the mere provision of safeguards required by law or for which reductions in premium are allowed. These are effective in degree but are wholly effective only when there is created and maintained in every individual in an organization a habit of mind which regards safety as a primary requisite to efficient operation, and which accepts the individual's responsibility to contribute to that end. Such a mental habit can be created and maintained only by the recognized leader, and then only if he himself possesses it.

To summarize: Betterment of safety performance is inevitable. It will come through the operation of one of two forces, viz.: Public opinion embodied in statute plus the economic pressure of increasing premiums, or the realization by management of its responsibility. The first will be slow, irritating and expensive. The second may be rapid, promotive of harmony and profitable both to management and man. To attain these results however, there must be complete understanding and acceptance of the fact that betterment is a function of the individual, not of the mass, and a function of every individual in the mass.

What is required is the acquisition by each workman of a mental habit which without conscious mental process recognizes hazard and impels him to avoid it, the acquisition by each supervisor of a sense of his daily and continuing responsibility to guard against hazard and to detect and emphasize the instances in which avoidable risk is taken, and in the management, the understanding acceptance of the direct and continuing responsibility of each individual therein. These things are as true for the small company as for the large.

The materials and methods for creating such a habit of mind have been developed and are available, but the vitalizing spark which makes and keeps them effective is the belief and sustained effort of the operating head. In this as in all else the organization mirrors the man who leads it. As he thinks and does, so will it think and do.

Once convinced of his sincerity and active interest there will develop in the organization through department-chiefs, superintendents and foremen, to the man at the bench and the laborer in the yards, an understanding cooperation which accepts the value of safety appliances and recognizes the hazard to all which lies in their neglect and the consequent justice of penalty for that neglect; which breeds intelligent analysis of existing conditions and measures and eliminates—not merely the accident, which frequently is only a symptom of an underlying condition—but the condition itself.

There is ample proof in the report of American Engineering Council, and in the experience of those plants in which betterment in safety performance has been attained in high degree, that these statements are true.

CHAIRMAN ADAMSON: As the final contribution this afternoon before our general discussion, we are to hear a talk on the subject of "Safety and Labor Relations." Those of you who are familiar with the early history and development of the National Safety Council know very well who the next speaker is to be. He early won distinction as the safety leader in the Fall River Shipbuilding Company. He won a national reputation because of the results which he obtained there, and he became a leader in the safety movement.

He was instrumental in the formation of the Boston Safety Council. He took an active part in the history of the National Safety Council. He is at present assistant to the president of the Bethlehem Steel Company; the Manager of the Industrial Relations Division of that company. I have pleasure in introducing to you, Mr. Joseph M. Larkin.

Safety and Labor Relations

By J. M. LARKIN

Assistant to the President, Bethlehem Steel Company, Bethlehem, Pa.

I have been asked to speak on the subject of safety and labor relations. Obviously such a broad topic cannot be adequately discussed in the short time at my disposal. I will therefore attempt to emphasize one phase of this subject which I believe has particular bearing in helping us to see in a new light the important economic position which good safety and good labor relations have come to have in business. I refer particularly to the necessity of doing everything we can to assure to workers steady jobs, in order that their living standards may be protected or even improved and their buying and saving power uninterrupted in the best interests of the community at large.

At the outset let me say that in no other country and during no other era have safety and labor conditions been as sound and wholesome as in America today. Greater emphasis is being placed on safety and accident prevention work than ever before. The results of these efforts are that industry is today a safer place in which to work; workers, collectively and individually, are more cognizant of the safety factor in their daily occupations. Furthermore they have come to realize the economic importance to themselves and to their company in avoiding accidents.

Such results as these are possible only because of the fundamental improvement which has been brought about in labor relations generally. Cooperation in industrial relations as a whole has brought with it a greater measure of cooperation in direct safety efforts. The economic side of safety has become a factor of greater consideration without disturbing the interest in accident prevention from a humanitarian standpoint.

There is generally a better thinking on the part of workers themselves. They have come to have an enlarged viewpoint toward each other and industry, they are

less provincial and are seriously concerned about the prosperity of business as a whole because they realize their stake in it. This is due largely to the enlightened educational work that has been done by industry in imparting freely to the labor force facts about the conditions of the business, to the generally sound policy of public relations we find in industry today, and to the larger participation workers have come to have in their companies and the better things in life.

I think I may safely say that workers have come to realize that their own interests are best served by having others prosper. After all this is but a part of the general trend of the times which is exemplified by a changed thought among business leaders themselves. They have ceased to take a certain quiet consolation in the fact that their own particular company is better off than the other fellow's and have come to realize and appreciate that the troubles of another industry are their own troubles.

This healthy situation which exists generally among business leaders and in labor circles is indeed one of the most hopeful signs for an enduring period of amicable industrial relations and the safety movement because of its unselfish aims has played an important part in bringing about these desirable conditions.

We find today that even in spite of the immigration restrictions and in spite of a reasonably high level of productivity, there is actually an ample supply of labor. Moreover the efficiency with which industry is being carried on today has made it possible to release from the old to the new industries an ample supply of labor. This efficiency has been brought about largely through the increased productivity of labor.

This increased productivity has had its greatest growth during the last five or six years. It has been brought about by four outstanding developments. First, there is the item of capital expenditure through which mechanical devices, electrification, larger units, changed methods and processes have come about. Second, there is the item of improved management. Third, there is the item of increased efficiency on the part of labor itself. Fourth, there is the item of a steady reduction in accidents and other wastes with the resultant gain in working time and increased earnings and purchasing power of the worker.

By and large, we are getting a better quality of labor today. Workers are more intelligent—the school requirements of the country are helping in this regard. There is a better feeling in labor circles. High wages are generally paid and management is exerting every effort to maintain these levels. Shorter hours are worked. The men are working less arduously than formerly and all of these factors have tended toward increased individual output coupled with better safety performance. Then again the extended experience formerly required to perform certain operations has been thrown to the winds until today we find that most jobs in our plants can be filled by new men under relatively brief training periods. So industry generally today is in the position of being able to obtain without difficulty sufficient labor of the type that lends itself more easily to rapid training in safe and efficient practices.

Naturally we ask what has become of the workers released as a result of increased efficiency and newer methods in the older industries. Have they left the community or are they idling away waiting for an opportunity to be employed? Not at all, they have largely become absorbed in industries which greater buying power of labor generally has helped to create.

The experience of one particular community which is probably typical of many others reveals that many of these released workers are now employed in an automotive manufacturing plant; in the many garages that have come into existence; in the scores of filling stations and automotive supply houses; in manufacturing radio equipment; manufacturing modern household utensils; in public improvements, including highways and bridges and a host of other lines created and maintained by the buying power of the workers.

The community I have just mentioned is essentially a one industry center in that the large majority of its population is directly dependent for a livelihood upon one large company. It might be expected that the reduction of 3,000 workers in this plant during the last seven years would to some extent reduce or retard the growth of the local population or that there would exist severe unemployment. The facts are, however, the population has increased by 28 per cent and there is no perceptible unemployment.

Fortunate it is, therefore, as a corrective of that greatest of all evils—unemployment—that the purchasing power of the people generally is opening up new lines to afford employment to those being separated from their former industry. Then again many of the separations are among those older in years whose needs are less than those of the younger men with families, and the pension plan which is quite general in industry is helping to take care of these men who have been permanently released. As indicating the economic importance of these plans, Mr. A. H. Young estimates that annual industrial pensions alone paid throughout the United States amount to over \$50,000,000.

Another factor that has helped to smooth adjustments between the old and new industries is the generally high saving power of the wage earner during this time of employment. This has been encouraged by savings plans, stock distribution and other facilities for thrift and investment which have aided employees in tiding them over from one industry to another. And industry itself is equipped today to be of service in this field by turning the efforts of its employment department from recruiting to placement on the outside.

The growing use of the automobile by the worker has had a tremendous beneficial effect upon the general labor situation. It has largely solved the fundamental problem of transportation for the worker and has greatly widened his working area. He no longer is at the absolute mercy of the neighboring employer for work, but the whole territory for miles around is now his to explore. And the employer too, has benefited, it has solved for him many of the major social conditions which a hoarded labor force around the plants always presented.

I have cited better management as one of the factors responsible for better labor relations. This generally includes a closer and more scientific administration of the payroll.

The efficiency of the employment department is now measured less by the speed with which it can recruit labor than by the aid that it can give management in avoiding the hiring of unnecessary people by transfer and other measures of labor conservation.

This increased care by management in administering the payroll is due largely to a desire to fortify the buying power of labor by holding to present wage levels in spite of decreasing commodity prices and the need for reducing manufacturing costs.

One of the aims of management in this respect is to obtain stability of employment and full-time wages for those employed. The organization of industry on such a basis that provides steady employment at full-time wages has become recognized as a sound policy from the standpoint of both the worker himself and of the company which employs him, and right here is where safety plays perhaps its most important role in the field of labor relations.

The necessity today for the high purchasing power of labor previously referred to becomes more significant in view of the fact that industry is organized on a mass production basis and this naturally requires mass buying. Perhaps this is one of the most important trends in the economics of this labor situation and in every labor policy today this element is basic. The ability to buy by the greatest number is of uppermost concern to the entire business world. Our industries have ceased to function solely or mainly to supply the needs of the wealthy classes. These needs would not be sufficient to maintain even a fraction of our present

productive capacity. It is, therefore, imperative that we have a high and sustained buying power by the masses of the people including the wage earners. Industry generally is alive to the value of high purchasing power for its workers and has adopted the policy of paying high wages. These high wages coupled with the decline in living costs over the last few years have been a most powerful factor in extending markets and increasing the standard of living of workers. It is, therefore, evident that accidents as they affect this buying power are of greater concern today than ever before and that their elimination is not only desired but urgently required.

Often overlooked is a further contribution by industry toward the purchasing power of labor through certain personnel activities that it has quite generally adopted. Among these activities is the practice of making up to employees a substantial part of losses in wages, that would otherwise be sustained through sickness and accidents, by the payment of relief and insurance benefits and workmen's compensation. This policy usually has been thought of from the standpoint of its advantages to the workers alone. Its importance as a means of helping to sustain purchasing power and thereby benefit general business has not been fully appreciated.

The most important contribution to the present state of affairs is that which is due to the cooperative relationship now generally existing between employers and employees. To reach the present basis industry has passed through several more or less clearly defined cycles: The first, of comparative indifference to the worker's relationship to the company which employed him other than as a cog in the machine; the second, realization on the part of labor of its economic power and consequent conflict with capital by reason of the fact that their mutual interests in industry were neither seen nor understood; the third, an enlivened interest on the part of management in the human side of business and on the part of the workers in the prosperity of the business in which they are engaged.

The third, or cooperative phase, is manifested on every side today. Indeed the company which is not striving for good relations today is the exception.

Safety is wholly non-controversial; it is beneficial to employee and employer alike and has no negative values. It is perhaps the happiest medium through which may be expressed the mutuality of interest of employees and employers. Organized safety work began more than twenty years ago, and in my own industry largely under the inspiring example of the United States Steel Corporation it stands as a beacon light of progress. One of its prime factors has been the work of the safety committees, composed of workmen or of workmen and foremen and this was really the first widespread demonstration of mutuality of concern and purpose on the part of employers and employees in American industry. This evolution into the present era of cooperation is not a haphazard result. It is definitely the joint product of the management group in American enterprise acting with intelligent labor leadership and is perhaps the most conspicuous and constructive accomplishment of employee-management relations.

How closely safety is linked with this development is seen in the similarity between the technique of safety work and the technique of good management. Foremost industrial leaders today view safety as much a part of the day's work as any other manufacturing problem.

Industry cannot operate efficiently and leave out safety, nor can business properly consider safety without relating it to the whole picture of the responsibility of plant operation in the most economical and efficient manner. We have in the past continually stressed the importance of reducing accidents mainly from a welfare or humanitarian standpoint. I do not fear that we will ever take a backward step in this regard, but let us in the future give our safety or accident prevention work a new stimulus, let us consider it as an important factor in our whole program of greater manufacturing economy.

The accident prevention movement can have a tremendously beneficial influence on general business, every accident that is avoided not only benefits the workman from a physical and monetary standpoint but it results in a direct contribution to general business. I know of an accident prevention campaign recently inaugurated that in the course of only nine months resulted in a saving to employees in wages alone of nearly a million dollars and the savings to the company are also substantial. Without detracting in any way from the broad humanitarian aspects of this work does not a consideration of the economic aspects of what this million dollars means in sustained purchasing power, in providing steady employment and keeping the wheels of industry moving furnish a new measure of appraisal of the important place which safety holds in the sphere of labor relations.

Good safety is necessarily a component of good labor relations and good labor relations spell safety in a much larger sense than as applied to mere accident prevention.

He would indeed be a brave man who would attempt to place an absolute economic value on the development in good labor relations in American Industry over the last decade or two, but it is a certainty that the wise attitude of cooperation and conciliation generally existing between management and labor in this country has been one of the most powerful factors in helping American Industry to achieve the leadership which it enjoys today. If we would know what might have been all we have to do is to examine the records where such cooperation has not existed to see the full effect of conflict, misery, economic suffering and business stagnation.

Good labor relations mean the safety and security of our social, economic and political well-being. It follows, therefore, that those who are bending their efforts to rid industry of the waste occasioned by accidents are engaged in a work that is essential to economic progress.

CHAIRMAN ADAMSON: It was a very thoughtful provision of your committee to arrange that when the point was reached in this discussion where some authoritative knowledge of the questions was needed, that an associate chairman should take charge. The gentleman who is now going to take over this meeting represents an organization which is an outstanding concrete example of safety as applied in a great industry. His industry is a notable example of what can be done not only economically but in other aspects by the intelligent, thoughtful and human application of safety principles. I know that you are going to be glad to hear now from the associate chairman, Mr. Arthur T. Morey, general manager, the Commonwealth Steel Company.

ASSOCIATE CHAIRMAN MOREY: Will Rogers has written that if we elect him President, we shall laugh with Washington and not at Washington.

The founders of the National Safety Council had in mind a democratic organization in which groups could get together and confer about their experiences and cooperate to attain this great objective of safety, which at that time was thought by many to be impracticable.

These gentlemen who have talked to us today have not come to talk at us but with us. We haven't come to be told; we have come to confer together.

I hope that we may have quite a discussion from the floor of the points brought up in these various papers. Mr. Heinrich, for instance, says that a wider study of classification is necessary in the elimination of causes. He also said that we have talked too much about types and that we need to study more about the causes. He says that 98 per cent of accidents can be prevented.

Mr. DeBlois sounds a note, the finest we have ever heard in our Congress, that all accidents are preventable. What do you gentlemen think of that proposition?

You have the floor. Do you accept the proposition that all accidents are preventable?

SIDNEY ASHMAN (Ludlow Manufacturing Company, Ludlow, Mass.): I would like to ask Mr. Heinrich if a particular example of an accident is within his accepted two per cent. A brakeman of experience, in boarding a car, strains his back. What is the cause of that accident?

MR. HEINRICH: From the very limited details given about this accident, it is impossible to determine the cause or the answer. In my talk I tried to make the point clear that it is necessary to get a complete story of an accident. If we don't know under what conditions a brakeman boards a train, we don't know very much about it. If we do know the complete story, why then we have a better opportunity to determine the answer.

MR. ASHMAN: The accident I had in mind occurred when a locomotive stopped to take on water. Before the locomotive started, the brakeman from the roadbed, which is in good condition, stepped up to the saddle and took hold of a bar as he climbed to the side of an ordinary freight car. Every bolt was tight. The brakeman was entirely in good condition, sober, and had no history of a previous back injury. That is all the data that I have. I am unable to determine the cause of that accident.

MR. HEINRICH: May I suggest a remedy without necessarily giving the particular answer that you want. If you set up a list of probable causes and you are able to eliminate every one of those causes, then most certainly I would agree with you that the accident was unpreventable. If, for instance, you know that instructions as to proper boarding of trains had been issued and were enforced in this particular case and that the employee obeyed those instructions, then one of your probable causes is out. If you know that he was physically fit, then another of your probable causes is out. If you know that there was no unsafe practice involved, no defects in equipment, that there was no improper planning of operation, then another cause is out. In other words, if you go right straight through the list and no one of those causes exists, then of course the accident is practically unpreventable.

MR. DEBLOIS: Looking at it from another angle, it is a common experience of a safety engineer to have the manager of a plant (for instance) who is being initiated into safety for the first time, approach him in this way: "Well, Mr. Safety Engineer, I want to go over these accidents with you. How do you prevent this? How are you going to prevent that? How are you going to prevent this other thing?" My experience with industrial accident reports is that after reasonably thorough examination into the causes of the accidents, you have to set aside about one-third and say, "I don't know how to prevent them." Here is what I have always said to plant managers: "Mr. Smith, I don't know how to prevent this accident of a back strain, or this accident where a man broke a leg when he stepped off an eighteen inch platform. I can, however, tell you this: That if you get safety going in your plant, our experience is that those accidents and all the other types of accidents stop." The best I can say is that the men themselves prevent them; and the back strains, which I have noted are somewhat epidemic, go along with the rest of them; they disappear. It can be done.

CHAIRMAN MOREY: Isn't our sense of the unavailability of an accident somewhat the measure of our own limitation of progress? Just a case in point. I remember very well, as you no doubt will also, when woodworking machinery was the most murderous of all to operate. I presume if a discussion like this had taken place ten years ago, I could have stood on the floor and said, "Now, how could you avoid such and such an accident in the pattern shop?" But since that time, our thought has risen, our understanding of the problem is much better and we have made many inventions and improved conditions so that instead of having

accidents we now have large safety records. I was down in a shop some little time ago, a new shop with 100 men in it, and they have gone 1,302 days without a lost time accident; while in another shop where they also have about 100 men they have gone about 700 days without a lost time accident. It seems to me that our sense of the unavailability of accident is only a measure of our own false limitation in the progress of our understanding.

D. S. FIRTH (Standard Accident Insurance Company, Detroit, Mich.): Mr. DeBlois, in support of his theory that all accidents are preventable, apparently uses the no-lost-time records as proof of his theory, while Mr. Heinrich includes, I believe, minor cases as well as major cases. Mr. DeBlois refers only to the major or lost time cases. Therefore, perhaps in the final analysis, there may not be a great difference of opinion between them.

In analyzing accidents, is it your thought, Mr. Heinrich, that minor accidents should be given the same consideration as major accidents, and if so, should they be analyzed individually or by groups according to type or immediate cause? Considering the apparent high frequency of so-called minor accidents, it would appear almost impossible economically to analyze the cases individually and thoroughly, and my thought is that perhaps if you do include those accidents to be analyzed that treatment according to groups by type or immediate cause would be the proper method of approach.

MR. HEINRICH: Mr. Firth has given me a very good opportunity to talk on another point that was not included in my paper. He asked this specific question: Whether or not in the analysis of accidents we should give equal consideration to minor accidents and major accidents, and whether there is not too much work involved in the consideration of all accidents if they are on the same basis?

In my opinion there is no such thing as a minor or major accident. There are such things (mark this well) as minor injuries that result from accidents. If we are in the business of preventing accidents, it is the accident that we are interested in, and not just the result. We are misleading ourselves again, because any accident has the potentialities of producing a serious injury. We have, of course, serious injuries and major injuries. An employee who drops an object 30 times may miss his foot 29 times. He may hit his toe the 30th time and on the 31st time he may crush his instep. In each one of those 31 or 32 cases you have the same accident. And yet, we are in the habit of taking the crushed instep as a measure of our accident prevention work.

And so, my answer is that there is no such thing as a minor or major accident—though there may be minor or major results from accidents.

As regards the economy involved in that, I believe from experience, that you are chasing a will-o'-the-wisp. If you set up a proper organization and eliminate them one by one, you will have no difficulty in cost involved in analyzing all accidents properly.

MR. BLUNT (Valentine & Company): We had quite a problem as to minor injuries, so many in fact that we were quite up against it. Mr. Heinrich's article came out in the *National Safety News*. I read it over. I immediately set the ball in motion to analyze not only our serious accidents but also our first aid accidents. We have, since that article was published, investigated, just as the article states, basic and physical causes and all the rest of them. We have been following those through. I can't give the results exactly. We have been trying to eliminate the small first aid cases that have been a bugbear in our plant. Here is one accident where a woman, coming downstairs, stumbles and sprains her ankle. That time it was not a minor accident, though before that, such results had been minor.

I was interested in telling you that we are trying to see if there is any relation that we can arrive at by following this scheme of Mr. Heinrich's through. We are

not only doing it on the major but on the minor, or simple, accidents. In this way we believe we will head off the major results of accident causes.

MR. DEBLOIS: I would like to pick up a point right there and illustrate it with an example, which at the same time may serve to show that Mr. Heinrich and I are not apart on theory at all. We are looking at the thing from different points of view.

Tripping on the stairs. There were a number of cases in one of the DuPont plants of accidents to girls tripping on the stairs and spraining ankles. The accidents were prevented by studying the cause. The cause wasn't high heels. The prevention was brought about by putting in an addition to the lunch room. They tripped because there was not enough lunch room seats for everyone and the girls hurried to get a seat.

SAMUEL J. STEINMANN (Indemnity Insurance Company of North America, Philadelphia, Pa.): About a year ago, my company instituted a service for the purpose of reducing accidents of all kinds. We took into consideration all accidents, the so-called minor and the major. For the past year, I have put all my efforts on the analysis of accidents. Recently, I concluded an analysis of a risk out in the Middle West, where in getting the cause of injury, I found that 39 per cent of the accidents would come under the flying object class; 32 per cent of those, of the total accidents, were eye accidents—one of the accidents did cause the loss of sight in one eye and there is a probability of removal of the eye. The cause of injury was the same in that case as in many of the other accidents, a flying chip, which brings out the point that all accidents should be considered.

This particular concern had a good safety committee, and the management was behind the safety movement. The safety committee in the investigations brought out one point, namely, that proper goggles were not provided. Another point brought out was that there appeared to be a lack of cooperation on the part of the supervisory force. I personally believe, as Mr. Heinrich does, that the real cause of those particular accidents was physical and supervisory, which could be controlled by the management.

I think if we go along in that particular line, we will make some progress in accident prevention work. We have talked too much about lost time accidents when the minor accidents have the same potential possibilities.

CHAIRMAN MOREY: Just as much instruction in a near accident as in a major.

B. G. DOOM (Electrical Metallurgical Company, Glen Ferris, W. Va.): I want to accept and defend if possible the position of Mr. DeBlois that all accidents are preventable. I believe it fully, and I believe there are just two elements entering into that problem which we must consider. It is a question of physical conditions and a question of mental attitude. I believe that in the case just cited, of the individual who was injured on the locomotive, that if that whole circumstance should be thoroughly analyzed, we would find that either the physical conditions were not safe and right or that the mental attitude of the individual was not right. If the physical conditions had been just right, had been safe, and if the attitude, the mental attitude of the individual, had been that of thoughtfulness and care, he would not have had the accident; there would have been no injury.

That, in my opinion, is the whole problem as to how to accomplish our end. We must make the physical conditions safe and we must maintain the proper attitude of mind on the part of the management and the workers, so far as it is possible. I contend that it is possible, and I want us to continue working along these lines until we realize the goal.

CHAIRMAN MOREY: Mr. Heinrich spoke of a man who accidentally dropped something 29 times and the 30th time he had some bad luck and it hurt him. I think that might have been bad luck to him, but that was pretty poor supervision, it seems to me.

JOSEPH SULLIVAN (Phoenix Furnace Company, Duluth, Minn.): I would like to bring out one point that Mr. Heinrich made, physical and mental causes. In analyzing a couple of accidents just recently, the result of the analysis showed that it was a mental cause. The point I want to bring out is: How are we to discover mental causes? To me, that is one of the hardest analyses to make, to put down a mental cause. An employee can come down to the plant in the morning, he could have had domestic troubles, not of a serious nature, but just enough so as to upset his whole system, and his industrial attitude is concerned for the rest of the day. How are we going to approach that man to find out if he had any minor domestic trouble that was the cause of that accident?

CHAIRMAN MOREY: I would like to speak on that point. (By the way, I didn't mean to confine the discussion to Mr. DeBlois paper and Mr. Heinrich's paper. Mr. Larkin brought out how safety was the entering wedge to better conditions, and because of those better conditions we knew our men better.)

It seems to me, in getting at mental causes, there has to be the finest cooperation in an organization; if we have a benefit association, for instance, or a visiting nurse. We have found that our visiting nurse gets pretty close to some situations, closer than we would get. If the safety committee in the plant, the foreman, the superintendent, those who come in contact with the man, his own fellow workmen, hear of some condition not good for the man, they should counsel him and report it. I think it takes vigilance on the foreman's part. The safety committeeman should catch a lot of those things.

I think lots of times, too, we don't pay enough attention to tendencies. We have seen this in our plant, and it is one that has been very hopeful to me, because we have discovered that the first carelessness does not usually produce an accident; sometimes it does, but it is very infrequent. It is the repetition of careless practices, under the human law of averages, it seems to me, that produces accidents. That is our answer to the no-accident effort. I believe if we study more closely and nip careless practices in the bud, we are going to get a whole lot closer to our no accident records.

MR. DEBLOIS: May I ask the gentleman this question? Let me take as an instance a small plant of the DuPont Company; 350 people in seven years had one time losing accident. Do you suppose for a minute that among those 350 people, men and women, during all that period of seven years, there were not literally thousands of mental conditions predisposing to accidents—worry, domestic rows, all sorts of things of that kind, which we can't possibly discover? How do you know that you and I today haven't some mental cause of disturbance on our minds? Yet we rise above it here. And so in the plant, it seems to me, the individual, when he has sufficient interest in accident prevention and has learned to establish safe habits of doing his work, rises entirely above those mental causes.

I don't think we have to know those mental causes. I think we have to get the right attitude and the right habits in the men and the mental causes will take care of themselves.

J. E. LONG (Delaware and Hudson Company, Albany): I think in a few of these discussions and suggestions we might well put it in this way: We have been insisting on safe practices in doing work, the right ways of doing work, but fundamentally we should at first create the incentive to doing work safely. It is all very well to superficially ask the man to do the work in a certain way, but until you have enlisted his interest, his active cooperation, his enthusiasm in the safety records, he will not get at the fundamentals, he will not get the actual performance that we desire.

E. B. PATTON (N. Y. S. Department of Labor, New York City): Mr. Heinrich at the beginning of his talk pointed out that there were many accidents which could be prevented. I presume because of the difficulty of analyzing the employee situation, he has transferred his attention to the employer and has reached the conclu-

sion that 98 per cent of the accidents can be prevented. It is extremely gratifying to have an insurance representative take that point of view. I think on the whole it is a fair one. I think Mr. Heinrich will agree that a great part of that 98 per cent which can be prevented by the employer, could also be prevented if you could bring the proper influence to bear upon the employee. I don't believe for a minute that these no-accident records could ever in the world be achieved through employer effort alone. It was because of the pressure brought to bear upon the employee that these records were achieved.

CHAIRMAN MOREY: Absolutely it is the employee who is a very large factor in producing results. We should bring him all the education and enlightenment we can.

C. M. STAVE (Globe Indemnity Company): It seems to me, that most of us in the insurance companies who have been accustomed to dealing with these analyses covering accidents in large numbers, almost on a daily basis, have become in the habit of dealing with accidents in matters of frequency and severity. It seems to me that some of this discussion on the question of minor and major accidents falls in that classification of frequency and severity. I think there must be some insurance men here who are thinking just about the same thing I am now and have probably had the same experience. When a large number of accidents come in as a report or analysis of some risk experience, we are rather inclined to say, "Oh, well, they have a large frequency rate but the severity is low." From my own personal experience, I agree with the man who says that every accident, no matter how minor the effects may be, the result of that accident should be considered a serious potential accident or a potential serious accident.

I came across an experience just a short time ago that is concrete evidence of what I have in mind. Any man who has ever worked in a shop has gone through the experience sometime or other of having a splash of oil in his eye. I doubt if one of us here today has ever had anything serious result from that accident. Just a short time ago, I ran into a case over in Pennsylvania, where a man received nothing more startling than a little splash of oil in his eye. The last thing I heard about that case, due to some peculiar local condition of the man himself, he was in the Wills Eye Hospital about to be operated on. It seems to me that the way to remedy the local conditions that creep up later in the so-called minor injuries, that often, very often develop in the serious injuries, is the matter of physical examination before the employee is put on the payroll.

CHAIRMAN MOREY: As a matter of prevention of causes, have we anything to say on the matter of physical examination?

J. H. MEIGS (Western Union Telegraph Co., Boston, Mass.): I have to do with maintenance outside and inside the plant. In 1922, we had 86 accidents. We have about 500 employees, outside men. We started, as we thought then, a pretty strong accident prevention campaign. We reduced them from year to year. Last year, we had 22. This year, so far, we have had nine. We report every accident. We make up reports on every accident, regardless of whether it is a minor accident or not.

We carried on quite an extensive campaign in accident prevention. We carried it on in this way: When we had an accident, I went out personally and interviewed the man, after the report was sent in. I talked it over with him. Oftentimes, if it was a serious accident, I talked it over with him in his home. I know most of the people and go to their homes. We get out a letter each month and send it to each employee in his salary envelope, giving the name of the employee who had the accident and how it was caused and what could have been done to prevent it. In addition, we send each employee a blue print each month, one being issued for each group of men in the New England States, and the cities in the New England States where we have accidents to two or more men have a circle on the blue print. The name of the supervisor or foreman that these men report

to, is shown over the circle. If John Smith has an accident, we put his name in there. If he doesn't have an accident that month, we show just a blank circle. We carry that blue print on through the year, so that at the end of the twelve months, it shows all the accidents that a certain foreman had. If he had no accidents, he just has a round circle. If he has had no accidents in the last three or four years, we give him a circle within a circle.

CHAIRMAN MOREY: Do you put the name of the injured man in?

MR. MEIGS: We send it to every man that has an accident. As a matter of fact, it has brought about good results.

We send out a yearly letter, showing the accidents we have had during the month. We have reduced on the outside, our male employees, down, as I said, to 22 last year and 13 this year.

We are carrying on the same force of men. We hold safety first meetings. We sit down in a tool room or workshop and just talk safety first. We talk about safety methods and accident prevention. We talk over the accidents we have had and how they could have been prevented. If a man is with us fifteen, twenty or forty years, like a lot of our men are, his salary card shows every accident he has ever had, a lost time or any other accident. They try to keep out of the circle, as they term it. The men call each other's attention to any unsafe methods in practice. The foremen who have anywhere from 12 to 25 men, when they come in at noontime or at night, asks the men, "What do you think of today's work? Have we carried it on in a safe manner? Have you any suggestions to make?" The men are free to express their opinion. We have them feel and understand it is nothing against them at all. We don't allow the foremen to hold anything against the men. We ask them to bring out these points.

CHAIRMAN MOREY: I would like to interrupt you there to put this point to the meeting: What is the thought of you men on publishing the name of the man who had the injury? Is that good practice?

B. H. WEEKLEY (U. S. Sheet and Window Glass Company, Shreveport, La.): We started out something on the line that the brother is talking about now. The first thing we did was to find out from the employees themselves whether or not they would care to have their names posted in case of an accident. Out of about 500 men, there were but two that objected. We have done some good work along that line.

MR. KEATING (Manufacturers Casualty Company): I would like to say that we have one large risk embracing six states, and before we used the names on the bulletin board we also put it to a vote. We found that among those 3,000 employees there was not one unfavorable vote to having a man's name posted on the bulletin board for having an accident. It has been productive of wonderful results, in that the various departments, as they are divided for competition, are very jealous and zealous that their names do not appear on the board.

MR. MEIGS: I would like to go one step further on that. We have on the inside, as most of you know, large offices in all the large cities. In Boston, we must have 1,700 or 1,800 people working in one office. They are composed mostly of girls and women. We had cases where girls and men would fall down the steps and sprain their ankles or sprain an arm or get a broken arm. We found upon investigation that it wasn't due to the high heels so much as it was due to the treads on the steps that had become worn. We went and replaced those worn steps. In addition to that, where we had quite a large number going down the steps, such as at ten o'clock, at noon-time, at three o'clock and five o'clock, one employee would be appointed to supervise those people in going down the steps. If she saw them running down or jumping or walking in an unsafe manner, she would call their attention to it. We have reduced those accidents to a minimum. I haven't heard of one in years, that is since 1922.

CHAIRMAN MOREY: I would like to leave this thought with the meeting and put it in the record, that our sense of an unavoidable accident is but the measure of the limitation of our own understanding. I think that is a natural conclusion from Mr. DeBlois paper.

W. S. CLARK (American Mutual Liability Company): The gentleman from Minnesota brought up a very pertinent question on the mentality of the man pertaining to accidents. There was one step he missed, and that is, what do you do with the man when you find out he has family difficulties?

CHAIRMAN MOREY: We have found that our personnel department has been able to remove a great deal of that condition of thought, of worry. We have helped settle family quarrels, and we have assisted men to go to the hospital to get cured. We have helped them leave and go to a better climate. We have sent them home when we didn't feel they were in a fit condition to work. We did everything we had the wisdom to do to help the particular case. Of course, no two cases are alike.

I think the delightful situation is coming in industry where instead of the relation of master and servant we shall enjoy a more friendly relationship. We are all friends, cooperating together to carry on the business. As we get that friendly interest in each other, we will do everything we can to help in whatever our problem is, financial or otherwise. Lots of men worry about financial things. We have a loan fund without security. We will loan men money to take care of their affairs and keep them out of the hands of the loan shark. It may be sickness; whatever the need is, we ought to, as friends, do our best to help him overcome that particular trouble.

W. C. REIBLING (American Tar Products Company, Chicago, Ill.): I studied our accidents all year. I found that during the period in which our business was dull we had no accidents, while we always had a few accidents when we were busy or rushed. The point I want to bring out is this: We must get down not only to the cause, not only the apparent cause, but the fundamental cause. What is the cause of those accidents? I don't think the sales department should crowd us with unnecessary rush orders. I think that is very fundamental.

ADJOURNMENT

**SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL**



General Round Table

October 4, 1928

GEORGE OPP, Chairman

Safety Engineer, Detroit Edison Company, Detroit, Mich.

The General Round Table Session at the Seventeenth Annual Safety Congress, was called to order at two-fifteen o'clock by the chairman, George Opp, Safety Engineer, Detroit Edison Company, Detroit, Mich.

CHAIRMAN OPP: We are very happy to have you in attendance today. This General Round Table Session is one that has been added to the recent programs for the purpose of clearing certain general or miscellaneous items that each and every safety man, executive or otherwise, in attendance might have on his chest. It gives a chance to swap ideas, a chance to get together with those of other groups and other trade sections to have an opportunity to review with them their problems and your problems.

We are today very happy indeed to have Miss Ruth I. Stone as the opening speaker on this program. Miss Stone has been very active in industrial work in women's organizations and now has a splendid record established in the organization in which she now works. We are very happy indeed to have Miss Stone here today to speak to this General Round Table Session upon her subject.

How Safety Looks to the Worker

By RUTH I. STONE

Chief of Women's Personnel Department, Operating Branch, Hawthorne Works, Western Electric Co., Chicago.

If I were to put to you the question that was put to me, "What does the worker think of safety?" I think your answer would be: "The worker thinks safety is a damn nuisance." Of course, I can't tell you that; your committee wouldn't invite me to come down and say that to you.

I do take issue with your answer, which I am quite sure down deep in your heart you would have given me. I am quite confident that the worker does not think that safety is a nuisance, with the adjective omitted. He feels about safety quite as you feel about the traffic problem. Safety in itself is quite right. You don't quarrel with a traffic cop that picks you up and puts a ticket on your car; you don't quarrel over the fact that he is saving your life and that he is saving you perhaps an injury to your family. The thing that makes you quarrel, the thing that makes you mad, the thing that makes you swap stories the next morning, is not that he was trying to save you, not that he was rendering society a service, but the fact that he caught you trying to slip something over.

That is exactly the way the worker feels about safety. We have no objections to having our fingers saved and our lives saved and our eyes saved. It is awfully inconvenient at times to have to abide by all the rules you have laid down.

I have no right to speak for every worker; I have no right to speak for any large number of workers. In order to get an opinion on the work of safety, I sent, through the cooperation of four other concerns in Illinois, a questionnaire and asked them to give it to their gang bosses who were first line organization people, who would know what the organization thinks of safety.

I am going to follow very closely what they answered, because I not only think it is interesting but I think you will find it very helpful in your own safety programs to know what the worker thinks. These questionnaires were sent out and distributed and the gang boss was asked not to sign his name to it. Some did sign their names, and those I threw out. I got 197 answers unsigned, which I feel we have a right to assume is the person's real opinion of what the worker thinks of safety.

Do Guards Retard Production?

The first question was: "Do guards slow production?" I imagine that you would say, as a majority of our men said, "Yes." More than half said that guarding did not slow production. There were those more cautious who said that temporarily guards did. Others said that guards did slow production slightly. There were others who said that some kinds of guards do slow production.

I left a space for remarks, and on the remarks there were some very illuminating things. Here is one: "Some at first, until the operator becomes used to it. Not after proper instruction." Another one reads: "Through conversation with my operators, I found that where an operator is accustomed to using guards and wearing goggles they cannot work without them." Another one said, "Not if designed for the particular job. An operator can be trained to work with a guard." I think out of that we can interpret that guards do slow production, which means that you have got to be careful in the kind of guard you give us to work with, whether that guard is the very best guard to go on that particular machine and whether it covers the hazard of that particular machine.

The second question was: "Are guards worth while?" Of course, you would expect a vast majority to say, "Yes." There were some carefully-minded, more exact-minded people who said that some people do think that guards are worth while. There were five who felt that guards were unnecessary. One man just felt guards weren't worth while at all. These are some of the answers: "Some of the operators think that the guard slows them with their work." Here is another one which hits my sex particularly: "It seems to be the general consensus of opinion that such safety measures as hairnets, goggles, etc., are unnecessary and reduce the attractiveness of the individual operator."

I would like to add a word there. I am afraid you gentlemen don't understand our psychology, the psychology of the woman worker. I am afraid you gentlemen don't appreciate how we feel about spoiling our personal appearance. Are guards worth while? I have seen dozens of guards that were not worth while and so have you. I visited not long ago a factory which was beautifully guarded. It was one of the nicest factories I have ever had the privilege of visiting. All the girls were wearing cloth caps. I asked the man who was taking me around the factory, "Why are the girls required to wear these cloth caps?"

He answered me, "That is the first safety measure we put in. Fifteen years ago those girls were required to wear those cloth caps. It is the first thing we tell a girl when she comes in."

Cloth caps were necessary fifteen years ago when the machinery building was unguarded and when the shaft ends were exposed. They are required to wear those

cloth caps now because the girls fifteen years ago wore them. There isn't any rhyme or reason for having cloth caps on those girls at present.

I must tell you a story about one of our own department supervisors. Of course, we do change styles in our hair, and that is confusing to you gentlemen. First we wear long hair, and that is one kind of a hazard; then we bob our hair and that is another kind of a hazard; and then we decide to let our hair grow and that makes an extremely different hazard.

It is hard. I grant you, for you to keep step with our styles or hair dress. It seemed necessary in one of our departments not long ago for the girls to wear hair bands. They were effective for six months, and then the style changed in hair and they were totally ineffective. I made a plea that we remove the hair bands, which have always been a source of contention, at least, between the operators and the management. I got the men to admit that the present hair band on the girls was not worth a tinker's darn, but they would not take it off because they wanted to be able to report to the management that they were doing all they could for safety. If there had been an accident, they wanted to be covered by the fact that they were equipped with some kind of guard. They also felt, and this was probably true, that it was easier to shift the kind of a hair band if the girls had to wear something, than to have them taken off in two months or less.

If I could only send you home with the thought of not putting too much stress on non-essential things—I know it has been difficult for you to keep up with the passing style show—if I could only persuade you to evaluate your guards, I am sure it would go a long, long way toward your selling to us the things that are more important.

The Problem of Dress Regulation

We come now to the third question. "If the company did not supply this equipment of hairnets, gloves, etc., would they attempt to safeguard themselves?" They said just as vehemently as you would, "No." There are the reasons, which are pretty logical. "No, it is quite difficult to have them wear these articles at the company's expense." You all say "Amen" to that. "No. I did when I first started for the company. I only had them on for two days." No. The first answer you would get would be, "They cost too much." I think those are perfectly honest answers which you would agree with.

The fourth question was: "Do your operators help safety by suggesting guards and safety equipment or safety measures for performing your operation?" I think you safety men may take a great deal of credit to yourselves when we find that unanimously, over 100 of the 197 answers I received said that the employees did make suggestions; only 38 said they didn't; some said a few operators would make suggestions. One discouraged gang boss said, "I never heard of such a case yet." Another one said: "Yes, and if no provisions were made for safeguards you would soon hear about it." I think that is very, very encouraging for you because it is encouraging to know that you have been able to arouse an interest. It is also good psychology. You have made the employee think of the hazards of their own occupation and you have made them make suggestions. Any psychologist in education will tell you that it is the thing you wish to do that is the thing you can do well. If you can make your employees wish safety, then there is no problem to solve as to how to make them careful.

The fifth question was: "What proportion of your people do you think pay any attention to the safety posters and bulletins?" There were a great variety of answers, as you would, of course, expect. Seventy-four of the 197 felt that less than ten per cent pay any attention to the posters and bulletins. The great bulk

of them, ninety of them, felt that between 75 and 90 per cent of the people did pay attention to the posters and bulletins. Twenty-six optimistic souls said that 100 per cent of their employees pay attention to the posters and bulletins.

These are the comments: "All pay attention because the posters are attractive and easy to look at, but only a few benefit by them." Another said, "They attract considerable attention when actual photographs are displayed. They do not think anything of bulletins." Another: "Very few, because posters do not bring safety home forcibly enough to them; it should be done by lectures."

Modern Safe Practices and Those of 10 Years Ago

The next question was: "Is it easier to get your people to follow safe practices now more than it was ten years ago?" Of course, the bulk of the people said "Yes." Of the 197, 184 said "Yes" unanimously with very few comments, because ten years ago there was little to the safety campaign. Four people made no comment at all. Four discouraged supervisors said "No." One man said, "Very much so, because it has been driven into them by continuous lectures." Another one said, "Yes, because through posters the idea of safety is constantly before them."

That may be of some use to you in planning your publicity campaign.

The last question was: "Do you think this safety business has been overdone?" Of the 197, 136 said "No;" 24 said "Yes;" and 27 said, "Some of the operators do think that safety has been overdone."

Let us now go back to my original premise. I said that it was not the question of safety, not the spirit of safety with which we are making our quarrel, but it is your interpretation and the way you enforce your safety ideas on us that make it difficult for you to handle and difficult for us to avoid accidents. Let me read from the original sheet, because the comments of these gang bosses are very illuminating and also, I am sure, will mean much to you. "I do not think operators have any idea as to whether safety is overdone or not." He is an honest soul. "The safety program has been a wonderful thing for the operator." He also is an honest soul. On this one, I wish you could see the handwriting and the spelling: "My opinion of safety is great. I make it my business at seven-thirty every morning to go to each and every one of my operators asking how they are, look at their tools, and tell them to watch their step for the safety of us all, and I repeat the same oration in the afternoon. Safety First all the time." The next one reads: "As a general rule, no. They look upon it as they would education of any other form, thus their interest in the matter is rather apathetic." I wish I knew what company and what department that intelligent answer came from. Remember, these are all gang bosses. I have no idea what company it came from.

This one, I think, is a very great lesson for us all: "A lot of minor injuries are not reported because of the department attitude toward them. In an attempt to keep a good record, a certain amount of fear of consequences is instilled into the minds of the people who will take a chance rather than report an injury and get a bawling out." I wonder if you talk to your people who are injured just as the traffic policeman on the corner bawls you out when you pass a traffic sign? I think it is very difficult for the safety director and for the safety man whose job depends on making work safe and reducing those abominable statistics, lost time and otherwise, to always remember that the pressure is being put on production and "we" are between the devil and the deep blue sea as to whether to take a chance and do the thing we think is going to increase our production or whether we should take the narrow and straight path and have the feeling all the time that the foreman is going to jump on us because we haven't produced what we should.

Listen to this one: "They will cooperate if some attention is paid their suggestions."

Are you as a safety person, merely doing the spectacular thing of putting up beautiful posters and a great deal of talking like the gang boss who repeats his oration every afternoon, or are you actually doing the thing and are you paying attention to those invaluable criticisms that come from us who know the job far better than you as a safety man can possibly know it?

Preaching vs. Practical Action

"The worker thinks that there has been too much preaching to him and not enough practical action on the part of the employer." I don't have to make any comments on that.

Remember, there is no one who is quite so critical of the thing that you are doing and the methods by which you do it as those of us who are working on piece work and those of us who are trying to meet our production schedules. If your work is all preaching for the benefit of the impression it is going to make on the management and you are not practicing for the benefit of the employee, there is no one going to catch you so quickly as we are, and there is no one going to be so harsh on you and say that the whole safety program is "bunk." You and I know and the workers know, organized labor and the other organizations that helped pass the compensation laws must have known that if they fined the employer who had unsafe condition it was the one way to make him provide safe conditions in which to work.

Do we think that safety is a damn nuisance? No, but we often feel that your thoughtless and unsympathetic attitude of imposing and interpreting safety for us in our working conditions is a nuisance, and therefore we don't always pay attention to it.

CHAIRMAN OPP: Now, gentlemen, some of Miss Stone's remarks throw out a challenge to those of you who may have a difference in opinion on the questionaire that was circulated by Miss Stone. This is your opportunity to make comments of your views, to ask her further questions, if you desire; in other words, the question is now open for discussion.

J. F. GREEN (Safety Engineer, Western Cartridge Co., Fulton, Ill.): We have in our employ about 2600 people, 800 or 900 of which are women. Most of those female employees have to run machinery of one kind or another. A big majority is on a piece work basis. All of them are instructed not to put their hands around dangerous parts of the machine. Some of them do so. The trouble we have on our hands is to persuade those female employees of the dangers involved in wearing bracelets, finger rings and so forth. Every once in a while the question comes up and some female employee says: "This is my engagement ring; I wouldn't take it off for anything." Another employee might say: "This is my wedding ring. I absolutely refuse to take it off." I just wonder what method Miss Stone would use to take care of a conflict like that.

MISS STONE: This question of personal appearance is a very delicate subject. It is a most tender point.

I can't conceive of a job that requires the removal of a wedding ring. I can conceive where it might be advisable for the woman who wears an engagement ring to take it off on some operations. It seems to me that it is possible to point out here too that it is dangerous to that precious ring if she wears it to work. I think it needs a woman to tell her that. I agree with you that sometimes they take advice from a man quicker than they will from a woman. I admit that women are not very reasonable creatures. It does seem to me that when a thing is obvious it ought not to be difficult to get that girl to see your point of view.

The question of hairnets is an entirely different matter, because as I said on Tuesday morning to the Power Press Section, we women are in the marriage market. She is far more concerned in being successful in the marriage market than you are in the marketing of the product she is making. Therefore, she does not wish to do anything that might spoil the marcel that she had put in during the week.

I realize, gentlemen, it is very difficult for you to understand our psychology, and it is very difficult for us to understand you. When you want to make an impression, you all get into the identical kind of an outfit. When we wish to make an impression, we get something entirely different because we don't wish to look like anybody else. That, of course, is the difficulty in putting girls into uniforms. I am not committed to putting girls into uniforms unless under very unusual conditions. I feel we have no more right to complain about the kind of clothes or necktie you wear than you have to complain about the kind of clothes we wear.

We this summer had a girl come to work without any stockings. I told the foreman to tell the girl that it is quite the thing at the present moment to go to dances without stockings and to go to the bathing beaches without stockings but it has not yet been the style to come to work without stockings; that the company is very conservative and when it becomes the style we shan't object at all.

C. H. DAVEY (New York Telephone Company, New York City): Does Miss Stone think the time element in putting safety posters up would affect the field of the average employee?

MISS STONE: That is highly technical. Baron Collier could give you a far more intelligent answer than I on that. It so happens that I am a bulletin board hound and always read every bulletin that is put up. However, I do not think that it pays to keep up a bulletin until it becomes worn looking. I would much rather leave a poster up for two or three days and take it down and have a bare bulletin board for the balance of the week or month than to leave it up until you have a new poster to put in its place. You may take it down and leave it down for the balance of the week and put the same poster back up again on Monday morning, I don't care, but don't leave it there until it gets to be a monotonous thing. Does that answer your question?

CHAIRMAN OPP: Any further questions or comments?

You will note the introduction of Miss Stone was somewhat unusual. Generally when speakers are introduced you hear from the presiding officer all about them. In this particular case, we have reserved the biographical sketch of the introduction until the conclusion so that you can now weigh very definitely the remarks that have been made.

When Miss Stone graduated from Cornell University, she accepted a position with Joseph and Feis Company, Cleveland, where she was in charge of the employment of women operators.

At the beginning of the war she resigned and became connected with the Quartermaster's Department as an inspector of the working conditions in factories having government contracts.

In 1919, Miss Stone accepted a position in the Employment Department of the Hawthorne Works of the Western Electric Company, at Chicago. She was in charge of various phases of this work until 1924 when she went abroad to study and become more fully acquainted with working conditions in the factories of England, France and Jugo-Slavia. At the present time, Miss Stone is in charge of personnel work for women in the operating branch of the Western Electric

Company, Hawthorne Works; and in preparation for her part in our program she spent considerable time in the punch press departments of that company getting actual experience as an operator.

Miss Stone is a member of the Board of Directors and Chairman of the Industrial Committee, Chicago Y. W. C. A., member of the Industrial Girls Work Committee, Council of Service Agencies, and member of Committee on Women in Industry of the Illinois League of Women Voters.

We certainly are very proud to have had you with us today, Miss Stone. As a last chance, are there any questions that you wish to ask Miss Stone before we pass on?

H. N. FOWLER (Liability Insurance Company): I wonder if Miss Stone can tell us anything about the use of the colored chalk blackboard bulletin service?

MISS STONE: I am sorry, but I can't tell you a thing about it.

CHAIRMAN OPP: The preparation of a program for such a session as this one has largely devolved in the past, at least, upon the Council Headquarters Staff. In order to get more of the opinions of you folk who contribute to the success of the program, it was decided this year to have a set of officers elected at this meeting, their chief purpose and function being the preparation of a program for next year's Congress. I am very happy at this time to present to you Mr. John P. Eib, who as chairman of the Nominating Committee has a slate to present for your approval.

Report of the Nominating Committee

JOHN P. EIB: Mr. Opp, having in mind all of the things that you outlined, the committee has the following nominations to present to this meeting:

Chairman, George Hodge of the International Harvester Company, Chicago, Illinois.

Vice Chairman, Carl J. Rutland, Safety Engineer, Texas Power and Light Company, Dallas, Texas.

Secretary, Elmer L. Hewitt, Manager of the Detroit Industrial Safety Council, Detroit, Michigan.

CHAIRMAN OPP: As chairman of the Nominating Committee, I presume you put that in the form of a motion?

MR. EIB: Yes.

CHAIRMAN OPP: Do I hear a second?

(The motion was seconded and carried.)

CHAIRMAN OPP: We will have the vice-chairman in this case, in the absence of a secretary, cast the ballot for this slate, if you will so move at this time.

MR. EIB: I so move.

(The motion was seconded and carried.)

CHAIRMAN OPP: I am sure that with the selection of a set of officers like this there will be no question about the content and quality of next year's program. At any rate, however, let me remind you that your own suggestions submitted to these officers or to the National Safety Council headquarters will be very much appreciated and more than likely incorporated in the program for next year's meeting of the General Round Table. You can contribute your own ideas during the coming ten months, allowing at least two months for the preparation in final form of the program.

We have a feature today that is outside of the arranged program. There has come to my attention an individual, very remarkable, who has a story to tell in which I am sure you will all be interested. I am going to ask our good friend

Bill Winans to introduce the next speaker at this session. Mr. W. H. Winans of Union Carbide and Carbon Corporation:

W. H. WINANS: Mr. Chairman, Ladies and Gentlemen: Walter Darling, who is here with me, about five years ago was an expert service operator and demonstrator of the Linde Air Products Company. At that time he suffered a very severe accident, as a result of which he was totally blinded. Since then, he has made a better man of himself than he was before. His ambition from now on is to devote his life so far as he can to preventing others from going through the experience he went through. He will tell you in a very few minutes what he thinks about safety. We in the Union Carbide and Carbon Corporation are proud of him as a former fellow employee and want to do everything we can to make it possible for him to accomplish the results he is after.

The Cost of An Accident

WALTER DARLING: All of you are familiar with accidents and accident prevention work. I wonder how many of you have stopped to consider just what it costs to have an accident. To the manufacturer, the increasing number of industrial accidents each year means a higher experience and the expenditure of large sums for safety equipment. It means a great deal of industrial inconvenience such as the training and replacing of men. It means the added expense of maintaining industrial relations and first aid departments. To the industrial insurance companies, it means more claims and more money for medical service, hospital bills and compensation for time lost. To the victim, it means injury, pain, suffering, and the worry of being incapacitated or handicapped, not only in a physical way but as to the continued support of his family.

Although all of these are big and serious items and amount to large sums of money, that pay dividends only in good will among men, still they represent only a minor part so far as the actual costs are concerned. If you will allow me to tell you my experience, it will show you a new version of what the costs of an accident are.

My parents, like most parents, had spent a great deal of time and money raising me, and I suppose I gave them, like most boys, a great deal of trouble, especially when I was only a child. Before the war, I was at an age where I was not of much help to them, and while in the service I could not help them to any extent. Then, after the war, I settled down to the business of getting somewhere in the world and began to save and to help and in a way repay my parents for what they unselfishly had given me. In the next few years, I managed to pay off a small mortgage on the old home, and it looked as though my parents might lay down their work and let me bear the care and the worry they had borne for so many years. I continued to save, and as the load got lighter I became engaged, and then just as things were at their best, the unexpected happened.

A Flying Piece of Steel

I had a most serious accident. In an explosion, I was struck across the face with a piece of steel and the damage was great and far-reaching; more so than I realized at the time. I was taken to the hospital a torn and bleeding mess, living, but still a pitiful piece of humanity. There were X-rays and ice packs. After a few days my family were notified. My father came to that hospital, and to this day, folks, I am thankful that the bandages hid the extent of my

injury. He was unable to see the condition of my face. But, as I felt his hand, I felt tears on mine. When a big man, weighing 180 pounds, sheds tears, he has a mighty good reason for it. Right then and there I said that were it ever in my power I would prevent heartaches such as these from occurring to the loved ones of others. I knew what it meant to my father, because he would have to comfort my mother.

After seven weeks, I was able to leave the hospital and make the trip home. Upon my arrival, I was put under the care of a specialist. There was a chance that I would have the partial sight of one eye, and to this end a series of operations were started, seven in all, lasting over a period of three years. Each time I came from that hospital, I had to be treated at home. This was my dear old mother's work. My eyes had to be bathed and fresh bandages applied and drops administered. I am sure that it was only the caring for my needs that carried my mother along, for after the operation was over and it was decided that nothing more could be done, that I could never see again, my mother died.

As I stood at her grave that cold day in October, I again said that I would do my part to save someone else's mother from what mine had gone through. Fourteen months later when I laid my father at rest beside my mother, for the third time I said I would do my part again to kill this awful condition brought about by accidents.

I could not quite get over the terrible ending that had come to my family after all their work and sacrifices for me. I do not tell you these things, folks, to enlist your sympathy; I don't need it and I don't want it. I must, however, have your help in so worthy a work. There isn't a bit of doubt in my mind but that anyone here could have and would have borne it equally as well. For the victim it is not so bad. A good physician or surgeon can with cocaine stop your pain or relieve it. But, remember, that neither he nor anybody else can give an anesthetic to the heart and the feeling of those who actually do the suffering.

CHAIRMAN OPP: Mr. Darling, you have my word that your story, told in the manner in which it was, not to make a touching story at all but a story, a true story of the price of an accident, certainly has left a deep impress upon us. We thank you for coming here today. We thank you, Bill Winans, for bringing Mr. Darling.

A picture such as that, gentlemen, ought to remind us oftentimes of the responsibility that we, either as executives or safety men, carry upon our shoulders. We have heard a lot about the incidental costs of an accident. This is a new item, I am sure, for Mr. Heinrich to include in his remarkable list.

Now, we proceed to the matter of discussing our most serious problems and how they were solved. Stories of accomplishments, stories of things done are always of interest, and we shall be very happy as we go down this galaxy of experts along safety lines to hear from each and every one the problem that in their own mind was the greatest, and then to hear of the accomplishment that met their work upon those problems.

The first one to speak is Mr. D. Frank Lord, Safety Engineer of the M. J. Whittall Associates of Worcester. He is a member of the Worcester Safety Council, and one of the organizers of the Worcester Chapter of the ASSE-Engineering Section of the National Safety Council. He is the new chairman of the Textile Section of the Council, and yesterday he was elected a member of our National Executive Committee.

Our Most Serious Problems and How They Were Solved

By D. FRANK LORD
Safety Engineer, M. J. Whittall Associates
Worcester, Mass.

Since my subject is one that I cannot well cover in the brief space of time allotted to me, I will confine my remarks to the problem that I found the most difficult to solve, namely the "Foremen."

It will be necessary for me to describe briefly the conditions existing at our mills when I took charge of the safety work. Our mills had been running many years before such a thing as "Employers' Liability" or "Workmen's Compensation" had become popularized. The foreman and the overseers were men who had been brought up in the business and had been at the plant many years. It is quite true that we had done everything the insurance companies asked for when the "Workmen's Compensation Act" was put in force, such as guarding machines, having a safety committee and enough of the first aid organization to cover their requirements. The safety committee met occasionally and there were a few perfunctory inspections, but it was not until 1923 that real activity began.

Selling Safety to the Foreman

Then came the question of selling safety to the foremen. These men had been used to taking care of the worker as best they could. They were a kindly lot and meant well, but did not quite understand. This condition puts me in mind of a story that I heard recently regarding a fellow who went from one of our large eastern cities to a ranch in the west.

He furnished himself with all the necessary equipment including a wonderful saddle, bridle, chaps and a beautiful silver mounted six shooter. Upon his arrival at the ranch he sought out the chief wrangler and said, "Now I am all ready but I want a horse." "What kind of a horse do you want?" said the wrangler. "Oh, I want a good one." "Have you ever ridden a horse?" "Well no, not much." "Well here is one that nobody has ever ridden and that's what you fellows in the city call a 50-50 proposition."

I think you can readily understand the position that I was in, in regard to the foreman. The first thing I did was to create a feeling of confidence in the foremen by showing them that I had considerable enthusiasm and assurance on the subject of safety. I tried to show them what safety really meant in connection with the men, that they might be kept at their work, thereby insuring them of continued wages and rendering to the management a full measure of production.

I called meetings and at the start made suggestions to them and it was not long before sufficient interest had arisen so that they were making suggestions to the committee. A safety committee had been formed consisting of the foremen and overseers. All accidents were investigated and reports together with suggestions as to how to prevent further accidents of like nature were made.

Speaking for just a moment of the safety committee, I am very strongly of the opinion that one of the greatest benefits that can be derived from a Safety Committee is to change its membership and organization at least once a year being careful to retain on the new committee enough members of the old committee to carry on the work satisfactorily.

Letters from the management criticizing the men when they failed, and praising them when they had done good work, resulted in the building up of an interest that

is hard to pull down. Every month I made it a particular point to present at the meeting of the safety committee the results of the previous month. I saw to it that they had a copy of the report. We have arranged with the National Safety Council to have enough copies of the NATIONAL SAFETY NEWS for circulation among all the foremen. These are marked on the cover with the names of the foremen to whom the magazine is to go and any particularly interesting article in the magazine is indicated on the cover with a request that they read it. Each magazine is sent to seven different foremen with the request that each read and pass the magazine along to the next name printed on the cover, but not to retain the magazine over four days. We also were able to create sufficient interest among our foremen so that a large number of them attended safety rallies, which were sponsored by the Worcester Safety Council. The foremen soon got into a frame of mind very strong for safety. I am quite proud to give you a few figures as a result of this intensive work.

A Fine Showing

In 1922 we had 35 lost time accidents, 14 of which were compensated for, a total of 460 lost time days. In 1923 we had 38 lost time accidents, 22 of which were compensated for, a total of 798 lost time days. It was at this time that intensive safety work was started. In 1924 we had 37 lost time accidents, 14 of which were compensated for, a total of 467 lost time days. In 1925 we had 25 lost time accidents, 13 of which were compensated for, a total of 319 lost time days. In 1926 we had 18 lost time accidents, 12 of which were compensated for, a total of 346 lost time days. In 1927 we had 22 lost time accidents, 9 of which were compensated for, a total of 265 lost time days.

These comparisons had best be made with the knowledge that there were employed an average of 1,500 men and women. The compensated accidents are those which kept the injured person away from his work more than seven days, and you will notice the steady decrease from 1922 to 1927 and that the greatest number of lost time days was in 1923, of 798, and this was reduced in 1927 to 265. However, if we are able to continue this year's work as well as has been shown from the first of January, 1928, we will have a much greater reduction than during the previous year.

I feel confident that after the interest of the foremen is aroused, greatly improved conditions will obtain. I thoroughly believe that, first, last and always, the keyman in any plant, for safety, is the foreman. That there have been other serious problems is beyond question of a doubt, but they have all been solved in due course of events; the one that is outstanding, in my mind, is the one which I have tried to describe.

CHAIRMAN OFF: Mr. Lord, we thank you for your part of the contribution to the subject of the problems that have been solved. Unless there is something specific at this point we will omit discussion on each particular paper, going on through the list of the various problems and then having general discussion upon all of them.

The next speaker is Charles H. Black, Division Manager, Stone and Webster, Inc., construction engineers of Boston, Massachusetts. Mr. Black was the chairman of the Poster Committee of the Construction Section during the past year.

Our Most Serious Problem and How It Was Solved

By **CHARLES H. BLACK**

Division Insurance Manager, Stone & Webster, Inc., Boston, Mass.

Perhaps many of you think that I will start in by telling you about some particular operation incidental to our construction jobs that made us pull our hair because of the hazards involved, but to begin looking for a special risk on a construction job would be a problem in itself for I think the construction industry represents the greatest hazard from a safety viewpoint of any industry in the universe.

I am not going to take the time to enumerate construction hazards. Each of you has a pretty good idea of the ever changing hazards involved.

With only five minutes to go and knowing of the desire of the National Safety Council for us to stay on schedule I am going to ask you to visualize in a few seconds the construction operations of a large organization having jobs in about twelve different states and each job under the supervision of a superintendent who rates ace high in his field.

Now here's my story:

It was felt that an organized safety movement was needed, as too many accidents were occurring on the jobs. On looking into the matter it was found that there was a frequency rate of 87 lost time accidents per 1,000,000 man hours. Hard to believe but it was so. Various safety programs were undertaken, monthly letters to the superintendents pointing out benefits of safety work both financial and humanitarian and monthly statements showing competitive standing of the various jobs were sent out. When you stop to consider that in the construction field like that undertaken by Stone & Webster when a job is finished the supervisory force moves to a new location and has to instruct a new crew in the practices of safety, I think you will feel as we do that we did accomplish something in reducing our frequency rate from 85 lost time accidents per 1,000,000 man hours to 65 lost time accidents per 1,000,000 man hours.

The next question was how were we to reduce our lost time accidents still further. The members of our General Safety Committee continually kept after the jobs under their supervision. Those in charge were called to task concerning the serious accidents and safety had come to be a special feature on our jobs. The idea was conceived of analyzing our accident summary to determine the four principal causes of our lost time accidents. The procedure we used was that outlined by the National Safety Council in Safe Practice Pamphlet No. 21. The four principal causes proved to be falling objects, stepping on or striking against objects, falls of persons and handling material and objects.

In October, 1927, a letter, with a supply of special bulletins, was sent to all of our superintendents. I shall read the letter:—

Dear Sir:

Examination of our accident record for the period August 16 to September 15, 1927, will show that our frequency rate is much lower than for the corresponding period last year. Considering the increased exposure this record is very encouraging and indicates that the work of our safety committees is not in vain. There is still room for improvement, however, and we are anxious to have more of the smaller jobs under the caption "Section A," "Jobs that had no lost time accidents."

It should be borne in mind that a high frequency rate on any particular

job results in a higher average for all our operations, and, therefore, the job with a poor record not only stands out as an apparently unsafe job, but it also nullifies, to some extent, the job with a good record, for as pointed out above, it raises the average for all our construction operations.

Classifying Accidents

An examination of the last comparative statement will show that there are four classes under which the majority of the accidents are listed and these are as follows in the order of the number of injuries:

1. Falling objects.
2. Stepping on or striking against objects.
3. Falls of persons.
4. Handling material and objects.

The above will show the operations that are the most hazardous and which produce the greatest number of lost time accidents, and we would ask that you take extra precaution during the month of November to prevent accidents occurring under the first class.

By an examination of the causes of most of the accidents on your own accident record, you may find a way that will help to reduce the number.

We shall select for the month of December accidents of the 2nd class and so continue through the list each succeeding month.

The efforts that are made to reduce accidents of any one class will, of course, be additional to the routine safety work that is part of the construction program and we hope by concentrating on the hazards which cause the greatest number of accidents that much improvement will be shown in our operations as a whole.

We are enclosing a supply of posters which you should place in conspicuous locations around your job.

I trust that we shall have your hearty cooperation in making November and the succeeding months the best that we have had since the safety campaign was started.

Yours very truly,

W. N. Patten, Vice-President,
Division of Construction and Engineering.

Similar letters and bulletins were sent out in November and December, also National Safety Council Safety Calendars were sent to safety committee members and foremen. The classes of accidents that were responsible for lost time accidents were forcibly brought home to the men on our jobs and the jobs were given the idea of how to analyze their own records of causes of lost time accidents, and on the whole excellent results have been obtained. Not only were the lost time accidents classified under the titles falling objects, stepping on or striking against objects, falls of persons and handling material and objects reduced but a reduction was effected in all classes.

We had our jobs in Massachusetts participate in a safety poster contest sponsored by the Massachusetts Safety Council. A poster was placed in the hands of hundreds of workmen and foremen on construction jobs of approximately twenty-four contractors throughout Massachusetts. Cash prizes were offered for the best answers to the question "What's Unsafe in This Picture?" Our own campaign that I previously mentioned was also in process at this time and it was pleasing to Stone & Webster to have four out of the six prizes won by our men. We took the first, second, third and one of the two five dollar prizes given as the sixth

prize. An official list of fifty-three unsafe practices was given to the judges with the poster, but the surprising part of the contest was that the prize winners found considerably more than that number. Our first prize winner was able to enumerate one hundred and thirty-six unsafe situations revealed by the picture.

Previous to our special campaign the yearly average frequency rate was 65 lost time accidents per 1,000,000 man hours. Forty-one lost time accidents per 1,000,000 man hours has been the average frequency rate for the past eight months. I think we have reason to be proud of our record when the magnitude of our work is considered and the fact that we do not have the same workmen on all our jobs as do the average local contractors. This is a mark for the larger construction companies to aim at and if your frequency rate is not so good you should do better. If your work is not construction you do not have our hazards in the other industries and, therefore, this rate is not comparable to the frequency rate you may enjoy.

In closing I want to emphasize the need of classifying your accidents. The method recommended by the National Safety Council will aid you in the solving of your accident problems and will help you to find the evils that are eating into the efficiency and financial coffers of your business. If you would study your accident analysis as you do your financial statement and act accordingly, your accidents will diminish and your savings will increase.

CHAIRMAN OPP: Thank you, Mr. Black, for your contribution.

The next speaker is one who is getting rather nervous that I might introduce him with some of the applesauce that sometimes is associated with introductions. I think last evening's issue of *The Crash* indicates that all my applesauce is delayed en route between Detroit and New York in a box car along with other miscellaneous notes. Unfortunately, we haven't an added flourish to sound for Mr. Armstrong. We just take it for granted that as safety engineer of the Eastman Kodak Company, Rochester, he has a real job. He may indicate upon rising to his feet just what his connections may have been in regard to the story that he is going to tell.

Solving Our Most Serious Problem

By A. L. ARMSTRONG

Safety Engineer, Eastman Kodak Company, Rochester, N. Y.

We started a few years ago a work in our plant which I believe is rather different from that done by any other concern. Our problem was to reduce what had been thought to be a very good accident record—that is, comparing it with statistics which were available. As a means of preventing accidents, especially in the chemical industry, we decided to launch an educational program. In other words, we wanted to find out what was causing the accidents. Some of you may say, "That is easy." If you do, you are not in the chemical industry. We put our proposition squarely and fairly up to the employee, had them in, talked over our problems and from them received a knowledge of hazards which existed in the plant that we had no knowledge whatever of.

The work was started in a small way as an experiment in our chemical plant. We checked over all the accidents that had occurred, and we produced these accidents on a laboratory scale for the men. They were asked how this type of accident happened. The answer was that they did not know. In other words, men were handling acids, alkalis and other corrosive substances and did not have a sufficient knowledge of those materials to handle them properly and safely. That is pretty general throughout the country of a great many materials, contrary to a great many people's belief.

We showed different reactions of acids and caustics. That was one of the first things we did. The next thing we did was to impress upon the employee the necessity of using water on acid burns. To do this, we poured acid over the hand and immediately put it under water. Then, we took a piece of burlap and poured acid over the burlap to show how quickly the burlap could be destroyed. We did that because in our work we handle a lot of burlap. This one demonstration, I believe, saved us a very severe if not fatal accident shortly after we had gone into the work.

Safety Training Saves His Life

One of our employees was transferring acid from one building to another. He put the pressure on the blow tank and started in to inspect the line. A six inch nipple blew out, showering him with a mixed acid. He immediately got under the shower bath. I saw him three hours afterward in a hospital and the only place that the alkali showed any reaction was in the ear where the acid had not been thoroughly washed out. That particular thing has been discussed in the Chemical Section a great many times.

A man came to me this morning and said, "I don't know how you get your men to use water; our men want to use linseed oil." It is easy to give that demonstration and talk to the men about it.

Because of the nature of our work, we use a great deal of static equipment to remove static from materials and inflammable liquids. Many men will not believe that static will ignite gasoline or benzol fumes. In fact, I have seen men throw a lighted cigarette into a pan of gasoline to show how quickly it would be extinguished and how impossible it was to ignite gasoline with a spark.

Take the Toronto accident, which was one of the worst we have ever had. A man didn't want to pay for having his drapes dry cleaned. He went out and bought some gasoline, took the drapes down and put them in the washing machine. The fumes given off finally got to an explosive concentration. The static charge built up in the machine blew up the house. Both he and his wife died at eight o'clock that night. The next morning, I believe it was, they found the two little children in the cellar with their legs burned off up to the hips. It blew the house next to it partly down. When you get that sort of thing among people who have real good intelligence, educated people, when they do that sort of thing you can't expect your \$30 or \$35 employee to go out and handle materials of that kind safely unless you can in some way instill in him the seriousness of not handling it properly.

For demonstrating purposes we use a static machine and set up equipment on a laboratory scale the same as is used in a department, and by moving the equipment out of adjustment show how high potentials can be built up and made to jump through space, also igniting fumes from inflammable solvents. When you have shown a man that, there is no question in his mind but what it is serious and the equipment must be kept properly adjusted.

The argument may come up that workmen cannot be made to understand or appreciate this type of hazard because of their lack of technical training, but this sort of work need not be done along technical lines. In fact, much better results are obtained by keeping away from the technical or going into the reason for static or how it accumulates.

After trying this work out in our chemical plant, we branched out into other manufacturing departments and eventually took in all of our E and M foremen and gang bosses, as well as our truck drivers and riggers. Some of you may say, "Why the truck drivers?" The truck drivers have to handle

all the dangerous materials that come in. One of the first questions I got put to me was, "Suppose we throw a cylinder of ammonia on the paper will it do any harm? We had one of the manufacturers up here several years ago and he told us it was all right." If they throw off ammonia, they will throw off chlorine, and they will throw off other substances.

We had in all our E and M bosses. Another question brought up by a truck driver was, I believe, something like this: "Does the supervision in this plant have to hold all their conferences in the middle of the street and just around blind corners?" In other words, you immediately get from the employee the fact that you can't establish rules which you wish him to live up to unless your supervision is going to live up to the same rules. If this work is done and you instill in the employee the proper attitude, they won't be a bit backward in telling you what they think of conditions throughout the plant. If you are going to have safety in the plant, that is the one thing you have got to do.

Discuss Accidents in Other Industries

We make a very careful study of accidents, fires and explosions which happen outside our plant and tell our employees how these accidents happened, where we have parallel conditions at Kodak Park and what can be done to prevent this same sort of accident in our plant. The average man will not read safe practices pamphlets and he is not interested in accidents which happen outside his own plant. Of course, there are exceptions to this rule but I believe it is pretty general among all workmen. However, they are very glad to discuss this sort of thing with someone else. A great many times they will point out conditions which exist in the plant which might be the cause of a serious accident. In fact, we have received a great many very valuable suggestions from our workmen, some of which have led us to discover hazards which we did not know existed.

Our school will accommodate 30 employees. We have them in during working hours and spend from two to three hours with them, depending upon the size of the class. All new employees go through this school within two or three weeks after employment. After this we have them in once a year, and I might add that we have found that it is advisable to handle not more than thirty employees at a time. In starting this work in a large plant, I would advise that it be tried out in two or three departments which will give the man doing the work an opportunity to install proper equipment for demonstrating purposes and make up his lecture work to fit the different groups. This man should have a thorough knowledge of manufacturing conditions throughout the plant. He should also have a thorough knowledge in regard to safe practices for handling materials which are used in the plant, such as welding equipment, ammonia cylinders, carboys of acid, drums of caustic, tank cars, and materials of this sort. It is also very necessary for him to have the confidence of the employees because without this he will be unable to get them to discuss the different conditions around the plant.

We have a stenographer sit in at the discussions after the demonstrations are given and every question and answer is written down, and a copy of those questions and answers go to the superintendent and also to the plant manager. The employee's name is not taken. I might add here that if you take the employee's name you might as well quit. One of the first things I got when I first started in this work was, "What the hell have you got us over here for—to get us in trouble if we say something?" That is the attitude of the average employee. I don't think our plant is any different than any other. If you don't take the name and they have real confidence in you, they will tell you about these

things and talk them over. If the situation is handled as it should be, you can do a lot of good work and not hurt anyone's feelings.

A Good Accident Prevention Record

We have in our plant about 6,000 employees. A little better than one-third of these are girls. We have 112 different departments. Out of these 112 departments we had 58 which operated during the year 1927 without a lost time accident. In 1928, up to the first of October, we had 72 departments operating without a lost time accident. Our severity rate per thousand hours work for the two years was: 1927, 2.65; and 1928 to date, 1.05. That includes such departments as sulphuric acid, nitric acid, cotton nitrating, silver nitrate, steel fabricating, machine shop and carpenter shop. I might add that in our steel fabricating department we have 110 men who have operated about fourteen months without an accident. I think that is a real record for anyone to shoot at.

Our experience after going into this work and doing it for two, practically three years, is that a great many accidents happen throughout your industry entirely because of the lack of knowledge on the part of the employee. I also believe that if you are going to put over a safety program you have to give the employee a part in that safety program. I don't think it can be a one-man job. I think you have got to get them interested. If you want to get them interested you have to let them talk. When you do that, I think you will find out what is causing your accidents. In other words, I don't believe it is possible unless you have established confidence in the employee to go out and properly investigate an accident and get the results. In other words, they won't tell you unless they are absolutely sure that if they tell you something about the supervision or the way the department is run that you are not going to go to the superintendent and get them in dutch.

CHAIRMAN OPP: Thank you kindly, Mr. Armstrong. The next speaker presenting his problem and the solution is listed as George Martinson of Pickands, Mather and Company, Hibbing, Minn. Is Mr. Martinson in the room?

The next, then, is Arthur D. Berquist, Safety Inspector of the Youngstown Sheet and Tube Company, East Chicago, Indiana. In 1926 at the Detroit Congress, Mr. Berquist played the part of "Careless Cal" in the playlet "The Education of Careless Cal," presented at the General Round Table session. He has been nicknamed "Careless Cal" as he has played the part on several other occasions. We are happy to have "Careless Cal" with us today.

Our Most Serious Problems and How They Were Solved

By ARTHUR D. BERQUIST

Safety Inspector, Youngstown Sheet & Tube Co., East Chicago, Ind.

I haven't any reputation to lose as an orator, although I have taken a couple of lessons in Mr. Hardy's school of Public Speaking, and if I do make a flop, it will not be any reflection on him, because I haven't gotten my diploma yet.

I have heard a number of remarks in various meetings of this Congress that have kind of struck me, and before I give my talk I just want to say a few things in connection with them.

At some of the meetings, some men have brought up petty little things as to why workers will not conform to safety rules or regulations, as laid down by the plant. There was one mentioned here this afternoon, and with all due respect to the men making these remarks, I just want to express myself in this way:

You lay out the work for the people that are working in your plant, you expect them to do their work in a certain way, they are not going to tell you how they are going to do their work; it is up to you to tell them how to do their work safely.

I heard a remark yesterday morning by Mr. Homer L. Ferguson, President of the Newport News Shipbuilding and Dry Dock Company, in which he stated that the simplest problem of management is safety, as it can be enforced without fear of contradiction. I think that is one thing that every one of us ought to realize. We have got to do it. I want to say also, that if we accept the excuses and alibis for not following safety rules and regulations as laid down in our plant, we don't have the courage and conviction of carrying out those rules and regulations, but we sit by and wish that the employee would do it and worry about the possibility of a future accident.

The subject of this discussion is, "Our most serious problems and how they were solved." What is our most serious problem? What are we trying to do? Stop accidents. Who gets hurt? The man. The man then is our problem. What are we going to do with him? It has often been said that about 75 per cent of our accidents are due to carelessness, ignorance or some other form of unsafe practice that eventually leads to disaster.

If that is the case, it is a question with us as to what we are doing to try to stop carelessness, indifference, ignorance or unsafe practices. It has been said that education is the solution to unsafe practices or the dangerous way of doing work. If that is the case, we must map out a system of education that will reach every man and one in which we have some reaction to know that it is being carried out.

That leads me up to the things I want to talk about or the things that we are doing in our plant; three things, taken from our entire work, which I wish to bring to you to show you how we are trying to solve the problem of education. And rather than have the safety department tell them what is going to be done, we are asking the foremen, the superintendents and the operating men what they are doing.

About three or four years ago, we instituted a system in our plant of holding safety meetings of foremen in each department at which time we discussed everything that we knew of that pertained to safety to educate the foremen and expected he would carry it to his men and that we would get safety in that way. We did make a reduction in lost time accidents, but nothing near what we think could have been accomplished or what other plants were doing in the country, with the result that an order came from the superintendent of the plant that every foreman would have to hold a safety meeting of his men at least once a week or by-monthly, according to the size of the department and the record they made. A form is furnished on which this meeting must be reported. The form shows the department, the foreman's name, the date and the number of men present at the meeting and who conducted the meeting. It also shows a place for the report, that is, what unsafe practices were reported or what conditions were reported. This form must be sent to the safety department where a record is kept.

Daily Report Required of Foremen

We have instituted in our plant, and I think we are the originators of it, a system of reporting by the foreman daily which we have entitled "The daily report of unsafe practices corrected." The foreman must send this in every day to the superintendent of his department. It is then forwarded to the safety department to be checked against the foreman's record. In the event the foreman

finds an unsafe practice, he must write out the man's name, check number and the description of the practice and how he remedied it, signing the report and sending it in. If he has no unsafe practice, he writes across the face of the report, "No unsafe practices found," or words to that effect, and also sends it in.

We realized that the foreman, confined to his little shop or department, could not always come in contact with things that would be of interest at a safety meeting or a warning to any of his other men. We have arranged in the safety department to issue a weekly bulletin, run off on a legal sized mimeograph form in which we write up records of near accidents, unsafe practices and cases of discipline.

Those are the three things I wanted to call to your attention. They are measures or features that have helped us considerably in cutting down unsafe practices. There is a psychological effect in the handling of these reports. We feel that a foreman writing out his reports of a safety meeting has the things or items which he writes out on the report indelibly impressed in his memory. The prime purpose of the unsafe practice report was to make that foreman think of safety at least once a day. What effect has it had? I am glad to say that in our plant (we employ 4,500 men) we have had a 35 per cent reduction in the number of lost-time accidents for the nine months of this year as compared with last year, and the year 1927 was the best record we ever had in the history of the plant.

CHAIRMAN OPP: Thank you very much, Mr. Berquist, for your contribution to the program.

The gentlemen will be ready to discuss any part of the matter that has been presented after the next speaker concludes his contribution to this program.

The next speaker is one who has had considerable experience in the public utility industry. You will note how varied this program has been this afternoon, both in personnel of organizations represented, in industries in which they are engaged, and also in material which they have contributed. The next speaker is a man who has recently been awarded a McCarter medal for work done in resuscitation. He is the Manager of the Safety and Claim Department of the Northern Indiana Service Company of Hammond, Indiana. I have pleasure in presenting Mr. Harry M. Keller.

The Problems of Responsibility

By HARRY M. KELLER

**Manager, Safety and Claim Departments, Northern Indiana Service Co.,
Hammond, Ind.**

Much of what I intended to talk to you about has already been discussed.

I feel our biggest problem has been getting the foreman or supervisor to accept his responsibility in our accident prevention program. Therefore, I am just going to touch lightly on that for two or three minutes, and try to get to you our ideas as to how the foreman should be dealt with.

In the beginning of our safety work, the foreman was overlooked. We felt that, like a good many other companies who were inexperienced, this thing could be overcome by the management issuing those orders and those orders were to be lived up to. We soon learned that foreman support is absolutely necessary. We must remember that safety work is not and cannot be the responsibility of any individual in an organization employing a great number of people; the responsibility must rest with the various department heads and foremen.

We had a very hard time convincing our foremen that safety work was a definite part of their job and an operating problem. They could not see why, when there was a man there to devote his entire time to safety, that man should not do all the work. There must be a very close understanding between the foreman and the safety director of any organization. The foreman in any industry has what we call job pride. Every foreman is anxious to make a good showing. One of the things that stand out in this matter of job pride is that of doing the job without accidents.

We devised a plan of issuing each month a bulletin covering the various districts throughout the state in which we operate. We showed on this bulletin the number of accidents in each district, the name of the employee, the name of the man's foreman and the number of days lost. That sheet soon became known as the black list; and believe me, not only the foreman but the employees on down the line were anxious to keep their name off the black list.

Reducing Motor Vehicle Accidents

As I said, a good deal has been said about the foreman, so I am going to pass on and try to just bring up here something that we have adopted that has aroused considerable criticism, and we have had letters from a good many companies about it; we think you will be interested in it. We operate a good many motor vehicles. We are having a great many automobile accidents. We decided that we must do something, adopt some plan to stop those accidents. We adopted a rule that when an employee has three automobile accidents, he cannot drive an automobile for the company again. Some people say, "That is pretty hard-boiled." It does sound so. They will say, "Suppose the man is not to blame, suppose he is going down a through street and some one crashes into him; that is not his fault, why should you hold that against him?"

Here is the way we work it: We have a card record of each and every employee in the company. Every accident report comes through the safety department and shows on that card the date of the accident, the nature of the accident; and then, when a man has three automobile accidents, his reports are pulled and sent to the vice-president of the company. He reviews the details of these accidents. We have not made any exception to the rule that a man shall not drive a car again. As a result of that, during the past year we have laid off four employees, but our automobile accidents have decreased 60 per cent. The automobile accidents are a thing of the past. That record, we believe, will be a great deal better during the coming year.

We also have combined with that the rule that if a man has three lost time accidents his case is passed to the Vice President. He reviews the details of the accidents and some disciplinary action is taken. That also is very effective.

This year I am happy to say we had only one fatal accident in our line department as against seven last year. Our lost-time accidents are the lowest in the history of the company.

While this rule may seem, as I say, hard-boiled, I think you will agree that the results justify the adoption of such a rule.

CHAIRMAN OPP: Thank you, Mr. Keller, for your contribution to the program.

Now, gentlemen, the speakers are all here awaiting your onslaught. I trust you are going to give them some real "posers" of questions to answer. The meeting is in your hands.

MR. CHAPIN (Philadelphia, Pa.): I was very much interested in the remarks regarding the training of foremen. I have just come from a luncheon of the National Carbon Company where I heard a most interesting talk by Mr. Conroy

of the Niagara Falls Carbide Company. He said they had reduced their accidents from 1,100 in 1927 to something over 800 this year, up to date, 600 days of which were penalty days on account of a lost member. You said, Mr. Berquist, that you have your foremen report unsafe practices; how do you know that they know an unsafe practice when they see it?

Mr. Conroy takes the foremen into his office and draws a diagram on the blackboard. He says, "We are going to do a job here; we are going to load a car, we are going to do some operation around the plant, and this foreman here (pointing one out) is going to tell us when we are doing it right." He then starts with the beginning of that operation. He says to the foreman, "I am a new man; I am going to do this work; if I do anything that is wrong you are to tell me I am doing it wrong. Every time I do something that is wrong and you don't tell me about it, I am going to take ten off that hundred." He starts the game. The foreman tells him what is right and what is wrong. Sometimes he gets the percentages down as low as 40 and sometimes he has a minus chalked up. He said at first it didn't make much difference, but gradually, after the first three months, there was a marked improvement in the interest on the part of the foremen and in the accident record in the plant.

I wish Mr. Conroy were here to give it to you more directly.

The interest of workmen can be aroused in another way. I heard of a colliery company where the president walking on the property, got off the train and walked up the track and he was going between two cars that were about fifteen feet apart when somebody on top of the hill hollered, "Get that guy." Two fellows came rushing toward him and said, "You can't go through there; that is against the company rules; don't you know that; you are fined fifty cents." They looked him over. They saw he had on a white collar. That did not make any difference. The president was fined fifty cents for disobeying a rule of safety. The president then knew his men were on the job and had safety on their mind. They were watching the safety rules of that company.

F. A. OXLEY (Union Carbide Company): Referring to the statement of the speaker a few minutes ago saying the foreman should have something written to impress upon his mind the safety of the company once a day, I would like to say that if the foreman has to have something written to impress safety on his mind once a day, he has no place in industry as a foreman and should not be retained in any line of work as a foreman.

CHAIRMAN OPP: That is a very good contribution. Thank you.

B. K. GODFREY (Georgia Power Company, Atlanta, Ga.): I would like to ask Mr. Lord how he figures his record there on the basis of days lost, for instance, lost time going over from one year to the next. How would you charge up a fatal accident or one causing permanent disability?

MR. LORD: The number of lost-time days in any one year is charged to that year. If it laps over from one year to another, the next year gets the penalty. We haven't had any experience yet with fatal accidents. We have to give them 6,000 days. We haven't had any permanent disability cases. I am not going to cross the bridge until I get there.

MR. COLLINS (Claim Department, Youngstown Sheet and Tube Co.): I would like to inquire of Mr. Armstrong what manner of shower he uses to take care of acid burns?

MR. ARMSTRONG: We use the number three spraying nozzle in rooms such as an acid screen room (if you are familiar with that), where an employee is liable to get acid over the head or over the entire body. There is only one exit, and when he steps out, he steps on a platform and this platform operates the shower.

Anything finer than a number three spraying nozzle will not answer the purpose. If we are going to prevent an acid burn, we have to get a lot of water on it.

MR. ROGERS (Southern Chemical Company): I would like to ask Mr. Berquist whether they consider it an honor for a foreman to report many unsafe practices or whether he is criticized if he reports more unsafe practices than they consider should exist? In other words, are the number of unsafe practices considered indicative of a foreman's ability as an executive?

MR. BERQUIST: I can answer that in this way: That we credit a foreman when he reports an unsafe practice, but if he reports the same one too many times it is a discredit and he is told so. If he continually reports unsafe practices, we know that he is looking for them, he is on the alert. We also tell him that he has too many unsafe practices in his department and it is time to have some discipline.

FRANK AYER (Morenci Branch, Phelps Dodge Corp., Morenci, Arizona): Referring to Mr. Berquist's scheme of being pretty hard-boiled with the men, we have at a company which I have operated in Mexico, used a similar scheme, not to be hard-boiled but to get results. We had a very great deal of difficulty getting our men to wear their goggles on their eyes instead of on their hats. For that reason, we put in a system whereby when any man was found disobeying the goggle rule, his foreman turned him over to what we called a Careless Workmen's Committee. This committee was composed of some of our best and most reliable workmen. These workmen gave this man a raking over such as he never got before and he never forgot this talk that the workmen gave him. On top of that, the workmen recommended to the chairman of our company's safety committee that his man get a formal notice warning him that if he disobeyed this rule twice more his connection with the company would be severed. We found in the first year that we had something like 80 of these letters sent out; the second year, only 12 were sent out. When I left the employ of that company about a year ago, it had not been necessary to send a single man his third letter which dismissed him from the company.

The result was that in our goggle campaign instead of having some 250 eye accidents, we reduced them down to zero.

We have worked down through our foremen, as has been mentioned, and are getting to our men as closely as possible. We have reached a point now where the men are shoving us just as hard as they can. We like to be shoved. Our campaign has been quite productive in the last five years. We have reduced our accident rate so that it is one-thirtieth of what it was five years ago, and figuring it out on a million hour basis, which I notice is used here, it figures about five lost-time accidents per million man-hours. I figure that even though that record is pretty good, there is no reason if we put in the same amount of work in the next five years that we did the last five it shouldn't be one-thirtieth of what it is now.

CHAIRMAN OPP: Thank you, Mr. Ayer. Are there any further comments?

If not, the rest of the meeting will be devoted to the presentation of your problems. Tell us what your trouble has been. Ask any question you wish in that connection. We will make some effort to see that you get an answer either here now or from the National Safety Council later on.

CHAIRMAN OPP: Your Vice-Chairman, Mr. Earl F. Blank of Jones & Laughlin Steel Co. will speak.

E. F. BLANK: Before I go, I would like to just raise one question in regard to our problem which has not been touched on at all. I believe that every safety engineer's most serious problem is how to arouse and maintain interest in safety.

Several have spoken in regard to arousing the interest of the foreman. I don't believe that in the plant where the top men, the president or general manager, are sold on safety that that is any problem at all, because the man who runs the job asks his supervisors to get out production and they get out production in the way he wants it gotten out. In regard to safety, it is the same proposition. If he is active and sincere in safety, he tells them that he wants the work gotten out safely. That is all there is to it. There is no problem that I can see at all in selling the supervisor or the line organization. There is a problem that all of us have in arousing and maintaining interest in accident prevention work down the line.

The phase that happens to be my particular hobby now (I used to have the statistical hobby) is the safety competition hobby. In our work we have aroused and are maintaining at the present time more of the safety spirit among our men than I have seen any place in the country. What I mean by that is, that you can go through our plant, any place, and you can ask any workman what safety means and what would happen if he had an accident, what the program is, and he could tell you pretty closely what our entire safety program is. The reason that we have been able to get that across is that we have safety contests between the plants and interdepartmental contests in each of the plants. There is a trophy put up and every month that is awarded to the department that has the best record. The reports are put up monthly on the bulletin board so that each man, each workman can see where his department stands.

We have been able to get these men intensely interested in safety through the competitive idea. I just want to register that with you. It hasn't been mentioned at all this afternoon. Of course, we have a number of different ways of reaching the men. But, it is the interest in the contest that keeps them alive.

We use the same system that Mr. Berquist does at the foreman's meetings. In fact, we stole the idea from him a year or so ago. We have the foreman report when he has a safety meeting, and all of these foremen hold meetings weekly or every two weeks or sometimes just once a month. When the foreman gets up and talks about safety, they know that he knows what he is talking about. It isn't like the safety engineer going out and delivering an oration on safety. The men know that the foreman is the man that can hire and fire them.

At the meetings he lines them up on unsafe practices and gets suggestions on machinery that needs to be guarded. The meetings are held on company time.

The first year we had the contest, our accidents were reduced 39 per cent. Last year, we reduced them 57 per cent. You can see from that that it is getting results.

ADJOURNMENT.

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Fire Prevention Session

October 5, 1928

RUDOLPH P. MILLER, Chairman
Consulting Engineer, New York City

The session on Fire Prevention at the Seventeenth Annual Safety Congress was called to order at 9:40 o'clock by the chairman, Rudolph P. Miller, Consulting Engineer, New York City.

CHAIRMAN MILLER: I think the outstanding object of the National Safety Council is the conservation of life. In fire prevention, for many years this work has been going on, thinking more of the conservation of property. In recent years, however, this conservation of life has come to the fore. I believe this is only the second time that the National Safety Council has had a Fire Prevention session. It is to be hoped that this division will continue, and the thoughts that might be brought out in this connection will be repeated each year, or not necessarily repeated, but perhaps emphasized, and new thoughts brought forward.

Commissioner Hamilton, State Industrial Commissioner of New York, in addressing the Construction Section on Monday, called attention to the fact that in New York State, in the year 1927, there were nearly 100,000 casualties for which compensation was claimed. If the proportion holds true for the entire country, that means that there must be about a million casualties in this country each year, in industry. That is not counting the casualties resulting from traffic, and I doubt whether it includes the casualties that result from fire in all cases.

At the Wednesday afternoon meeting, Mr. Heinrich of the Travelers Insurance Company, stated that 98 per cent of all industrial accidents are preventable. Why there should be so many of them is hard to understand. He says that 88 per cent of them are due to the failure to observe rules, the ordinary rules of safety, and 10 per cent are due to the physical condition of the plant in which they occurred.

Mr. Dublin, statistician of the Metropolitan Life Insurance Company, on Monday, referred to 95,000 deaths due to accidents in this country. The figures apparently bear out the figure I just stated a moment ago. About 25 per cent of these, he says, occur in homes.

Of those that occur in homes, about 20 per cent are due to asphyxiation and suffocation, and about 19 per cent to scalds and burns. That means that about 40 per cent of the accidents that occur in homes are due in some way to fire or the result of fire.

The fatalities from fire in the country throughout the year are generally estimated at about 15,000. We have nothing very definite on that point, so that is more or less of an approximation, but it seems to be consistent with the statements that have been made by reliable authority.

In New York City, we have kept for a number of years fairly accurate figures as to the deaths from fire. For the six years, from 1920 to 1925 inclusive, the total deaths from fire were 756. Of those deaths, 55½ per cent occurred in tene-

ment houses, houses in which three or more families live and carry on their households independently.

Another 25 per cent occurred in other residence buildings, that is dwellings and furnished-room houses. Altogether, 80 per cent of the deaths from fire occur in residence buildings. The New York Board of Health figures corroborate these statements and give as the chief causes of those fires, children playing with matches, explosions and ignition of flammable oils—that is, probably starting a fire in the stove with kerosene. The third thing is carelessness with cigars and cigarettes. It is remarkable how large a loss of property is attributable to smoking and matches. The National Board of Fire Underwriters' figures show that about \$30,000,000 annual loss results from the careless use of matches and carelessness in smoking.

To meet these hazards, it seems we might follow one of several courses, or should follow all of these more or less.

In the first place, there is the matter of construction. We can prevent fires in a large measure by building our building properly. The greater use of fireproof construction will contribute very largely to that. But even better than that, and something that can be more generally observed, is good housekeeping.

In this matter of housekeeping, when we look over the National Board's figures, and assuming that housekeeping includes the handling of hot ashes and coals, the use of open fires, taking care of rubbish and litter, and the proper use of stoves, furnaces and boilers—we find that nearly seven per cent of the annual loss by fire in this country is due to that cause.

Another thing we must look after is that we have ample exits in our buildings so that when fire does occur, those who are in the building have the opportunity to get out safely. That means not merely sufficient stairways. More important than the number of stairways, in my judgment, is the proper enclosure of the stairways. If the stairways are kept properly enclosed and kept for that purpose only, not used for the storing of materials and things that are likely to burn, a great contribution will be made to the safety of the occupants.

I have no use whatever for the so-called fire escape as a proper means of exit. It is a makeshift that we may apply occasionally where something better cannot be done on an existing building, and when something must be done; but for new buildings, we should not allow the so-called fire escape to be used.

Another point in meeting this life hazard from fires is the prompt extinguishment of fires. That means, when the fire occurs, notify your fire department at once. Do not wait to see what you can do, but notify the fire department. After that, if you have the facilities at hand—a good soda acid extinguisher or some other extinguisher, even a garden hose attached to your cold water spigot at the kitchen sink will help you—you may save the fire department some trouble.

Of course, that applies more particularly to the home, but in the plant one of the best means that we have yet found for prompt extinguishment of fires is the automatic sprinkler. It has had such a splendid record in the extinguishment of fires that I cannot help but mention it at this time, not as an advertisement of automatic extinguishers, but as an effective means of promptly extinguishing fires.

I think I have said enough in the way of introduction, and I am sure you are waiting to hear from those who are on the program.

I regret very much that Mr. Franklin H. Wentworth, the Secretary of the National Fire Protection Association, who was to have presented the next paper, isn't here. But he has sent us an excellent substitute, in the gentleman who is going to talk to you.

I take pleasure in introducing Mr. Percy Bugbee.

Facts Written in Flame

By PERCY BUGBEE

**Assistant Managing Director, The National Fire Protection Association,
Boston, Mass.**

My subject might lead you to believe that I am to indulge either in some fiery oratory or in a statistical treatise of the problem. To reassure your minds, before I launch upon my talk, I am glad to say that I will not treat my subject in either of these ways, and that I conceive the topic assigned to me and the purpose of my being asked to address this meeting as an opportunity to bring before you some generalizations of this whole fire-waste problem, and to open the session and pave the way for the more distinguished speakers on your program, for their discussions and papers.

It seems to me that probably everybody in this room is thoroughly familiar with the enormous fire waste in the United States. The statistics have been hammered at you through all sorts of publicity mediums for years. It isn't necessary to describe the terrific losses of life and property that we have to face in this country.

It might be better, and it seems to me more to the point, to think of the facts to be written with flame, to be burned into the consciousness of the people of this country, along this line. The fire waste in the United States will never be reduced by passing resolutions. The fire waste of the United States is an individual, municipal and industrial problem. It must be attacked by the individual community and the individual industry before it can be successfully solved.

Fire waste in this country must be treated with common sense; practical methods must be looked squarely in the face. The issue must not be dodged, if we are to expect to reach any very satisfactory trend in the downward curve of our fire losses.

I think the reluctance of the people of this country to interest themselves in this fire waste problem must unconsciously go back to the old days of the fire worshiper, the people who looked upon fire as a dangerous and uncontrollable force, people who were simply treating fire as an act of God, a conception of uncontrollable power which could not be met with and harnessed as our other sources of energy could be.

Of course, the difficulty we have to contend with in all our fire prevention activity is that question of ignorance and indifference to the whole subject, on the part of the general public. It is a curious thing to notice that the people who have never had a fire, who have never known of any of their close friends or business acquaintances being touched by fire, show very little direct interest in the problem.

The man who has had a fire in his own home or in his own business, or whose friends have suffered by fire, is the man who takes a whole-hearted life-long interest in the reduction of fire waste. It is so easy for us to "pass the buck" on this problem to the insurance companies. If you have a fire, you may be glad to see your insurance agent, but you never want him to come around again. You appreciate the destruction, the waste of time and energy and labor and money that are involved in a disastrous fire.

We are trying, through our work in the National Fire Protection Association, to overthrow this long-range conception of the problem on the part of the public and to get the individuals, in their communities and in their cities, to look at the fire-waste problem through a microscope—to analyze it, and to deal with it in a direct, personal, common-sense way.

Fire is a chemical reaction. It is subject to ordinary physical and moral laws. It must be so treated and analyzed if we are to get any results in this kind of work.

Why was last year's fire record \$70,000,000 better than any record for a good many years? We believe that this result is obtained through a combination of circumstances, a combination of the work that a body such as this National Safety Council is doing, to interest the general public in the serious problem. And that encouraging trend, the first we have seen in that work in a great many years, must be in part due to a general awakening to the importance of the subject.

Probably the best way to treat this subject briefly is to cite some personal experiences which we have had in our attack upon the fire-waste problem.

The National Fire Protection Association initiated its field service about five years ago. We decided to go into the cities all over the country and to attack the fire-waste problem at its source, by appealing to city officials, chambers of commerce, local Safety Councils, and any other avenue of local approach we might reach.

We found from the very beginning there is apparently no conception on the part of these cities of this fire-waste problem as a whole. For instance, we might find a city would have an excellent water supply system, but along with that a very poor fire department. We might find that a city would have a good building code, but no ordinances controlling the ordinary common hazards of fire, so the effect of the code might be lost. We would find that a city might only have a few dry-cleaning establishments but have very rigid rules controlling the hazards of that industry, and yet over half the fires might be caused by wooden-shingle roofs, and the city would have no ordinance prohibiting the use of wood shingle roof coverings in the city.

I was looking through our files the other day and picked out a letter which seemed to me typical of the problem we have to meet, and I thought I would read it to you. It is a letter written by one of our field engineers last spring to a city of about 25,000 population, in the middle west. It is directed to the Commissioner of Public Safety. It reads as follows:

"Dear Mr. Commissioner:

"I enjoyed very much the chance to make your acquaintance and talk to you about Smithtown's fire situation, when I was in your city a few weeks ago. I know you are interested in the safety of your city. I think you will be interested in my reaction to your local situation, which is given below.

"The fire situation in Smithtown appears to me to be very serious indeed. In the first place, the fire department is very short-handed, having scarcely enough men to man the apparatus. There are no men for the one aerial ladder which the city owns, and if this is needed at a fire it is necessary to send back for it. This makes the ladder practically worthless, as they are needed in the early stages of the fire in order to save life.

"The fire department is short of equipment. The city has only two engines. One is so old the chief does not like to run it through the streets, the inference being it is not in any too good shape from the safety point of view.

"As I mentioned before, there is only one aerial ladder in the city, and that does not respond to alarms at all. This is aggravated because of the fact that Smithtown, being at a considerable distance from other cities, could not count on any great amount of aid. I understand one pump station could be obtained from Johnstown, ten miles away.

"In addition to that, structural conditions are very bad from a fire standpoint. There are numerous places where bad fires could occur. There are relatively few installations of automatic sprinklers.

"Although structural conditions are bad, there is no supervision of building construction, the building code being practically worthless, because of the lack of any penalty, and no building inspector has ever been appointed to enforce it.

"All that means that Smithtown is (more than most places) liable to have a severe fire, and the city is ill prepared to meet such an emergency. The lack of apparatus means delay in controlling fires. The lack of building supervision permits fire-breeding buildings to stand without any protection.

"An attempt is made by the fire department to do fire-inspection work, one man being sent out every day, when he can be spared from fire duty. At least one man should be put on full-time inspection work and relieved from fire duty.

"I know you are aware of these conditions (for the most part), but there has been no special inclination on the part of the city to spend the money necessary for their improvement. I have asked the Chamber of Commerce to take an interest in these affairs, in the hope they will support what action the city officials take in these matters."

Is it any wonder a city in that condition has a terrific fire-loss record over a period of years? Until that city takes a direct personal interest in looking over its fire hazards and studying these problems, it will continue to have such an unfavorable record.

The same proposition applies to an individual industrial plant. An example of that, about as good as anything I can give you, occurred about six months ago. I was in a city and had an opportunity to go through a large paper plant. The fire chief of the plant prided himself on the money and time and effort that the plant spent in their fire protection and fire prevention work. They had an elaborate system worked out and all the latest appliances in use. Conditions were generally much more satisfactory than in the ordinary plant.

I walked through the plant with him and called his attention to a particular building which seemed to me not up to the standards of that protection. About two months later I got a letter from the local Chamber of Fire Prevention Committee of that city, which read as follows: (It was directed to Mr. Bond, one of our engineers.)

"When you see Mr. Bugbee, tell him I was at the X Paper Company today, and that the chief stated that Bugbee was 100 per cent right, as they had a fire the other day right in that portion of the plant Mr. Bugbee predicted there probably would be.

"However, the city department was able to hold it, and we understand the loss wouldn't run more than \$5,000 or \$6,000."

That is simply another instance of the failure of our people to conceive this fire prevention problem as a whole. They are going at it hit-or-miss. They will see one obvious hazard and pass right by another one, and until the problem is treated with the same scientific exactness and splendid results that they have treated the accident problem in industry, we cannot hope to very much improve our records.

I was in an automobile-painting establishment a little while ago. They were cleaning cars with gasoline and using a lot of paint and other finishes in there; and they had for heat in that plant, an open stove, about six feet from where they were cleaning cars with gasoline, with absolutely no ventilation, no particular segregation of their painting and spraying operations.

I said to the owner, who was smoking a cigar at the time, that it seemed strange to me he hadn't burned the place down.

About a month after I left that city, I had a letter from the fire chief saying the plant was a total loss. They had an explosion there and the fire had burned with such rapidity that they weren't able to save the walls. This is another example

of the failure of ordinary common sense in the treatment of this fire hazard problem.

The interest which the local Safety Councils throughout the country are giving to the fire prevention problem has been extremely gratifying to us in the National Fire Protection Association. I could not conclude my remarks without paying a tribute to these local councils.

To conclude, I think the following statement about sums up the remarks I have given you—that until the general public is willing not to dodge the facts and to apply common sense to the correction of a needless, dangerous, and stupid waste of lives and resources, we will not hope to solve the fire-loss problem.

CHAIRMAN MILLER: We have certainly had some good thoughts in this paper, and the main point that I should draw from it is the fact that we must reach the public at large and the individual in particular. Now I am going to ask if there aren't some thoughts in these many heads here as to how that can be accomplished. How can we arouse the public interest in this subject to that extent, that we will reduce not only this enormous property loss but the life loss as well?

I would like to ask Mr. Lacount to say a word or two. Mr. Lacount was formerly President of the National Fire Prevention Association.

H. O. LACOUNT (Associated Factory Mutual Fire Insurance Company, Boston, Mass.): I think, Mr. Chairman, that the real point to all this is not the generalization of the large statistics that are brought to us at these conventions so much as how to reach the individual—not the public at large, but the individual. He is the man who occasions most of the fires, not because he wants to but because he is calloused and ignorant and thoughtless.

I think the study of causes of fires is a very helpful means to this end, not that the individual shall be told about the causes in another city or another state, but even a study in localities. I think Mr. Bugbee would say that they are doing that in their work, studying causes in the townships and the cities where this field service of the N. F. P. A. is in operation.

I think it makes a great deal of difference to you and me whether the fire has happened or we are convinced that the next fire may happen in our alley. It looks a great deal different than it does on the next street or the next county, and we may be sure that it is only a matter of time when a fire will break out in our vicinity, and we may be the guilty party for that particular fire.

So if this could be brought home—not in general conventions like this, although this is a good starting point, but if it ends here the individual will receive no benefit—if it can be brought back to our localities, our companies, our towns, our communities, I think there is still a great work to be done in impressing the individual with his responsibility as a duty, or as a privilege, to safeguard his own interests. Perhaps self interest comes first, but he can safeguard the interests of those who are closer to him and in the large reduce the tremendous cost of the fire loss and cost of equipment and facilities, through the public development and other means of fire protection, which by the way is not so honorable as fire prevention.

The fire that we prevent, we do not have to extinguish. We cannot prevent them all, and therefore, we have to have these public departments for local protection, which run into great expense.

Even then statistics tell us that we are not only burning up property at a tremendous rate, but that we are endangering life, which of course is more serious in the end, a very serious matter.

So, Mr. Chairman, I certainly am impressed every time this matter comes up with the responsibility we have in bringing it to the attention of the localities and eventually the individual.

MR. VOGUEMAN (Travelers Insurance Co., Hartford, Conn.): I am pleased to announce that beginning next week, Station W O R is going on the air with a very novel fire protection program, and building up that program has been a remarkable thing. Great activities have been going on. It is the work of the Protection Fire Department, and the result has been that every man in the fire department has talked on fire prevention more than the average speaker.

I think it would be a good idea if the news could be broadcast as far as possible by the people here. The program is intended to hit home with the women and children mostly. Any further publicity you can give this thing by word of mouth, I am sure, will be appreciated.

E. E. BACH (Chamber of Commerce, Philadelphia, Pa.): The one great problem to be considered in fire prevention is the matter of creating sentiment against it. In most of our cities we have to consider this one thing: Someone must be responsible for it. We can't let everyone do this thing. There must be some organization in the city that takes a real interest in the thing and will see to it that there is a continuous program of fire prevention the year through.

Philadelphia eleven years ago had a very live fire marshal, Mr. George Elliot, whom you probably all know, who constantly hammered at the matter of fire prevention, day after day and year after year. The result was he finally created a sentiment against fire, until three years ago there was put in the City of Philadelphia an organized fire prevention program, held by the Fire Prevention Committee of the Philadelphia Chamber of Commerce.

This committee has been consistently working along this line. They have taken as a principal part in the program, the matter of the education of the people of Philadelphia, the men, women and children, trying to create an "air mind." That has been the large problem.

They have circularized the citizens through the schools, through the various industries, and they have been spoken to at the luncheon clubs; and there has been an organization created of all the various clubs in the city, the civic organizations and things of that sort, to act concertedly in this matter of fire prevention. The Chamber of Commerce has helped in this particularly.

The result has been that three years ago when we went into this large, nation-wide fire-prevention contest, the National Fire Protection Association, sponsored by the United States Chamber of Commerce of Washington, D. C. The first time we were active in that was three years ago. We simply got to second place in our class of cities, above 200,000. The first group of cities was 200,000 or over. We have 2,000,000 people in Philadelphia. We have 129 square miles to protect, and it didn't seem as though that were just fair. The people in small cities of 200,000 never said a word about it.

The next year we entered with 500,000 and over and were able to get to second place again. Last year we succeeded in getting to first place in the National Fire Prevention Association, with the reduction of \$2,500,000 in our fire loss in two years, in Philadelphia.

It can be done if everybody works concertedly along that line. We have one of the best Fire Prevention Departments in the United States. We have the city organization back of it. We have the various organizations I mentioned back of this whole thing, and we are now having a concerted sentiment against fire in Philadelphia, and we are certain that we can reduce the fire loss because we have done it in the past, and we are continuing and not lying down. We hope to make a new record in the coming year.

MR. ELTON (Chamber of Commerce, Pittsburgh): I think the last two speakers touched on a vital point in fire prevention. If I may, I would like to stress one portion of their remarks.

It is our opinion in Pittsburgh, after a study of the problem for several years, that you can arouse your adult population for a week or ten days to an interest

in fire prevention or any other civic activity, but you cannot continue that successfully over a period of years without a great amount of effort.

You have in your schools a coming generation which is ready to be told of the evils of fire prevention and of the needlessness of it. We find that the schools are the real place in which to plant the idea of fire prevention. Our schools are taking a very active interest in the problem.

Children in school remember things they are taught. We adults have become rather set in our ideas. We believe that the fire insurance companies pay the loss. We can get over to the students in school the idea that they pay the loss and when they come out and take up their places in the business world, they are going to carry on the messages which you are implanting in their minds at the present time.

I think that is a real fertile field for education, and I think it will prove very successful.

CHAIRMAN MILLER: We have had several suggestions. One way is to reach the individual through the schools; another way is through the local Chamber of Commerce; another way is through the radio, which is so very effective in transmitting matters these days.

Has anybody else any other suggestion to offer or any other thought to present on this subject?

A. AMRAN (Hamlin & Company, 17 Cedar Street, New York City): With reference to the remarks of the gentleman from Pittsburgh, whose remarks are no doubt very good, about teaching fire prevention in schools; I would like to raise a question.

Why is it I have never heard of any European country, where the schools are excellent and fire prevention is taught, and yet the fire losses as you all know—I don't have to emphasize that—in Germany or France or other European countries are almost nil compared with the losses in our country?

CHAIRMAN MILLER: Mr. Bugbee might possibly offer a thought on that point, about the comparative losses.

MR. BUGBEE: I think the whole solution of the proposition of the difference in fire loss as between this country and European countries falls into two categories.

In the first place, the general building construction abroad is infinitely superior, as far as quality is concerned, than the construction in this country. They don't have the wood to build with that we have in this country. They have always been obliged to build safer and better than we do here.

The other proposition is simply in their general attitude of mind toward the fire-waste problem. In France and Germany, for instance, we have the Code Napoleon, which says that if a man has a fire, he is responsible not only to the community for bringing out the fire apparatus, but to his neighbor for destroying his property. He is made personally responsible for a fire loss through carelessness or design on his own property.

I can't conceive of that idea being wide-spread in this country at the present time. We are not a nation that is so trained that when an individual suffers from fire he is made responsible. We are sort of careless in that attitude, and while we have in certain individual states and cities a personal liability law, which says that a man is so responsible, we are a long way from reaching the European idea of individual, personal responsibility for fire losses.

MR. ELTON (Chamber of Commerce, Pittsburgh): European nations have been teaching fire prevention for centuries, until the people in those countries have begun to consider it as a part of their nature. They are naturally, as a rule, a frugal people. We are a nation of spendthrifts. We have wasted our resources with a free hand, and until just recently we have not begun to realize that this waste will materially reduce our resources.

So in Europe their problem is not to convince the adult of the value of fire prevention, but simply to carry on the education of the need for conservation of all resources. Our problem here is to completely change the adult idea of the use of natural resources, and it can be done more quickly by instilling the proper thought in the minds of the coming generation than it can by changing over our present generation.

J. A. NORTHWOOD (Bethlehem Steel Co., Johnstown, Pa.): I would like to add one thing to what has already been said. This educational program with the young is very fine. But I feel, as this is a section of the National Safety Council, and as they have another section of Plant Publications, one of our ways to spread the gospel of fire prevention and to further the education of employees or plants who will cooperate is through the plant publications, stressing in the plant publications the value and good of your own fire marshal and department in your plant.

CHAIRMAN MILLER: That is a very good suggestion.

Are there any further thoughts?

EDWARD R. COLE (Acheren Graphite Corporation, Niagara Falls, N. Y.): I am still interested in the garage man Mr. Bugbee told about. He could not educate that individual under that condition. I wonder if he now has been educated up to the point where he believes what you would tell him under the same conditions. I also wonder if he could be reinsured, if he would read bills.

CHAIRMAN MILLER: I dare say he has been educated if he is still alive. Possibly he went up with the plant.

MR. GOLF (Municipal Employee, Oklahoma City, Okla.): Being a fire chief, I am very much interested in the subject. I agree with the gentleman from Pittsburgh that the way to teach fire prevention to the future generation is through the school children.

But that doesn't cure our ailment at the present time in the larger buildings. I would like to find some way of reaching the architect. They are the ones that give me my trouble at the present time especially.

CHAIRMAN MILLER: You are not alone in that. I think that is a problem, to reach the designers so they will build properly. Fires occur even in well-built buildings, but they occur to a less extent, as statistics show, than they do in the poorly-built buildings.

JOHN SHAW (Hercules Powder Company): There is just one other avenue I think of, gentlemen; and that is through the corporation house organ, which is read in the homes of the employees. I needn't say more. You know what I mean. A great many children as well as parents and wives read the house organs of corporations. That is another possibility of education.

CHARLES W. HANKO (Pittsburgh Steel Company, Monessen, Pa.): I have been interested in this subject, being a safety engineer myself. I just wonder sometimes if our fire departments don't lack a little bit in fire prevention.

That is a pretty broad statement to make, but nevertheless it is a fact. If you go to a fire department they pride themselves on the wonderful fire-fighting equipment—wonderful, in some cases—wonderful trucks, ladders and fire engines. But when you get down to the heart of that fire department and ask him about the fire prevention bureau, there is none. They are there to fight fires and nothing else. I believe it is just as much the duty of a fire company to prevent fires as it is to fight them.

I think if our fire departments throughout the great country would adopt, with the chamber of commerce and our civic organizations back of them, the work of fire prevention, the fire question could be solved to a great extent. I think the fire department should take up fire prevention as well as fire fighting.

I happen to live in the city of Baltimore. We conducted fire prevention through the school there, and the fire department got back of it. We took speakers

and a fireman with us. We explained the fire conditions to the boys in the schools. The firemen were there, and we told the children what the firemen's duty was, but we wanted their help. We had questionnaires. They filled out the questionnaires, and it was surprising the amount of interest they took and the results we got.

For quite a while after that you would be stopped on the streets by the children, telling you just what part they have taken to help to prevent fires. I think if the fire departments throughout this country of ours would take that interest and get a bureau and get busy in the line of fire prevention, a great part of the losses on account of fire could be cut down.

MR. ELTON (Chamber of Commerce, Pittsburgh): The fire department in Pittsburgh is the principal agent through which we are educating the children in the public schools. We have firemen appearing in every school in the city. We have fire companies training boy scouts in fire prevention, merit badge work. We are putting on a great fire demonstration to teach the boy scouts how to handle fires. If you are not connecting your fire department and public school system, you are overlooking your biggest bet in teaching real fire prevention work.

MR. PARKIN (New York): I would like to know what percentage of this fire loss and death is in the outlying districts outside of our cities, and what is being done there to educate the people?

CHAIRMAN MILLER: I don't know that the figures are readily available for that. Undoubtedly the fire hazard in the outlying districts does present a series problem.

I have in mind a particular case, a rather small town of about 30,000 inhabitants, in the State of New York, in which the fire loss has been reported high.

The average fire loss throughout the country per capita is given at a little less than \$5 a year. In that town it has gone considerably over in some years and one year it went up as much as \$11 per capita. In looking over their fire records, as I had occasion to do some time ago, I found that the large losses were on the outskirts of the town where the fire department had difficulty in getting there on time, probably did not have a prompt alarm. A comparatively small loss, the destruction of a complete fine residence—the finer residences are generally in the outskirts of the town—sometimes amounting to \$15,000, \$20,000, or \$30,000, immediately raised the per capita loss for that town by perhaps \$1 for the 30,000 inhabitants.

W. E. FELLER (Westchester Lighting Co., Mt. Vernon, New York): I think any concern which spends money in advertising, as the insurance people do, could improve upon their calendars. You see many calendars gotten out by insurance companies, which merely say "Blank Insurance Company." If they had some picture showing children being burned at fires happening in tenements or garages, to bring that forcibly before the people where the calendars are distributed, I think that would be a good thing.

CHAIRMAN MILLER: The thought is that the calendar should be developed into a poster, which has been found so successful in other safety work. It is a good thought.

JOS. T. PRATT (Reading Company, Reading, Pa.): I happen to be a member of the fire association both in Chester County and in Lancaster, and when they have meetings at different points they have a man by the name of Dr. Rank, who gives instructions on preventing fire. He has gone through schools and had questionnaires made out in that way. They are doing a great work in the way of education in fire prevention.

MR. GOLF (Fire Chief, Oklahoma City): I would like to have some idea as to what can be done about the architects.

MR. VOGUEMAN (Travelers' Insurance Company, Hartford, Conn.): It seems to me an architect is a pretty reasonable sort of man. Suppose you get some

figures. Here is a case of some I saw recently. Take an area around New York City, an area within a radius of about 20 miles. The fire loss of 1927 was just about enough to pay what the two states paid for the Hudson Vehicle Tunnel, \$20,000,000.

In your little home circle, figure what public improvements have been made in that neighborhood. Start figuring your fire losses and call the architects in; call them publicly at the same time, and I am sure you will get improvement.

When a building is going up, have one of your firemen get into the building and see what is going on. The Chief of Newark told me that in four or five buildings he had his men go; notwithstanding the city ordinances they were putting stand pipes in there, where in case of fire, according to the size of the pipe they never could connect their hose.

P. C. ABELL (British Columbia Safety League, Vancouver, British Columbia): As you probably know, our greatest resource in British Columbia is our timber asset, and over a number of years we have been carrying on an extensive educational campaign, the major portion of which has been directed to work in the schools.

We know that the message put in the schools is taken home, and I am very glad to be able to tell you that after a period of years in British Columbia, the statistics show that our fire loss in the forest at least is one-third only of what it was even last year.

CHAIRMAN MILLER: Are there any further thoughts on this subject?

I am not an architect, but perhaps I might say just a word in defense of the architect in connection with his planning of buildings. He is not always free. He has an owner to satisfy, and if that owner is not convinced of the necessity of certain things in connection with the planning of that building which make for fire prevention, it is difficult for the architect to ignore that. He cannot ignore the owner's wishes to carry out his own ideas.

I will say also that the American Institute of Architects is taking a very lively interest in this subject of fire prevention, and is trying to get the message over to the architectural profession at large. The work has been slow and rather hard, and I think they had a hard time reaching most of the architects, but it will be done in time undoubtedly.

N. L. PARMELEE (The Celluloid Corp., Newark, N. J.): Could that not be settled by a standardized code, that the cities would be compelled to incorporate in their building codes?

CHAIRMAN MILLER: Efforts are being made in that direction. The National Board of Fire Underwriters has had for years a recommended building code.

Making standard codes is a rather difficult proposition, and the problems in cities are different; the same code cannot always be made to apply. But there are no doubt a great many points on which provisions in the codes can be similar.

Another effort that has been made in recent years and is still continuing was inaugurated by the recent Secretary of Commerce in organizing a Building Code Committee, a committee that for the last eight years or so has been studying this question of possible standard provisions and has issued a number of reports with recommendations as to what might be done. That committee is now at work on a report on fire prevention measures or provisions, and it is very difficult. But I can assure you it will have careful consideration, and I think some valuable thoughts will come from that report.

W. E. FELLER (Westchester Lighting Co., Mt. Vernon, N. Y.): I have mingled considerably with the fire departments in Westchester County, and I am free to state that the whole question resolves itself into just one fact, and that is this: Education.

The gentleman struck the keynote when he said we must educate our school

children. There has never been a time in the history of the work when the appeal to human judgment has been more compelling than at the present time. You can't get away from that. Every man here should resolve himself into a committee of one and go back to his community and preach the gospel of fire prevention, and then we can get results and not until then.

Your fire departments are seriously handicapped in many instances. But we as individuals can and must educate the young, and then you are going to have the desired results in fire prevention.

W. D. GREER (North British Mercantile Insurance Co.): I would like to speak a word or two along that line. It has been my duty for many years to superintend inspection and improvement, if possible, of risks of all sizes, all the way from dwelling houses to enormous industrial plants insured by my employers. The results of such inspections indicate, as we all know, an almost incredible condition of carelessness on the part of many people, sometimes amounting to almost criminal carelessness. You have only to read the daily papers to be convinced of that.

The root of the matter lies, as many gentlemen have pointed out, in our national, deeply-rooted attitude of indifference, carelessness, and if I may use the term, "don't-give-a-dammitness." There is no question about that.

I have talked with many people during many years—I started in the business when I was little more than a boy. I have talked with many, many men. One of my men or myself would investigate a plant, make a careful survey of it, possibly point out some things that might be changed.

The invariable question would be, "What reduction are we going to get in our insurance rate?"

"You are not going to get any reduction in your insurance rate. This is a matter of upkeep. You are not going to get a reduction for it any more than if you washed your face and hands and put on a clean collar. This is a condition imperiling the safety of the risk and the lives of perhaps hundreds of employees."

That is exactly what a man said to me one time, when I kicked because he had a paint, oil and sweeping rag closet under the principal stairway in the plant, the only means of exit for all the people in that plant, many of whom were women.

He wanted to know what reduction he would get in his insurance rate. I said, "You won't get any. There is a chance you may get a good, stiff increase if somebody catches you. That is the only thing I can say."

I think there are many gentlemen present who have had an experience similar to mine, and they can corroborate a good many things I say. The average plant owner is very apt to be influenced by reasons of expediency, the outlay of money.

I saw a plant a while ago, or one of my men did, that has always had a good record for care and cleanliness. He reported it was in a shocking condition. I visited the treasurer. I knew him very well. I said, "What is the matter, John? Your place is getting a terrible racket."

He said, "Our business is not good, and the old man (meaning the president who was quite a man on efficiency and things of that kind) has fired the two sweepers we have and one night watchman. We have no sweepers and only one night watchman, and our men can't start the cleaning. That is the trouble. We have to hire men all the time to keep clean, and the Old Man is economizing and cutting down, so we fired them."

I said, "All right, that is up to him, of course. Some of these days he will have trouble and wish he hadn't fired them."

I thoroughly believe, gentlemen, the only way we can get at this thing is, as several gentlemen have pointed out, to start at the roots. Don't treat the

symptoms; treat the disease. Begin at the roots. Educate the children; begin in the school.

They often get the idea of:—Never mind the other fellow's property; he has insurance; I have insurance; we will collect from the insurance company.

Only this week I had occasion to examine a very large plant which many of you would recognize by name. Several of the buildings were very light frame construction, very combustible. They didn't have value. They seriously endangered the rest of the plant.

I was talking with the secretary of the company and spoke about those buildings. He said, "You needn't worry about those. They are not insured. We wouldn't insure those at all."

I said, "That is fortunate, because you would find very few people that would want to insure them. But don't you understand that those buildings, while not insured, and while they don't represent much value, seriously imperil your other buildings, and if you have a fire, the local fire department can't stop it?"

The rest of the plant was equipped with automatic sprinklers, but these buildings were not. They were unprotected. They were full of old truck and rubbish of all kinds. They should have been torn down and moved away. They felt perfectly contented because they weren't insured and the buildings weren't worth much.

If we have to change the national attitude of carelessness and indifference not only to our own interests but to the interests of others, we have to begin with the children. You have to start at the roots and educate the children, and maybe some of these days we will breed up a generation who will look perhaps past their own interests—although it is their own interest, but you can't make them believe it—and think of their duties to their fellow citizens and their duties to the municipalities in which they live.

In Europe, as Mr. Bugbee has said very pertinently, in most of the big European capitals a man is held responsible and strictly accountable in his duty to his neighbor. In Berlin, if a man has a fire, he is hauled over the coals and expected to demonstrate why he had the fire, how he had it, and bring out the facts as to whether he was responsible for it or not. If he gets off without a fine, he is lucky. He probably will get an old-fashioned, German call-down, and his duty to his neighbors will be strongly brought home. I believe the same condition exists in France.

As Mr. Bugbee has said, in many of those European countries the construction is entirely different from ours. It is mostly stone or brick or concrete. Wood is a valuable commodity. They can't afford to use it to put up buildings. But the people of those European countries have been brought up from their childhood, for many generations back, to respect authority.

Berlin is covered all over with authority—You can't do this; and you can't do that. But all those things lead to a respect for authority, an idea of their responsibility to their neighbors and to their communities, and that is something we have to get into the heads of our people in this country, a respect for authority.

I think you all know what I am talking about and what I mean by that. There is a distressing lack of that respect for authority in the American makeup. It is almost *nil*, and we have to start with the children and educate the children, and some of these days we will find our fire loss has dropped.

MR. DERWILDER: Gentlemen, I have heard a lot this morning about children playing a part in this fire prevention campaign. I happen to be interested in school work in a rural community. I have been wondering whether or not when this proposition has been handed to the superintendent of schools, and he in turn hands it to the children, are we going to depend too much on that as a solution in the reduction of accidents?

The thought came to me, in connection with this garage man—How can educating the children remedy that? Now then, how many years is it going to take to get these children to take care of the conditions now? I am not defending the school authorities but there are a lot of things that have to be taken into consideration.

For instance, the teacher is told that she must keep up with school, and she has to study at night. The boys and girls come home, and if they have a lot of safety to take care of and public health and fire prevention, they are coming home with a bad report, and the parents are going to say, "What is the matter, Johnny?"

I agree with you that it is a channel through which we can accomplish wonders in the safety movement, in fire prevention, and in public health. But I tell you, gentlemen, there are those other things which we must take into consideration; and it still stands out that we have the present fire loss to fight. I can't see how the children, innocent children as it were, are going to remedy that.

E. E. BACH (Chamber of Commerce, Philadelphia, Pa.): Under the school laws of Pennsylvania, fire-prevention teaching is compulsory up to the seventh grade. Get after the teacher.

NORVIN E. GREEN (Louisville Car Wheel & Railway Supply Co., Louisville, Ky.): I want to tell a funny thing that happened in Louisville, before I get to my real theme.

A woman called the fire department and in very broken English asked how much it cost to send the fire department. When assured that it didn't cost anything, she told them her house was on fire. She had an idea it was going to cost her because she had the fire.

In connection with the children and your training, it seems to me that if the insurance companies would send an inspector to our residences to inspect the premises as they do to our plants, we could get an educational program across that would be worth a great deal.

Of course, the first thing that is going to come up, is that a lot of people pay so little in premiums that it doesn't pay the insurance company to send these men around. I believe that the saving in the long run would much more than pay for the inspectors, and I think it is worth their consideration.

MR. GREER (North British Mercantile Insurance Co.): I would like to say that many thousands of dwellings are inspected by the insurance companies every year, in the United States. The question of premium and expense doesn't enter into it at all. There are literally thousands of them inspected every year by the insurance company. I have inspected hundreds myself in the last twenty years, all over the United States.

MR. VOGUEMAN (Travelers' Insurance Co., Hartford, Conn.): Unfortunately there are not enough people who want their dwelling houses inspected. I personally do a lot of inspecting, and in the last two or three weeks I have been asked to turn around and leave the place. They said the company had a lot of nerve to send an inspector to their dwelling house.

JAS. T. BURKE (Chief Inspector of Ontario Government, Toronto, Ontario): This question is a very important one. In fact, it is next to loss of life, and it is something we have been handling and discussing for a number of years. I think the time has arrived when we ought to get down to brass tacks and face the issue.

Architects have made attempts in a liberal way, but of course we all know the architect is a hired man and very oftentimes it becomes our duty to go to work and bolster up. Then sometimes representations are made that the fire chief says that the building is quite safe. But in the judgment of the owners it is not.

Then in regard to insurance companies, they regulate your rate according to their regulations. Of course, that is true.

So under the circumstances, it seems to me we ought to try to work together. A good many of us have practical suggestions. We can't have our own way in

the world. If we get together and give and take, I believe we would get somewhere with this subject.

CHAIRMAN MILLER: A gentleman who is a little modest has sent a thought to me on a card. He thinks possibly some educational work might be done through the newspapers. It would be an excellent way, if we can interest the newspaper.

He also suggests that regular courses be established in colleges. That has been done in some of the colleges. I do not recall for the moment which of them, but there are some.

Now we have had a more extended discussion than we expected on this very interesting and important subject, and we could keep on. But we must have in mind the rest of our program. The next topic on the program is, "Organizing to Fight Plant Fires." This is a subject into which we might naturally drift. It was to be presented by a man who would be well worth hearing. I wonder if he is here—Chief Kenlon.

He apparently is not here. In his behalf, I will say this, for his not being here: I am sure it is because he has just a day or two ago returned from an extended trip through Europe, inspecting fire departments over there, and has undoubtedly found his office loaded up with accumulated work that needs his attention. I think for that reason, he may be excused.

I am going to pass then to the next topic, "Recent Developments in Fire Prevention and Fire Protection." On this subject we are to hear from a man who has had a very wide experience in connection with the National Board of Fire Underwriters, in fire prevention work. I am going to introduce, Mr. Harry E. Newell, Engineer, National Board of Fire Underwriters, New York City.

Recent Developments in Fire Prevention and Fire Protection

By H. E. NEWELL

National Board of Fire Underwriters, New York City

The numerous new processes and materials born in the research laboratory have made possible mass production as we know it in this country. These processes and materials have created many problems for the fire protection engineer to solve. Complicated as many of them are, it has been necessary to bring into play scientific knowledge and skill of the highest order. Indeed, research has in many cases been the means of providing the solution of these problems. Research plays such an important part in present day fire prevention and protection engineering that without it industrial progress would be retarded and numerous luxuries enjoyed by all classes of our people as a direct result of mass production made impossible. The more recent developments in the field of fire prevention and fire protection have in a large measure been due to research.

The use of carbon dioxide for fire extinguishing purposes is spreading rapidly. Special systems employing CO_2 have been designed and installed for the protection of telephone switchboards. Considerable progress is also being made in applying this form as protection to electrical generators and other power house equipment. The extinction of fires in generators by means of carbon dioxide is described in detail in an excellent paper by Charles L. Jones, published in the October, 1924, issue of the *General Electrical Review*, an organ of the General Electric Company. This form of protection is now available for dry cleaning plants, and a system for total flooding, or in other words, filling an entire room has been developed. In connection with finishing operations a notable advance has been made in the protection of dip tanks; the CO_2 lines enter the tank at the bottom and the CO_2 bubbled up through the finishing material in the dip tank.

The protection of isolated oil tank farms where water supplies are not available has long been a serious problem for the fire protection engineer. The speaker believes that CO² forms a large part of the answer to this problem. Numerous tests of wood roof tanks of small size indicate that oil fires in tanks of such construction can be readily extinguished by CO². To date, however, no tests have been made in connection with tanks of the size actually used in the oil fields. Further development in this particular case is held up pending the securing of the facilities necessary for such large scale tests.

I might stress just for a moment the importance of any discovery along extinguishing methods for fires that occur in isolated tank storage. We know that every year the principal losses in the petroleum industry are due to lightning, and in most cases the lightning involves tanks of wooden roof construction.

It has been my thought for some time that CO² could be applied to the wooden-roof tank and the isolated tank, my thought being that at various localities in the tank farm would be stationed trucks in which would be loaded the batteries of CO² cylinders. It would be necessary to maintain at least passable roads. Anybody who has ever been in the oil fields knows that as a general rule, moving about the tank farm is a difficult thing, especially in the spring of the year.

Also applying the thought somewhat further, it would be necessary to have pipe connections, either going to the bottom of the tank or coming out of the top and terminating outside, so when the fire occurred the radiation would not be so great as to prevent approaching close enough to connect the CO² cylinders.

You might say that is more or less in the air. It is, but I am firmly convinced from the studies I have made of the extinguishing problem in the oil industry that CO² is the answer.

Bulletin of the Department of Agriculture

In June of this year the U. S. Department of Agriculture issued Technical Bulletin No. 74, entitled "The Value of Inert Gas as a Preventive of Dust Explosions in Grinding Equipment." This bulletin describes in detail the method of introducing carbon dioxide in the form of flue gas, into grinding and pulverizing systems. For several years at least one large company has to the knowledge of the speaker safeguarded the grinding of sulphur by this method. The work of the Government, however, is especially commendable in that all necessary experiments and tests were made in order to demonstrate the practicability of this effective means of preventing dust explosions.

The use of CO² in the form of washed flue gas as a means of preventing fires and explosions aboard oil tankers marks another interesting and valuable development in the use of this valuable gas. For many years, the prevention of such occurrences has been a problem difficult to solve, and even at present it is being given serious consideration by oil companies, dry dock establishments and the marine committee of the National Fire Prevention Association. The Standard Oil Company of California, however, has introduced this method of prevention. The cargo tanks are filled with CO² each time the tanker is unloaded. In connection with loading and other operations, the *National Petroleum News* states as follows:

"When filling the ship's tanks with oil, a further safety feature of this flue gas system comes into play. When an ordinary tanker is loaded, the vapors that have to be expelled from the tanks to make room for the oil are simply pushed out of the vents or 'ullage-holes' onto the deck of the vessel.

"The presence of this inflammable vapor calls for extreme precautions throughout the loading period.

"The use of a flue-gas system provides a double safeguard against this hazard. In the first place, the mere fact that the tanks of a flue-gas equipped ship are filled with a non-explosive mixture would greatly reduce the hazard, even if the

tank vapors were discharged in the usual way—through the ullage holes onto the deck. But these vapors are still flammable when mixed with enough air and are therefore best discharged at some point safe from possible sources of ignition.

"This further safeguard can also be obtained by making use of the flue-gas piping for venting the tanks. The main distributing line is connected into the base of the ship's hollow mast. When loading starts, instead of opening the ullage holes, as has previously been the practice, the valves to the flue gas lines are opened and the tank vapors are pushed out through these lines. A check valve prevents any chance of the vapors being pushed back through the washer into the stack; and consequently they are forced out through the mast at a point so high above the deck that chances of ignition are practically negligible.

"Thus in all phases of a tanker's normal operations—loading, carrying cargo, unloading and running back in ballast—the flue-gas system tends to make a tanker about the safest kind of a vessel afloat. But some of the worst accidents aboard tankers have occurred not in the course of normal operations, but under some special conditions, as when tanks are being cleaned or repaired. Here again the flue-gas system can be called on for a large measure of protection.

"By operating a blower for the purpose of pulling flue-gas out of the stack through the washer and forcing it through the distributing pipe lines, flue-gas can be circulated through the empty tanks of the vessel until all oil vapors have been displaced by flue-gas; and then the usual 'wind-sails' can be used to displace the flue-gas with fresh air. Thus the entire operation of freeing a tank of vapors so that it can be entered for cleaning or repairs can be carried out without, at any time, permitting explosion vapors to exist inside the tank."

You understand that is not my conclusion. I am simply quoting the National Petroleum News. I do firmly believe that this system does make the tank a very safe vessel.

Operation of a Small Chemical Extinguisher

An interesting development in the field of hand chemical extinguishers is the 1½ gallon extinguisher placed on the market by the Fyr-Fyter Company of Dayton, Ohio. According to an article published in the July, 1928, issue of *Fire* this extinguisher is the result of research by the laboratory of that company, leading to the discovery that sodium potassium carbonate in solution is a successful agent in quelling fires. The extinguisher is operated by inversion. An acid bottle falls on a peg which ruptures a frangible bulb allowing reaction of acid with an anti-freeze extinguishing liquid; the reaction generates a gas expelling the liquid which is a special water solution developed by the manufacturer. This extinguisher is suitable for use on incipient fires in ordinary combustible materials where the quenching and cooling effects of quantities of water or solutions containing large percentages of water, are of first importance. It is also suitable for use in the extinguishment of incipient fires in small quantities of flammable liquids, greases, etc., where a blanketing effect is essential.

There has been some interesting development in dry powder extinguishers during recent years. The extinguishing value of bicarbonate of soda has been recognized for years, but its propensity to cake has made it of little practical use and for that reason the usual form of dry powder extinguisher has been tabooed by all authorities.

Claims have been made by several concerns that they have been able to prepare a non-cooling compound of soda which could be thrown on the fire in a powder form with good extinguishing effects. Numerous demonstrations have been made which prove these claims are correct where the material is thrown on the fire as a cloud of soda dust; on the other hand, if simply dumped on the fire it has little effect. The principal disadvantage is that the user must be within a few feet of

the fire, which limits its usefulness to small fires where this close approach is possible without danger to the user. To offset this condition there have been several machines built which blew the powder into the fire by means of compressed nitrogen gas. Portable and stationary soda containers with one or more cylinders of nitrogen and various lengths of one-inch hose, have been built, but none of these have reached a state of perfection where it could be considered by Underwriters' Laboratories. As compared with water lines or foam discharge these systems still are at the disadvantage that the powder can not be thrown more than a few feet.

The Deluge Sprinkler System

Of pronounced interest in the field of sprinkler protection is the Deluge Sprinkler System—Pre-Action type, developed by the Automatic Sprinkler Corporation of America. This is so named because the admission of water into the sprinkler piping and the ringing of the alarm gong is independent of and precedes the fusing of a sprinkler head. It actually is an empty or dry pipe system, but with the air in the sprinkler pipes at atmospheric pressure. The sprinkler heads are of the ordinary fusible link type, fusing at 165 degrees Fahrenheit. The entire sprinkler system is supplied through an approved deluge valve instead of through a dry-pipe valve.

In connection with the system, small air chambers, termed "Heat Actuated Devices" are spaced at regular intervals on the ceiling, thus subjecting one or more of these air chambers to the effect of temperature use from fires occurring within the protected property. These air chambers are connected together by means of flexible copper tubing, this tubing being directly connected to a sensitive diaphragm of a relay device called a remote control release.

Rising temperature causes an expansion of air in the heat actuated devices, thus developing an increased air pressure which is conveyed directly through the air tubing to the remote control release diaphragm against which the air pressure is exerted, thus moving the diaphragm. A fire therefore creates a pneumatic impulse which is conveyed to the release mechanism in the minimum of time.

A compensating vent is connected to the air tubing line. This vent relieves the slight pressure caused by *slowly rising* temperatures, such as from weather conditions, heating equipment, etc. However, *rapidly rising* temperatures (15 degrees per minute or faster) develop a pressure too great to be relieved by the vent, consequently this pressure is directly exerted on the diaphragm of the remote control release causing it to trip.

The tripping of the remote control release causes the deluge valve to open, thus admitting water into the sprinkler piping and alarm gong line.

The vital principle of this system is the differential in air pressure controlled by the ratio of the size of the opening in the compensating vent to the expansion of air in the heat actuated device when subject to temperature use.

I might say that since this article was written it was drawn to my attention by Mr. Hamilton, Mechanical Engineer of the Automotive Sprinkler Section that a very effective supervisory type has been developed.

With reference to finishing processes, the safeguarding of japanning and enameling baking ovens has always been a more or less difficult problem. In spite of carefully planned and installed safeguards puzzling fires and explosions have occurred as their cause has not been readily apparent. Industry is therefore indebted to the Factory Mutual Laboratories for the invention of a device providing an effective means for the prevention of such occurrences. The following discussion of the subject and description of the device appeared in the September issue of the *Factory Mutual Record*.

"One of the major problems today is the prevention of explosions in enamel baking ovens.

"The most important essential is to control the oven ventilation so that the flammable vapors of the enamel are kept below the lower explosive limit. Removing or guarding sources of ignition such as open flames or electric arcs is important but this alone will not prevent explosions, since an explosive mixture under certain conditions can be set off merely by the surface heat of the gas burner boxes, radiator tubes or electric heating ribbons.

"Control of oven ventilation heretofore has been more or less a hit-or-miss affair, because no one could tell quickly the exact concentration of vapor in the oven. The usual laboratory methods of gas analysis require a half-hour or more for results and in that time conditions in the oven might change entirely.

"To meet the need for a device giving immediate and continuous results, the Factory Mutual Laboratories, after two years of study and research both in the laboratory and under actual operating conditions in industrial plants, have developed the "F. M. Flammable Vapor Indicator" which promises to provide a check for the safe control of oven ventilation.

"The device is essentially a continuous calorimeter, in that it burns the vapor and measures the heat given off. A continuous sample of atmosphere from the oven is drawn by a small fan, first through a heating coil which keeps the sample at oven temperature to prevent condensation, and thence through a flash-back arrester to the detector unit. Here an electric heating coil ignites the vapor in the sample and the increase in temperature is measured by a thermo couple and is indicated on a millivoltmeter. The reading is then referred to a calibration curve which gives the percentage of vapor in terms of the lower explosive limit.

"The indicator records without special calibration for the various hydro-carbon gases, alcohols, and ethers, either alone or in combination, since flammable compounds containing carbon and hydrogen, or carbon, hydrogen, and oxygen, give off approximately the same amount of heat when burned at the lower explosive limit. Special calibrations are needed for hydrogen, carbon monoxide and acetylene.

"The device can be set for an ample factor of safety, and can then by the use of relays be made to ring an alarm, turn on a red light, start the ventilating fans, control the speed of fan motors, operate the dampers, turn off the oven heat, or perform any other function suited to particular conditions. Not only is it suitable for enamel baking ovens, but also for recovery processes where flammable vapors may collect in an enclosed space.

"The Mine Safety Appliances Company of Pittsburgh have developed commercial models which are now on the market."

The Tendency to Adopt Pumping Engines

In the municipal field of protection the present tendency is toward providing pumping engines, even in cities where normal pressures are high and formerly only hose carriers were provided. The extra cost of the pump is not great, and when compared, on the basis of the service possible, there is no question but that pumps are preferable to hose wagons in all cities and towns.

In former years, quickness of action on small fires made the large chemical engine or tank a very desirable feature for hose wagons and ladder trucks. With the general introduction of pumpers it was found that a cheaper and equally efficient service could be obtained by carrying a 40 to 80 gallon tank of water, with a connection to the suction side of the pump, and by use of the pump, discharging a small stream of water through the usual chemical line.

Some fire departments are equipping their apparatus with foam chemical tanks

and using foam on all incipient fires. The form of equipment most generally used is two solution tanks, with a cylinder of nitrogen to give the necessary discharge pressure. The principal objection to this is the high first cost.

Foam generators are coming into very general use in fire departments. Their need is being brought about by the increase in use of liquid fuels. Incidentally, the development of the so-called "Phomene Accumulator," a device making use of foam producing chemicals in powder form and made by the Pyrene Company, is worthy of mention. This forms another effective means for the protection of numerous industrial hazards.

The increase in height of buildings is a problem which fire departments in all cities has to contend with. The water tower and ladder pipe are available for moderate height buildings, but for those over 6 or 8 stories these appliances are of little value and dependence must be placed on equipment provided in the building. Standpipe lines are practically the only means of getting hose streams to the top of high buildings; recognizing this a number of cities have recently adopted ordinances covering standpipes and making provisions for house fire pumps.

Thus the development of fire prevention and protection is coincident with or follows closely expansion and development in all branches of industry. New processes and materials frequently create undue fear and excitement—a fact to be deplored. It should be realized that any process or material, once it has been demonstrated to be an economic necessity, deserves and demands constructive treatment at the hands of those interested in fire prevention and protection. After all, fire prevention and protection must render possible the use of these processes and materials in order to justify its classification as a legitimate branch of engineering. Calm, unbiased analysis, or in other words, true engineering consideration of the technical nature of a process or material will usually indicate that much of the hazard can be removed or made relatively safe by the application of intelligently planned safeguards. Fire prevention and protection engineering can in this way co-operate with the research laboratory and the industries making use of its discoveries and creations thus contributing in a constructive way to the industrial development of our country.

Discussion of Mr. Newell's Paper

CHAIRMAN MILLER: In Mr. Newell's paper reference was made to the development by the Pyrene Company, of foam extinguishers, and I think Mr. Timpson has a film to show you, which will be interesting.

N. L. PARMELEE (The Celluloid Corp., Newark, N. J.): I would like to ask Mr. Newell if he can give me any idea of the importance attached to the cooling effect of CO² as an extinguishing agent?

MR. NEWELL: I don't attach any importance at all to the cooling effect of CO². You will note in the Underwriters' Testing Laboratories' list, CO² extinguisher as a cooling effect is not stressed at all. It is the blanketing effect and not the cooling effect. I don't mean to infer that there is no cooling effect, but the cooling effect is slight, and from fire protection standpoint should not be given any serious consideration.

CHAIRMAN MILLER: Are there any other questions on Mr. Newell's paper?

Is there someone here who is prepared to tell us about this matter of organizing to fight plant fires? It seems to me it is a matter of considerable importance to this body, the National Safety Council, who have come here together to get suggestions and interchange ideas about methods that are adopted in various places.

Perhaps you have something in mind.

E. S. CHAPIN (Independence Bureau, Philadelphia, Pa.): I came here to learn,

not to teach, but I am only too glad to tell you anything I can that will be of interest in fighting the plant fire.

In the average plant, probably the first consideration is water supply that is adequate. Make sure to have a water supply that is preferably of a loop type, giving pressure of 35 pounds or over on your static, and discharging the standard nozzle stream from at least four nozzles without appreciable loss of compression.

You may need a sprinkler system in your plant. By all means, have it if you can. There may be some sections of the plant which cannot be sprinkled and you will want to take care of that by a hand apparatus. The type of hand apparatus used will depend upon the type used in your plant. Maybe you want the extinguisher in one section and soda acid in another, and foam in another, and a sand pail in the other. But find what you want and get it. And don't use soda where you should use foam and vice versa.

The organization of a plant-fire brigade is necessary. It will depend upon the number to be served, how many men you have. They should be trained at regular intervals and irregular intervals, responding to alarm and giving the best they have in them when they are being trained, not just simply walking through it, but going as though they meant it every time they turn out, because one of these times they are going to turn out and mean it, and if they want to take things easy they won't get anywhere quick enough.

The First Minutes of a Fire are Vital

The first two or three minutes mean the most. Have an alarm system that will work. The box alarm is better than the telephone alarm. I happen to have been a witness several times when the telephone alarm didn't work. The man got a note from the power house and blew a whistle, and the man who was to blow the whistle was in some other part of the plant and didn't tell him. We waited with watches for two minutes and called again on the phone, and then they got busy. But the first two minutes were a total loss because the human factor didn't function.

It is very necessary to have your night protection adequate. The story was told here of the old man who cut down on the night watchman. We find that often. When you have a few men on duty at night, you should by all means have adequate night watchmen in force, and have those men who are on duty at night thoroughly organized to fight the fire, because as many of us know, a great many of the plant fires take place at night.

The time when your plant is partially shut down also deserves special attention. It may be necessary, due to operating reasons, to have a five-day week, we will say. Make sure that on your off-day, Saturday or Sunday, when you are shut down, you have an adequate fire force.

Make a daily inspection for good housekeeping, if you can. It is most important to see that the little things don't accumulate and get to be big things.

Have your exits kept clear. If your employees complain—their safety is what we are primarily concerned with today—see they have at least two ways out of every working area, particularly those which contain hazardous processes. And then if you can, provide your building from the standpoint of fire spread with fire walls, properly protected by standard fire doors, so in case of fire in one section, the people can escape to another, where it is reasonably safe.

If you do these things, you are doing two things—You can save life, and you can prevent at least part of your property loss.

The point of cutting out exposures has been brought up here today, and I was glad to hear the point brought out. Sometimes you will find that a man has a plant for making acetylene gas or something like that, and he will use that all

through the place. The first thing you know you will find that a wooden shack lies alongside of the acetylene gas plant. That shack may be one that was put up temporarily, and when they built the acetylene plant they didn't pay any attention to the shack that was there.

Go over your plants and see if you have all the bad spots taken out. Separate the buildings so in case you have a fire in one, it will not spread right into another. Have good walkways and pathways so when you need to work on a certain building which is exposed or on fire, you can get around it or confine it to that area.

I could talk probably for another hour on this subject, but I don't want to take your time. If there are any questions I can answer, I will be glad to do so.

CHAIRMAN MILLER: Does anybody have any question to ask? Mr. Chapin I know is well informed from my experience with him.

Would anybody else like to make any suggestions on this matter of organizing for plant fires?

Compensation Paid to the Fire Department

MR. CHAPIN: Mr. Chairman, I have been asked to enlarge upon one phase. That is the compensation paid to the fire department. That is so largely a matter of plant management that we do not ordinarily go into it. But it is usually well-advised to have membership in the fire department properly compensated so the men will realize that you expect something more of them than you do of the others. They should be paid, of course, for drills, and they should be properly clothed for service.

That is another thing. If you ask a man to turn out for fire drill and he gets soaking wet just on a drill, he has to get his clothes changed, and it is a loss of time to him, and so on. If you really have a fire in bad weather, you want that protective clothing—coats, hats, mittens for winter.

The amount of that compensation would depend upon your general plant organization, but I should surely think there ought to be compensation for that service. And don't forget: You want somebody to head it up who knows how to fight fire.

A. W. FISHER (Bird & Son, Inc., East Walpole, Mass.): We have a fire department in our plant, in fact, in all our plants. We have four or five plants. There are 65 members in the fire department, and we have monthly drills. Those men are paid 75 cents a month for the drill. They drill about an hour.

We have rubber coats and hats for the men and try to protect them as well as we possibly can. In the summer time we have outdoor drills. We pull out fire hose and turn on water. In the winter time we have inside drills. In our fire brigade room, we stretch out 250 feet of fire hose and mix it all up so the men will have quite a job coupling it up. It is all uncoupled. We have men try the couplings and see if they are tight and if they are hitched to the dummy hydrant in the fire brigade room, and we must call for water. We take the time to see how long it took them to do it.

The carbon chloride extinguisher is placed here, and the sodium acid extinguisher is placed here and Foamite fire foam. We have a great faith in Foamite fire foam. We use sand pails and all our buildings are equipped with sprinkler systems and fire doors.

I think we carry on fire protection very well.

CHAIRMAN MILLER: We are about ready to see the picture; before we go ahead with the picture, however, I have been asked to call for the report of the Nominating Committee for the election of officers for this section. As the man who was to present this report has to report at another section presently, we will hear that now.

Is Mr. Miner ready to present the report.

Report of the Nominating Committee

H. L. MINER (Dupont Company): **Mr. Banash**, Chairman of the Nominating Committee, came to me last night at the "Smile Party" and said, "If I am unable to present the report tomorrow, will you please present the report of the Nominating Committee?" He isn't present this morning.

The committee unanimously selected:

Mr. A. R. Small, Vice-President of the Underwriters' Laboratories, as Chairman.

Mr. George Elliott, General Secretary of the Philadelphia Chamber of Commerce, as Vice-Chairman:

Mr. Percy Bugbee, Assistant Managing Director of the National Fire Protection Association, as Secretary.

CHAIRMAN MILLER: You have heard the report of the Nominating Committee. I, of course, must ask if there are any other nominations.

Hearing none, I am going to ask somebody to move the adoption by acclamation of these officers for the meeting of the Fire Prevention Section of 1929.

(The motion was regularly made, seconded and carried.)

(At this point **Mr. L. J. M. Timpson**, Pyrene Manufacturing Company, Newark, showed some moving pictures.)

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS.
NATIONAL SAFETY COUNCIL



Health Service Division

October 2, 1928

WADE WRIGHT, M. D., Chairman
Assistant Medical Director, Metropolitan Life Insurance Company
New York City

The meeting of the Health Service Division at the Seventeenth Annual Safety Congress was called to order at two-fifteen o'clock by the chairman, Dr. Wade Wright, Assistant Medical Director of the Metropolitan Life Insurance Company, New York City.

CHAIRMAN WRIGHT: This meeting of the Health Service Division is really an occasion for huzzas and hallelujahs and congratulations and other similar parts of speech, because it represents in a sense the celebration of the inaugural of a new activity in the National Safety Council—that is, the establishment of an Industrial Health Division.

There is a growing consciousness in the minds of many individuals in the safety movement that perhaps with the introduction of mechanical safeguards, with the development of various methods for rendering toxic substances less dangerous to those who handle them, with our growing knowledge of problems of public safety, the handling of power; and a host of other problems which have been accentuated in industrial service, after all, a great field has been left uncovered; and that safety did not involve alone actual physical damage from external causes to human beings, but that a reasonably high degree of physical fitness involved the consideration of health as well as safety (using the word in a limited sense) and that in consequence industry might very well consider the enormous toll which disease and physical defects are taking, many of them intangible, not admitting of accurate measurement, but perfectly obviously existent to any intelligent observer.

One place and another for years past you have seen figures set forth that for every day lost to industrial employees through accident, there were from five to ten days lost through sickness. It is almost impossible to reckon the total waste due to the curtailment of the period of usefulness in wrecked and unhappy lives.

The new Industrial Health Division of the National Safety Council, of which Dr. Clarence O. Sappington is the director, is going to endeavor to do, perhaps at first in a small way, what the Safety Council has done in a large way in the field of safety. He will tell you of that later. I don't believe I am speculating when I say that, after all, what industry and industrial organizations are concerned with so far as the physical well being of their employees is concerned, is the maintenance of groups of men with a high degree of physical fitness and a high degree of mental alertness, growing in usefulness, growing in opportunity, growing in experience, and continuing long years in the service of their respective organizations.

Neither do I believe that it is speculation to say that such continued service, under the conditions which I mentioned, cannot possibly exist without the main-

tenance of a very fair degree of health. Long continued service, long continued useful service almost inevitably connotes physical competency.

I doubt if there is anyone in the country who could speak with more authority regarding the possibilities and limitations of the statistical methods which may be applied in the measurement of the value of human life than the first speaker on our program, Dr. Louis I. Dublin, Statistician of the Metropolitan Life Insurance Company, New York City. Without further introduction, because he needs very little, I will present Dr. Dublin.

The Economic Value of Life and Health in Industry

By LOUIS I. DUBLIN, Ph. D.

Statistician, Metropolitan Life Insurance Company, New York City

This may be an occasion for hallelujahs for the chairman and the section, but for me this is an occasion for commiseration, for I have been assigned an impossible subject. It would take years to collect information which is absolutely basic to any evaluation, of the economic value of life in industry and it would then take years to analyze it, and we have had but a few weeks. The only thing, therefore, that was left for me to do was to skirmish around a little bit and survey the subject, think out something of the methodology that would be needed to make some progress toward the goal that your chairman had in mind.

I suppose Dr. Wright asked me to discuss this subject because I have been for a good many years now, engaged in studying the economic value of a man in general. You see, connected as I am with an insurance company, that is a very live subject. We try to evaluate a man to his family and have him insure himself for that value as far as his budget will permit. A man, in a sense, belongs to his family. His value resides in his family. His wife and his children are dependents on his earnings. Value here means something, for when a man passes out and leaves no visible means of support, his family is destitute; and there is the source of so many of our troubles and tragedies.

So the insurance company steps in and says to a man, "You are worth so much to your family. You had better provide for them that amount of insurance which will leave them, if not altogether in the same economic condition at least with an adequate measure of support." So with that thought in the background, we set to work to find out what his value to his family is.

Our first effort was in this direction: to find what it costs to raise a human being to the point where he begins to be a valuable citizen. I conceived of a situation something like this: A clock which is wound up and then is set going, releases the energy which has been put into the mechanism. A human being is wound up, fed, clothed, housed, and educated, filled with the tradition of a civilized people, is put in an organized society where he can work, and then he works himself out. But I realized at once that the physical analogy was not a perfect one; that the man produced more than what was put into him, otherwise the world wouldn't move forward.

Our next effort was to consider the subject somewhat differently. We said, the value of the man at any moment of time to his dependents is that amount of money which is the present worth of his net future earnings, assuming a mortality consistent with his class. So to simplify our problem a little further, and realizing that the economic value of the man was a function of his earnings, we considered a series of classes. The first group were those whose income was \$2,500 as a maximum, and at the beginning period of earnings, say age 18, we found the present worth, using three and a half per cent discount, of a man's net future earnings

to be \$29,000. We found, using this method, that a man of thirty in that income class would be worth to his family \$31,000 approximately. At forty he would be worth \$26,000. That means that such amounts of money should be in the bank to draw interest and provide that family, if this man were removed, with the same net income that he would give that family if he lived out his normal existence.

In the same manner we worked out a series of tables giving a man's worth in the \$5,000 and the \$10,000 class. As we increase the income, of course, the values likewise increase.

To make a long story short, we discovered that men have real value; that no one really conceived of the immense assets which are involved in human beings. In the insurance business we had conceived of the problem, had done it in a very modest way, and if these organizations would go out and preach the gospel of men's values they would treble and quadruple their business as they put that idea across. Men do not realize their values to their families, and if they did they would provide more adequately through insurance and other means for the protection of their families when they are gone.

So much for that aspect of the subject.

We also felt that the productive man had value to the community, for what is the community but an aggregate of families?

What is the value of a man to the community? It is obviously not the same thing as it is to his family, and we had no way of evaluating that amount. But, as a rough procedure, we said that if men are worth approximately \$15,000 apiece, that is, the present worth of their future earnings, taking productive adult men, as a class, then, what is the sum total of those values? We also assumed that for active women in the amount was one-half of that for men at the same ages. We found to our astonishment that the sum total of these came to a rough fifteen hundred billions of dollars, which is five times the value of all other goods—real goods, manufactured goods, machinery, agricultural products and everything else that has value. In other words, the productive value of man is equal to five times that of other valuable things.

The Individual's Value to Industry

When the question is put, what is the man's value to industry, what shall we say? Man is obviously of value to industry, for industry would be impossible without him. But what shall the procedure be by which we can evaluate a man to his industry? In the case of a man and his family we have a direct connection. There is an inseparable bond with the family. Obviously, a man is worth so much to his family as is indicated by his earnings. The earnings belong to them. But how about industry? What corresponds to the wife and the children? Obviously, the individual employer. What is the value of the worker to his individual employer? You are at once struck with the fact that that relationship which existed between a man and his family does not here exist. A man is a free agent. He may take himself out of this particular employment and go somewhere else, and he does. Yet there is value, nevertheless, and that is recognized because, as I said, without that man business could not go on, nor would there be profits.

Now, as a man in a measure is responsible for the profits of his concern, there must be some way of determining what that value is.

My suggestion is this: In order to obtain a figure which would have any value, it would be necessary to find what the productivity of the individual is to his industry. We don't know that. There are no figures indicating what a man's productive power to an industry is, what profits industry gets out of a man in his particular field per annum, and until we have such figures it would be impossible

to proceed. But taking the productive world as a whole, we can perhaps make an approach.

If you examine the figures of national wealth, you will find that we have been increasing the national wealth, at the rate of about \$100 per annum per capita. That has been true for the past two decades. If we realize that one-third of the population is in the productive ages, (in our total of one hundred and twenty millions there are some forty million workers) and that would mean that the average productive individual is producing some three hundred dollars additional wealth per annum; It might be possible to integrate those figures and obtain a fractional value for the productive individual at the present time. That hasn't been done. It would be an interesting thing to develop this thought and see where it leads us.

There are other side issues which throw some light on this question of the value of a man to industry. We know that it costs a good deal of money to make a man effective in industry. It takes the employer's time and attention in the industry to train a man up to make him worth something to his industry. When that man breaks down or leaves the industry he has to be replaced. The replacement value of the man can also be readily determined; in some industries it has been determined.

For example, in my own field of work in the insurance business, where there is a good deal of labor turnover, it has been found that it costs all of \$500 to replace a man in the field. That is, if one of our agents should for one reason or another leave our employ, it costs at least \$500 to find a man and train him to do the job equally well. My own suspicion is that the amount named is very conservative, and that the true figure is much higher. In other industries it may be higher or lower. You can see very well that this would depend upon the kind of industry. Where the process is simplified and where it takes little time to teach a man to run the machine, the replacement value is less; where you are concerned with specialists and it takes years to train them, the replacement value is large; and in business where they are concerned with high-grade executives or high-grade managers, they realize that value and do exactly what the wife or family does: protect themselves against that loss by taking out business insurance which accrues to the organization in the event of the removal of that man.

I am putting on the table a lot of considerations, a lot of lights on this subject. I have no solution. It would be an impossible thing for any one man to solve this problem, to give you a figure. It is not like turning a crank and getting an answer. That is not the situation at the present time. What is called for is the accumulated wisdom and skill of a large group of men, sitting around the table months and years, to think out the elements that go into this picture and develop a methodology which ultimately will give the value of a man to industry.

Now, may I say a word in the way of conclusion? I am mighty glad that this question of the valuation of a man has come up because heretofore industry has not given much thought to the value of the human element. We have been talking a good deal about the value of the goods produced and the value of the capital that has gone into the industry, but until now there has been very little said about the human values concerned. It is a very encouraging sign that industry has waked up to the fact that it is dealing with human beings who are the largest factor in the whole field of industry. Just as a man is worth five times all other goods, I believe that conception will give a multiple which will represent the value of man in industry.

That leads me to say this: Whatever be the value that can be ascribed or tied to a man in this or that or the other industry, that ought not to be a measure of the responsibility for that man. It is conceived that industry must remain solvent; that industry cannot be sentimental in its relationships, but must recognize its obligations to the individuals who make up the workers in its field.

This conviction is growing apace. Industry is conceiving of its workers as combined with it in a partnership for the service of the community. It is a combination of capital, of supervision, and man serving the needs of the community, and therefore a paramount issue is the protection of that man.

No consideration can put that out of the picture. So, quite apart from the value, in dollars and cents, of man to the industry, the first obligation of industry is to see that the man stays fit just as long as he stays in that industry, and I believe this sentiment is growing and developing in the hearts and minds of those who are responsible for industry. It is certainly very strongly developing in those who are working in industry. They demand protection, they demand safeguards, because they recognize their own value.

Possibly at future meetings some one will be able to present to you the figures that Dr. Wright had in mind. I, of course, can't do that, but it is to my mind a stimulating discussion and I hope that there will be comment from the floor as to the general plan that I have suggested, as to a method of proceeding which will ultimately give us the answer to this question.

CHAIRMAN WRIGHT: Is there any comment from the floor at this time? Does anyone feel the bursting urge to speak? I would be very glad if we might have some discussion now, or, if you wish, we will defer it until the end of the series of papers. Apparently no one is moved.

It doesn't make much difference what you want to know about, when you want to get to real facts, whether it be about living conditions in the Gobi desert in Mongolia, or the potentialities of a Forty-fifth Street speakeasy, you always want to talk to a man who has been there, a man who knows by actual personal experience of the things of which he speaks. I feel quite certain that there is no one in the country who can discuss as intelligently and with as much real personal knowledge the part which a sound, well balanced medical program may play in the maintenance of a physically competent working force than Mr. Howell Cheney, of Cheney Brothers. Mr. Cheney!

Continuity of Service

By **HOWELL CHENEY**

Industrial Relations Division, Cheney Brothers, South Manchester, Conn.

I find myself under somewhat of a double embarrassment today because I had been invited to speak on the Continuity of Employment and had most strenuously urged that I hadn't any solution to offer that would bring about that one hundred per cent of continuity of employment that we were looking for; but nevertheless I would attempt to try to sketch out some paths of approach toward that problem. So I started this morning with the thought in my mind that you were interested in paths of approach, determining the continuity of employment, and I am rather fearful that Dr. Wright has a different theory in mind.

In preparing myself this morning I happened to open the morning paper and I found a report of a conversation, or an address, by Dr. Dublin. "Aha!" I said, "there I am. It is all sketched out for me." So I took my notes accordingly, and the first speaker introduced was Dr. Dublin. Now, what is a man to do when he finds that his material belongs to the real author and is not devoted to the subject to which he had applied himself in preparation?

However, I am going to stick to the subject that was given me.

What do you mean by continuity of employment? Well, I have been impressed that the idea most predominately in mind in thinking of the continuity of employment is the ability to keep a man on a particular job, and employment managers

and industrial leaders have been led rather far afield from their true values which Dr. Dublin has attempted to sketch by centering their attention on their success in trying to keep a man on a job. The true values in continuity of employment relate to your ability to continuously get the utmost productivity out of a man of which he is capable. Dr. Dublin suggested those to your mind.

I would say, with us, that today a man is producing from \$1,600 to \$1,700 worth of goods annually, where before the war he was only producing \$800 to \$900 worth of goods; and that increase isn't entirely in the increased purchasing value of the dollar, but represents a real material increase in production of about 1.8 times the pre-war production. That is, one man can do today what 1.8 or 1.9 men did before the war; and consequently his increased productivity has a very great value which every manufacturer is conscious of, which he doesn't need to have pointed out to him, and which he really isn't evaluating in so many thousands of dollars per man.

This thought, however, is entirely and consciously on the minds of the managers of all industrial establishments, that whether that productivity per man be in thousands of dollars or in tens of thousands of dollars, it varies all the way from zero to double the average. So that, if the productivity per man in the silk industry be an average of \$1,700 per year, that productivity varies from zero up to \$3,000 per year, and your interest in the man and your expectation of a profit vary in like proportion.

So we are all coming, and I think far more consciously coming, to get away from the point of the reduction of turnover which tells us what our turnover has been in the ratio of exits to entrances or exits to an average working force, to something that is rather more intangible but has far more to do with the profits in our pocketbook. What have we done to maintain a man at his maximum working productivity, not for this year and not for that year, but for the working years of his life?

So continuity of employment means the maintenance over a long period of time of a maximum productivity. There is the definition, there is the problem. Now, what are the paths of approach to that problem (because I only have paths of approach to it, and I wouldn't for a moment be so rash as to suggest that they are cures)?

In the first place, the productivity of a man is directly determined by your success in placement. Has he been placed in proportion to his aptitudes and capacities as you may reasonably ascertain them?

Now, you have research laboratories which determine all the physical characteristics of your raw silk, of all the chemicals with which you dye that silk. You go into exhaustive analysis of your soap and of all the other chemicals that are combined with soap to produce your dyeing liquors. It has, however, remained for a later generation to conceive that the human element which was more than half of the total cost of production was capable of somewhat similar and scientific analysis of its aptitudes and capacities; and there your medical department comes in, not necessarily as an exclusion force, but as a scientific bureau for the analysis of the man power and the woman power that you are going to make your major item of cost. And in proportion as that medical department, coupled with an intelligent bureau of employment, analyzes not the general trends but the individual as he presents himself at your employment window, have you made a start, even a beginning, at maintaining the continuity at its highest point of productivity, of your labor force. You cannot commence to do that without thorough appraisal, with all of the resources that modern science brings to your aid, of the physical capacities of the individual whom you are considering at the time being.

The technique, the methodology of the doing of that have developed a peak. There has developed with it—and I perhaps see it far more effectively than you do

for I live in a one-industry town—an educational force acting upon the whole community. Before, their physical condition meant little. It was immaterial, apparently, to us whether they possessed certain physical capacities, certain probabilities of endurance and continuity in employment. Now the thought is very definitely brought home to every employee that his physical condition is of the first importance, and he comes to appreciate, and the community comes to appreciate, that good health isn't an accident; it is an asset, and if we put it into dollars and cents it is a purchasable asset which may be theirs by scientific study, endurance and patience. In other words, the community has become sold to the idea that physical well being is directly related to its productivity in life, and that physical well being is something that they may seek, not by accident but by a scientific method.

We have reduced to a routine the urine, the blood tests, and X-rays. That, again, has reacted upon the local medical profession which, in a country town, weren't equipped to give those services with the expert laboratory service that went with it, and medical practice today means a decidedly different thing in a country town than it meant ten years ago, because not the practitioner but the practiced-upon has had demonstrated to him that it is a matter of scientific determination and not entirely of guess work.

So much for placement. I want to indicate a further approach to that later.

Continuity of employment next depends upon your keeping the path of promotion open. It is sad and it is true that many industries today don't present very much of an ascending scale of promotion. I find that many industrial employers with whom I talk haven't become conscious of a promotion problem. They have thought of jobs as a job to which an employee was assigned. They lost sight of him after that assignment. The only contact they had was a certain indefinite turnover report that indicated that they had lost a man. But the question as to whether that ascending scale of productivity was going with them or against them apparently hadn't seriously entered their consciousness.

Now, it goes without saying that a man's productivity is not only in proportion to his physical vigor, which your medical department may have correctly assessed when they took him in; but it is in proportion to his interest in that plant and his accumulated knowledge as to the possibilities and resources that that plant offers for his own application of labor. Unless you have a fairly ascending scale of promotion you are going to lose your virile, strong, productive, alert minds and finally the workers. They are going to get away from you. They do in our own plant and they do everywhere, and this is an example of it.

I had in one department a man of the old type, an autocrat, brought up in an English factory on a German training. He believed that because things had been so they were so and they never could cease to be so, and that a man who once was a carder was a carder and there wasn't any use discussing that point, he was going to remain a carder. If you sent him a type of man who insisted on being something else besides a carder, why, he lost his interest in him. The thing went on for several years, and it was becoming more and more apparent that that department was going backward in the productivity of its labor and in its general rate of progress and morale.

He came to me finally and said, "Look here, Mr. Cheney. My men are no good. They don't have any interest. They haven't any pep. They don't feel the way I find the employees in all of the other departments feel. Now, what is the matter?"

Why, the matter was nothing but the simple principle that there was no outlook ahead in that department. There was no energy to be capitalized upon in proportion to its increase of productivity. He valued men simply for what they could do today, and his department inevitably became the place for dull, stupid, nerveless men who were satisfied without any future outlook, until finally the superintendent himself became conscious of that fact.

So to keep the men up to their maximum productivity you have to keep the path of promotion open. You have to let the men know that there is a path of promotion. Chart it for them. Show them the different steps. Let them make their applications for promotion. You have disappointments, you have your troubles. You stir up a feeling in your factory that there is a legitimate promotion for every individual, and you come back to the old stern hard truth that no man can earn a promotion unless he has made good on his past position. So it isn't altogether an easy path. It does increase that trouble a little, particularly in the individual department. But while the turnover in our individual departments may have been increasing, the turnover in Cheney Brothers as a whole since the war period has gone down from 50 per cent to 22 per cent, which is a pretty sure indication that the average man is satisfied and the average man is finding his way out in life.

But again, you are not going to keep the path of promotion open, you are not going to capitalize upon the increased ability that the experience in your plant accumulates to the individual, unless you can keep them in their best possible physical condition; and there again comes in the ideal of the medical department. Every employee may come in as long as he is able to remain at work and our legitimate interest in his physical well being is in keeping him at work as long as we possibly can.

I wish it were possible and I wish I could say that our employees were sold on the practice of periodical physical examinations. They are not. It is only the higher type of salaried man whose income has reached very material proportions who becomes convinced of the value of a periodical medical examination. Nevertheless, when we are giving 25,000 to 38,000 medical treatments a year, we come pretty nearly to seeing at least a half and probably two-thirds of our employees once a year and of getting some check-up upon their physical condition; and also of eternally hammering home to them that good health is a physical asset, is an attainable asset, and has a direct relationship to their plans of personal hygiene.

So the medical department has very definitely as its aim, not something sentimental, not something only relating to the abnormal cases. I wish I could get that out of your mind. The abnormal case is pretty nearly every case. The abnormal case is represented simply by the individual's reaction toward his personal problem; and looked upon that way, the abnormal problem becomes the universal problem. Your medical department becomes, not the agency for taking care of a few exceptional cases but an agency inspired to believe it has no less a problem than maintaining the physical effectiveness of your whole working force.

Now, the next line of approach to that problem reaches what you have come to consider more technically as the continuity of employment. What are you going to do with that employee when he reaches the declining period, when old age begins to have the slowing up effect upon him? There come in some of your most difficult problems in affecting the continuity of employment. There isn't any single cure for it. Periodical examinations certainly help, certainly prevent the degenerative diseases, and an intelligent, thorough, and never-failing follow-up of community health conditions helps to control contagious and communicable diseases which so effect later degeneracy.

We are fortunate to live in a country community which is more or less of a unit. We are fortunate to have the cooperation of that community in the improving of the public health conditions, not only those that relate to sanitation but those that relate to personal hygiene. As an illustration of that, the public health department and the Yale Department of Health came to us with a desire that they might make a study of the incidence of respiratory disease. We approached that problem with a good deal of hesitancy. We said that to bring in a public health nurse from Washington and to turn her loose in our factory would create

all sorts of disturbances and the employees would say, "Oh, that is another one of those silly ideas and here is some faddish woman who has come to ask us whether we sleep with our windows open and have the proper diet and whether we bathe, and to ask all sorts of questions that have no relation to her business or the company's business."

We were very doubtful and took a year to think it over, but we finally came to it. We took a woman in, not as a public health nurse but we introduced her as one of our own nurses, because they were used to our own nurses and were used to having them call at their houses. Over a year's period she quietly studied every case of respiratory disease, and through that cooperation the public health service think they have found—they perhaps have yet to convince us—but they think they have found that respiratory disease is rather directly related to the temperature of the rooms in which the employees work. The incidence of respiratory diseases was very much higher in rooms that ran over 68 than it was in rooms of 66 to 68.

We presented that report to our employees. There was a good deal of kicking, a good deal of insistence that rooms were too cold, and it wasn't an easy matter altogether to put it over. But it is now accepted as just one of the everyday mill problems with a convincing demonstration that if you keep a room at a reasonable temperature the incidence of respiratory disease is very much lower than it is if you keep the temperatures from 72 to 76. The problem of keeping the room at the proper temperature is eternally there with you, but the public has seen that it doesn't have a fanciful sentimental relationship to their occupation but that it means dollars and cents in their pockets, and the employer has a selfish and high-minded consideration in attacking that problem for their benefit.

So there again your medical department has got to be eternally on the job. If it could promote the periodical physical examination, if it could check up on employees, it undoubtedly would be able to reduce the incidence of degenerative diseases that commence toward the end of working life, at about fifty, sixty, or seventy years of age.

We used to think that the pension problem was a solution of the difficulty and that pensions answered the problem of the continuity of employment because it acted as a bait all the way on from the early working life up to the close of a man's working period, and that the prospect of a pension held him there.

I think I can say quite confidently that up to forty-five years of age a pension has no pulling force on continuity of employment, and that after forty-five the curve of interest may increase quite rapidly. But the pension award does not increase the individual's productivity. It gets rid of a sore, it finds a method of disposal; but is it a reasonable and proper method?

You retire a man at the age of sixty-five to seventy, at from one-third to one half of his average income, and he may have accumulated enough with that assistance to carry himself with some restrictions to the time of his death. But you have terminated his interest in life. You haven't capitalized on the accumulation of knowledge and experience and loyalty and devotion that a longer period of happy employment ought to have made yours.

We have been experimenting with another expedient which we call the partial pension system. The partial pension system attempts to make that difficult problem of adjustment somewhat easier when you have to change the job of the old man, because it reduces his income and instead of giving him a full pension you give him a partial pension which reimburses him for perhaps one-half or one-third of his loss of earning capacity. That is a very direct economic gain to the company and a very direct economic gain to the man. Every pension you award means an award of from \$7,000 to \$8,000. A partial pension only means half of that, and if the man can be kept continuously at some employment which represents the

maximum of his productivity, he is far happier, you have retained the productivity of that man in the field of its greatest possible application, and you have prevented an economic loss both to the company and to the man.

I think sometimes we get a wrong perspective on the pension problem, and during the last summer it seemed to come home to me more and more that men looked upon pensions as a decent burial, and the reward of pensions was very often coupled with tears and sobs and heart-rending scenes that brought it home to you that it represented to the man the end of his working life. Is that the legitimate or the necessary or the reasonable end of a working life to that man who still has productive energy?

Specialized processes, bonuses, premiums, piece rates, all put the older man at a disadvantage. He can't stand the speed. But there again your medical department who has been his confidential adviser can present the problem to him, can keep his faith in his legitimate energy, can make him feel that he has productive capacities that may be prolonged perhaps indefinitely, and by a slight assistance, which means far less in cost than a pension, you have been able in a few cases to make an adjustment that is decidedly in a man's interests.

I don't mean that partial pensions are going to be the solution of the difficulty. I don't mean that pensions are by any means a solution of the difficulty because they have got rid of a sore spot in a factory. I don't mean that periodical examinations are going to entirely and by themselves maintain a man at his highest productive capacity. I don't mean that the constant and solicitous care and the freedom with which a man visits the medical department are going to always keep a rational program of personal hygiene before it. I don't mean that the most skilled Placement Bureau with all the knowledge of psychology and personal aptitudes and mental tests that they employ are all going to bring a man to his job with his maximum capacities. I only mean that these are paths of approach, the tools, if you will, with which you may work, and they are successful tools only to the extent that you keep them constantly sharp and alive and fed up with new intentions, new spiritual meanings, new endeavors of higher accomplishments.

They do, however, all have this common path of approach: They must be used so that they bring a higher measure of economic return to the industry. Mind you, I would never for a moment affirm that I would be able to figure in dollars and in cents the exact return that a medical department to Cheney Brothers, any more than I could figure how much a pension system contributed to our morale or lack of morale.

I only mean this: Unless you can reasonably argue them out from the point of view that they do maintain an increased productivity, that they are not charitable expedients, you haven't a sound basis of approach to that problem. You may think if you put it on a charitable basis that you have a truer method of approach to the individual. You haven't. You have a false basis of approach to the individual. Unless you can ultimately make the individual see that any policy has a relation to the wages which he is going to earn you haven't a sound method of approach to that problem.

So every fact bearing on continuity of employment must be related to the economic return it makes to the industry and the individual. Every path of approach, you will find, rests upon sound educational principles. That education may be of a public nature, it may be of an individual nature; but it proceeds from an educational problem, and it has to be presented as an educational problem or it doesn't get over.

Finally, it means organizing all of the resources that you find existing in your own work and making the most of them. Don't feel that you are necessarily going to the nearest university. You will find Professor Winslow ready to help you, but you have resources existing in your own organization that are entirely

neglected. Organize those resources. Make the employees see their relationship. Make it a part of their intimate and daily life, and bring science to your daily routine of life, and you will have an effective organization of the things that already exist in your plant.

So the continuity of employment maintained at its highest productive point depends upon the economic return to the industry and to the individual, and your ability as an educator in leading the employee to appraise it at its true value depends on the scientific resource that exists today in your own control.

CHAIRMAN WRIGHT: Dr. Slater, our third speaker is not present and I have not heard from him. I am very sorry that we will have to omit his presentation of "The Organization and Conduct of a Plant Medical Department," at this time, but his paper will appear as a part of the published transactions of this session.

I think this would be a fit time for the general discussion of Dr. Dublin's and Mr. Cheney's papers. Is there any comment? Are there any questions which any of you would care to ask Mr. Cheney? Dr. Dublin has fled, as he was scheduled for another meeting.

Where is Dr. Thompson? He is vice-chairman of this section and I would be very glad if he would comment upon this general topic.

DR. L. R. THOMPSON (Surgeon in Charge, U. S. Public Health Service, Washington, D. C.): Dr. Wright, I really haven't anything to discuss, but I would like to compliment the people on the program that has been given. It brings to industry the specific problem of health. I think if we keep that always before us, and that the safety engineer has an individual problem, we have made a great step in connecting safety methods with health.

CHAIRMAN WRIGHT: Dr. Geier?

DR. OTTO GEIER (Cincinnati Milling Machine Co., Cincinnati): I can only add my word of commendation. No one can properly appraise such papers as Dr. Dublin's and Mr. Cheney's. I know the problems of industry would become relatively small if all employers had the point of view that Mr. Cheney has so splendidly presented here today. The thing that seemed to me most significant about his discussion, while he didn't call it that, when he spoke chiefly of the physical well being of the individuals under his employment, was to think at the end he was mostly striking at the mental health of his individuals. I think that keeping alive the interest of his workmen, keeping alive their interest in each other and hope in their success in the future as bound up with the company, is perhaps the most striking note in his paper. I think it is one factor that has been overlooked too much in industry even where the medical department has been quite efficient.

I, personally, am very grateful to Mr. Cheney for this paper.

CHAIRMAN WRIGHT: Dr. Watson?

DR. C. H. WATSON (Medical Director, American Telephone and Telegraph Co., New York City): I can only reiterate what Dr. Geier has just said. I have heard Mr. Howell Cheney a number of times and never in better form than today.

One of the most striking things which he mentioned, of course, was the employee past middle age going on the downward side of the hill, having his life plans interrupted by being offered a pension. It has seemed to me that there is nothing more sad than an employee forced to accept that for a lifetime endeavor. While Mr. Cheney doesn't offer the entire solution to the problem, it seems to me the partial pension is in part the suggestion, at least a very favorable gesture upon some line of procedure which will help the employer's effort in helping the man on the downward side of the hill who needs to have the situation solved for him.

May I, also, thank Mr. Cheney for his very delightful and interesting paper.

CHAIRMAN WRIGHT: Are there any questions or comments? Dr. Winslow, would you care to comment?

DR. C.-E. A. WINSLOW (Yale University): I have nothing to add, Mr. Chairman, except to say how deeply gratified I am at the way in which this new health division has been launched. I think the major problem before the health division probably is to increase the realization on the part of the council of the fact that medical service in industry is something more than what our chairman at luncheon described as "finger wrapping." This really very beautiful and finished and stirring address of Mr. Cheney's to which we have listened gives us simply an ideal form of a text or a program to show just what the health service in the factory may really mean.

The Organization and Conduct of a Plant Medical Department

By DR. B. J. SLATER
Eastman Kodak Company, Rochester, N. Y.

The Annual Congress of the National Safety Council is an inspiring sight to a physician. An assembly of such a distinguished group of men and women all interested in the prevention of accidents and disease cannot possibly do any harm and may be productive of great good. Physicians' work generally begins where safety men's work stops. The more efficiently *you* work the less work there is for *us* to do. In spite of this our sympathies are with you and all of your efforts. Those of us who are constantly visiting the great hospitals are appalled at the reckless loss of life which is visiting every community. To each and to all of you we wish every encouragement in the prevention of some of the terrible things which we see in our hospitals.

In the summer of 1924 there was gathered in the West Indies a notable collection of scientific men. They came from India, London, South America, Rochester, Minnesota, Boston, New York and various other representative medical centers as guests of a great industrial organization, namely, the United Fruit Company. Their program was the discussion of the prevention of disease in the areas that are affected industrially by the United Fruit Company. Here we have industrial medicine at its best. We understand that the budget for the hospitals and medical care of this company is about one million dollars a year.

On this occasion there were represented the world's greatest medical authorities in their representative fields. Such high standards are inspiring and show us what may be accomplished by industry when the proper facilities and interest are involved. In addition to an outlay of about one million dollars to the company hospitals and medical department, two or three hundred thousand dollars are spent on sanitation, to make the working conditions of the employee better and to stamp out certain diseases which are endemic to the territory from which the products of the United Fruit Company come.

Most of us engaged in industrial medicine are not part of such an ambitious program, and yet to all of us are given many wonderful opportunities to practice medicine under somewhat ideal conditions. There is no other specialty of medicine which offers such wonderful opportunities for follow-up as industrial medicine. As long as the employee stays in the organization, his physical condition may be followed, of course, always with his permission. Herein the opportunities are, of course, larger than to those engaged in private practice because, it is not so easy nor convenient to have patients come to the office. Inasmuch as there are usually no fees charged for such services, no one may criticize the attitude of the industrial physician for his interest in his patients. One of the first problems should be then the installation of an adequate follow-up system.

In the organization and conduct of a Plant Medical Department three things are most necessary. They are probably as necessary in any other organization as they are in a Plant Medical Department. First of all is the personnel. In the organization of a Medical Department the work of the department is always limited by the intelligence which is guiding it. If I were organizing a department from the very beginning, my selection would be a young man from a Grade A medical school who had shown qualities of leadership in his class and broad general intelligence. He would be advised what the general policy of the company was and asked to organize his department accordingly.

For the last four or five years the advent of the younger man in medical circles has been very noticeable. For instance, St. Louis University with a great medical endowment, has chosen as head of its medical department a man not over thirty-five years of age. Similarly, the University of Rochester with a great medical endowment, equaling that of St. Louis, has chosen as its professor of medicine a recent graduate not over thirty-six years of age.

In the realm of research, younger men are gradually coming to the front. Dr. Berghau, the discoverer of the erysipelas serum, is a relatively young man. Dean George H. Whipple, the physician who by his research work has made possible the giant strides in pernicious anemia, is a relatively young man. Dr. Banting of Toronto, the discoverer of Insulin is also a very young man. My choice of the younger man at the head of the department would be made for the same reason that these universities have made their choice, namely, that it would bring youth, energy, physical stamina and intelligence to a problem. With such qualities results frequently are obtained.

Previous practice has been to select some man who had more or less of a reputation in private practice. By and large the problems of private practice are not those of industrial medicine. Training required in each field is often quite different and habits once formed are, of course, difficult to break. In my opinion every industry large enough should have one physician who devotes his entire time to the company. The whole time physician devotes his whole interest, life and ambition to the work at hand exactly in the same manner that anyone devoted to any other line of work does. The part time physician has a divided interest and while he often brings to the department a much needed point of view, the irregularity of his hours and the separation of his interest, make it desirable that there should be someone constantly on the job to see that the interests of the department are constantly looked after.

As regards the conduct of the personnel of the department, it should be run on the basis of a kindly sympathy for those who need its services. It should be eternally on the job and as pointed out in the beginning should have an adequate follow-up system in operation. The physician or nurse who is constantly on the job even though he or she may not be the most brilliant of his or her profession, is of greater usefulness to an industry than someone more brilliant in his or her particular line who lacks the interest to be constantly and forever on the job. A medical department should be free from arguments of every kind and description. Whenever there is an argument in our department, the burden of proof is to prove that the patient is not right. Our motto should be sympathy, kindness and understanding and we should to the very limit of our ability not indulge in anything not catering to these principles.

As an illustration of what vigilance may accomplish, I might cite the fact that we have not amputated a finger because of infection, in all of our plants in ten years. This record has been accomplished only through the maintenance of an adequate follow-up system. Whenever an employee is injured there is a card bearing his name hung on the wall in the medical department. It is the duty of the nurse to call up his department the following day to find out if the employee is working and if so to see that the employee is sent to the medical department.

This follow-up will save many fingers during the year and, perhaps, some lives. If the employee is not working, it then becomes the duty of the physician in charge to find out why he is not working by a visit to his home. The results in a lessened incidence of infections speak for themselves. Our methods are no better than anyone else's. Our ability, however, to closely follow the cases which are under our care is, perhaps worthy of some attention. After all the difference between a person who is a specialist and one who is not, is only a matter of attention to detail.

In the matter of syphilis in one branch of our medical service, we have run down over three hundred cases. Twenty-five years ago we doubt if any industry had recorded that number of cases of syphilis. It is, however, coming to be a common thing to make the search for this disease a routine procedure. The results are very striking. By constantly being on the job to discover disease one is surprised at the number of cases which will be uncovered. This does not mean that our incidence of this malady is larger than that of other companies. As a matter of fact we are inclined to think it is probably less. It does mean, however, that cases in our employment are under medical supervision and medical care. We have seen to it that all of these persons have received adequate treatment at a very reasonable charge. Since the inauguration of this intensive study no injuries have been complicated by syphilis. In other words, periods of disability have not been prolonged because of a blood disorder. This represents an advance and illustrates the good results which follows such a procedure.

A medical department should be organized with sufficient equipment to make a thorough study of any case requiring treatment. It should have a small laboratory where blood counts can be done; an X-ray laboratory where X-rays of teeth and chests may be readily available. In this connection we feel that a proper X-ray equipment is one of the greatest aids which a plant medical department may have. The services of this department should be constantly available at very short notice in order that a proper diagnosis may be made. The question of the immediate availability of the X-ray is a very important point. It does not take very long to make a chest roentgen-ogram. It takes a comparatively long time to make a good examination of the chest by means of the stethoscope. If the X-ray is difficult to get and there is an unnecessary delay in getting it, the tendency may be to postpone the X-ray which should be taken.

As a general rule it should be the policy of the medical department to examine all people who have been absent for a period of over three weeks. In our company we examine by X-ray people who have been absent because of asthma, pneumonia, pleurisy, bronchitis, certain types of abscesses, nervous breakdown and chronic indigestion. We have routine chest X-rays made of their lungs when they return to work. The results of these X-rays are frequently very illuminating. When employees applying for work give a history of having had any of these diseases, the chest X-ray is taken at once. We have the same routine for those who are 20 per cent underweight.

At a previous meeting of the National Safety Congress one of the speakers asked what a medical department might do to lessen the complications of apparently minor injuries. The answer lies in my opinion in the results we have had in our X-ray work. If people with tuberculosis are permitted to work, the slightest injury may produce very serious complications. It should be the function of the medical department to catch these cases as quickly as possible to prevent the possibility of an injury. If the medical department by its preliminary physical examination is able to detect a large percentage of diabetes, syphilis, tuberculosis and heart disease, then some of the major causes of complications relative to accidents will have been eliminated, if such employees are properly placed in industry. The medical department should be so equipped in its personnel and its physical layout to do exactly this.

You may take it as a certainty that no one connected with an industrial organization asks sick people to work. It has been our experience that those who are not making good at their job, who are hard people to handle and who offer difficult problems from the industrial relations point of view, are frequently either mentally or physically sick. This is a rule which usually is infallible. We have proved time and time again that many employees who are thought to be ill-tempered were in reality sick and evidence of irritability which came from sickness, disappeared when health was restored. On many occasions, knowledge of this character will help to settle many difficult industrial problems.

Finally it is taken for granted that the industry should be able through its medical department to diagnose such diseases as may be thought to originate within the company itself. A physician is familiar with plant processes or should be and his department should be able to answer for the company how far its processes have contributed to a disease in an employee. The employee has a right to know and so has the industry. Familiarity with plant processes should place the physician in industry in a better position to make such diagnoses than the general practitioner who cannot possibly be familiar with such industrial processes.

A newer phase of industrial medical practice is gaining ground. This is the medical examination of food handlers. It is our policy to examine all food handlers to see if they are carriers of diphtheria, syphilis, tuberculosis or typhoid fever. Under no conditions may any employee suffering from any of these diseases touch or handle food. It may interest you to know that in an examination of two hundred and fifty food handlers we found two who were typhoid carriers. These employees had had typhoid many years ago and were still eliminating the germs of typhoid. It does not require much imagination to see how easily such an employee might spread an epidemic of typhoid among other employees. Companies should so far as they are able insist that those employees who handle food should be free from disease which may be disseminated by contact.

This question may be asked: "How far may we carry our medical work in industry?" To my mind there is no satisfactory answer to this question. A broad, humanitarian policy on the part of industry is necessary. The compensation laws have brought industrial medicine here and undoubtedly it is going to stay. The needs of some industries are quite different from other industries as some may have particular hazards not common to others.

Medical departments in addition to the aid which they may give individuals in the plant, by physical examination, by periodic check-ups, by health surveys, by routine examination of various departments for hazards, have other duties to perform. They should in the highest sense possible promote cooperation with other departments, particularly the safety department. All accidents coming to the knowledge of the department, whether large or small, and which bear any relation to safety methods, should be reported to the safety department. Sometimes small accidents point the way to larger accidents just as minor symptoms frequently point to major symptoms which are to follow in disease.

As a question of medical ethics the medical department should carefully avoid anything which is not purely of medical interest. My own feeling is that too many duties which are non-medical should not be thrust upon a medical department. It is not to my mind good practice to hire men of good medical training to do other than medical work unless such individuals deliberately choose to separate themselves from medical interests. While a medical department should not interest itself too much except for cooperation with other departments it should be supreme in its own line and in the management and treatment of patients as well as be the final authority as to what kind of treatment they should receive.

If a physician is successful in industry he will necessarily have a great many friends. The help which he gives to many people cannot but bring him the closest

types of friendship. Many times people may because of this friendship try to get the physician to interest himself in problems which are not purely medical. To the limit of his ability the physician should be on his guard against this kind of thing no matter what the purpose or what the character might be. While in individual cases he may succeed, in the long run such conduct will bring discredit upon him and his department. In a broad general way the best interests are served by each giving meticulous attention to his own work not forgetting to carry out such cooperation as is required between various departments.

CHAIRMAN WRIGHT: As I remarked at the opening of our session, a new bud is enfolding. There is a little bird twittering in the nest, a new ship sliding down the ways. I think it would be very interesting to hear from the new skipper of the ship, Dr. Sappington, who is the director of the new health division. Dr. Sappington!

DR. C. O. SAPPINGTON (Director, Industrial Health Division, National Safety Council): For a number of years, as you probably know, the council has had a Health Service Section. The establishment of an Industrial Division is the crystallization of all of the thought that has proceeded through this Health Service Section from time to time.

I want to go over, in just a very sketchy way, some of the things which we might be able to do in this new division. Of course these are all very tentative and they are open to criticism and suggestion.

One of the first things we thought we might do was to devise and perhaps put out a series of plans for plants of different sizes. This would include equipment, layout in general, personnel, duties, costs, and so forth.

There has been a great deal of speculation and a great deal of theory about the results of medical service in industry. We thought also we might collect some material on that subject, and see just what those results have been.

Again, it was suggested that we might also do work in cooperation with the various health hazard committees—which are formed from time to time.

We should probably have a finger in the formation of the programs of the Health Service Division each year, and also, in the field of education, write articles, pamphlets, and give talks; probably not the least of value, we should carry on correspondence which would endeavor to answer queries of various types coming from plants engaged in diverse manufacturing processes throughout the country.

This, in the main, I think, represents our present idea on the matter. This is a large undertaking. We expect to give a great deal, but we are going to need a great deal of help.

-ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Public Speaking Class

October 2 to 5, 1928

C. D. HARDY, Lecturer
Professor, School of Speech, Northwestern University, Evanston, Ill.

The first session of the Public Speaking Class at the Seventeenth Annual Safety Congress was called to order at eight-thirty o'clock by the chairman, Ernest W. Corn, Field Representative of the National Safety Council.

CHAIRMAN CORN: A year ago last summer, in our Institute for Managers at Whitehall, Michigan, we secured the services of Professor C. D. Hardy of Northwestern University to deliver a short series of lectures on the practical problems of public speaking. He was so popular with the Council managers that it was suggested he attend the convention at Chicago last year. Many of you heard him there. To you, the Professor needs no introduction.

I shall not encroach on his time except to say, that I know of no field of leadership, by the very nature of which some ability in public speaking is more needed, than in that of accident prevention. We are the only great national organization that still is able to maintain a mass meeting program, in the first place; and in the second place, there are committees and groups to talk to practically all of the time, especially in industrial accident prevention.

Professor Hardy is not going to give you a four-year course in public speaking in four brief lectures. He will endeavor to crowd together for you some outstanding hooks upon which you can hang your hat, at least, and will outline some of the fundamentals of forceful presentation. I am pleased to introduce Professor C. D. Hardy, of the School of Speech, Northwestern University.

LECTURE NO. I.

The Speaker and His Problem

That was a very pleasant introduction. As I listened to the Chairman in his observations on how I came into contact with this safety movement first, and his suggestions of some of the impressions that seem to have gone out of that early contact, I became a little nervous. I have been afraid, as he talked, that he was going to raise your expectations altogether too high. It would take something of a man to live up to some of the suggestions involved in that speech of introduction.

How seriously I took that I can perhaps illustrate by a little anecdote. I once heard of two negroes who lived in the blackest belt of Louisiana. These two negroes were known as Sambo and Dinah Washington. Dinah was fifty-five years old, Sambo was sixty. They were unusual negroes. They were very thrifty. In order to be thrifty they found it necessary to economize. They couldn't eat any

meat foods because these were too expensive. Sambo was something of a fisherman. He was in an area where he could fish. He fished a great deal. They had fish for breakfast and fish for dinner and fish for supper, in lieu of any meat foods. As Sambo and Dinah approached the years fifty-five and sixty, they accumulated a little property. They had no children. Sambo became anxious as to what they were going to do with the property. One day he said to Dinah, "What are we going to do with the property we have accumulated? We have no children. We have no near relatives. What are we going to do with the property?" He thought a bit and then said, "Now, Dinah, I wish you would go over to Dr. Johnson and ask him if you is too old to have any children."

The next day Dinah went over to see Dr. Johnson. When he came into the room he said, "What can I do for you?" She told him the reason for her visit. Finally the doctor said, "Dinah, how old are you?"

"I'se fifty-five years old."

"Well, Dinah, have you ever had any children?"

"No, I ain't never had no children yet."

"I am sorry to disappoint you, but I am quite sure that, if you should have a child now, it would be a miracle."

Dinah was crestfallen. She went home. When she got to the gate, she saw Sambo running toward her. He said, "Dinah, what did Dr. Johnson say?"

Dinah looked at him and said, "Sambo, you old fish eating nigger, I don't want nothing to do with you no more. Dr. Johnson said, if I ever had a child now, it would be a mackerel."

Now, friends, I don't want you to have any too high expectations as to what you are going to get during these four lectures, if you are courageous enough to hear me from morning to morning. I shall do the best I can to say something that will not be interesting but perhaps helpful to some of you at least.

I suppose the greatest character that came out of the recent World War was Marshall Foch of France. The record shows that he was not always a military man, that is, a military man on the battlefield. The record shows that he was an instructor in the military schools of France, and you will expect he was an extraordinary instructor, not the usual theoretical, standardized type. He adopted some new methods in the military schools of France. He used what we, in this country in our legal profession, call the case method. It was his plan, as he instructed his men, to outline a battlefield. He would first lay out the position of the opposition; their guns, batteries, trenches, and, in so far as he knew them, the machine gun nests. Then, he would discuss the terrain over which they were to go; its nature, its rocks, its trees, the ravines, whatever obstacles there might be in that stretch of territory in his imaginary picture. He would locate his own lines, his own batteries. After he had painted this complete picture, he would say, "Now, gentlemen, we have to advance against the enemy's lines yonder. In order to do that, young men, what have we to do here?"

Now, today, tomorrow, this week in this particular course of lectures that I am going to try to give, what have we to do here? Well, as nearly as I can put it in one sentence, we have this to do: We are to see if there are not some suggestions that can be made as to the fundamental elements or fundamental principles of effective speech from the platform that will be of some assistance to practical men who are confronted with the task of presenting a set of facts or a policy to a group of people, with the end in mind of getting that group of people to respond and to do something.

In order to do that, I am going to group my four discussions in about the following manner: This morning I am going to discuss some of the fundamental problems that the speaker in beginning his discussion must face. Tomorrow morning I am going to attempt to discuss the statement of the point of view that the speaker is to make, some things about it, and to make some observations on the

selection of materials with which to develop the particular or the specific point. On the third morning I am going to say some things about the final or the spoken style that the man is to use in expressing his ideas. The last morning I am going to say some things about the speaker on the platform, his actions, his presence and his oral presentation.

In attempting such discussions, I am going to be serious about it, although I hope not too serious. What I mean is that I think the thing we are going to attempt to do is important, and particularly important in this day and age in which we live.

We are no longer a simple civilization, we are a very complex civilization. The complexity of today, great as it is over the complexity of yesterday, is nothing as to what the complexity will be a generation from now.

Let me suggest this thought to you: We are developing in our use of machinery, developing in our scientific methods of promoting our civilization much more rapidly than we are developing our ways and means of understanding one another, and through that understanding getting an adjustment to these new and complex elements in our civilization. What I hope to do is to make some suggestions (and they will be suggestions only, understand) that will enable us so to express ourselves that we can get a better understanding of each other's problems and the problems of our complex civilization and thereby be able to make adjustments easier.

In this talk this morning, "The speaker and his problem," the first suggestion I want to draw to your mind is this: That the speech is not an end in and of itself. When I say that I must say it with a reservation, because there are certain types of public speech which may be considered ends in and of themselves. There are occasions when speakers take the platform for the purpose simply of delighting and pleasing an audience. Their purpose is to discuss material with the idea of leaving a pleasant reaction or a pleasant emotional experience with the audience. That type of speaker has very much the same point of view as has the poet, when he writes a beautiful piece of poetry, or very much the same point of view as the essayist when he writes an essay for the sole purpose of delighting the reader in the elegant use of prose, in the elegant outlining and illumination of a theme.

I am not particularly interested this morning, and I don't think you are, in that particular type of speech. You are much more interested in the practical side of it, the business man's side of it, who uses his speech as a means to accomplish an end. He thinks of his speech as a tool. I don't care how eloquent he may be, how much a master of facts he may be, how well he can put those facts into understandable and choice language (and all of those things are desirable), his object is to get men to understand facts, to get men to adopt a policy, or to stimulate them to continue in a line of conduct more vigorously than they are now working.

The sales manager, for example, has that latter object very materially in mind, when he stands before a group of his salesmen and attempts to outline for them, to them, the program of activity for the next year, and to inspire them to get into their activity with more energy than they had before.

Speech, then, that we are interested in, in this series of discussions, is not an end in and of itself but a means to an end.

The second suggestion I want to point out as a problem, and a very real problem, that confronts the speaker when he takes the platform is, how can he get attention? That first moment of attention is important. Psychologists point out that one of the elements that make us remember ideas is the intensity with which the idea first strikes the attention. Impressions are deep in proportion as the presentation is striking. How shall we get that attention?

There are no pat rules that I can suggest to you. The one suggestion I do want to make is that the speaker, when he begins, has the problem of saying

something striking, something attention-getting. It may be the presentation of a striking fact, it may be the presentation of an interesting incident. Consider your safety movement, for example. When you are confronted with a group of your people working in industry, sometimes you can fasten their attention, rivet it for the moment, by drawing attention to some striking incident of the operation of safety, or the failure in the operation of safety, devices that has occurred within the knowledge of the people listening to you.

How to get attention. The most I can do this morning is to put an emphasis upon the importance of it. Many a speech has been spoiled for at least the first half of it because the speaker began so badly. The first impression that he made upon his hearers was one of fear, one of timidity, one of hesitation, one of plain dumbness, rather than one of alertness and mastery of the subject material.

Let me give one or two illustrations. These are classic illustrations. In 1886, Henry W. Grady, then an editor in Atlanta, Georgia, and an orator, came to New York City to make a speech before the New England Society of New York City. He was the first southern speaker that had been asked to appear before that Society since the Civil War. It was a crucial moment. He knew it was a crucial moment. He knew that, if he succeeded, he would do a great deal for the South. He knew that if he failed, he would hurt the South irreparably. This is the way he began: "Mr. Chairman and Gentlemen of the New England Society: There was a South of secession and slavery. That South is dead. There is a South of union and freedom. That South is living, growing, breathing every hour."

"These words uttered from the immortal Benjamin Hill in 1880: True then, truer now, I shall make my text tonight."

It would have been a dumb audience indeed that wouldn't have had their attention riveted on Henry W. Grady, when he began with the use of such a striking statement of fact, such a striking quotation. This idea is emphasized in our minds, when you remember the occasion, the man, and the relations of the man to the occasion.

One of the unfortunate things that one faces, when he is discussing these principles, lies in the fact that you have to use your illustrative material totally detached from the speaker himself. If you had Grady here and had him speaking such words you would see the force of the principle much better than the force is apparent to you, when I relate the incident.

Attention-getting! Let me give you another example. In 1895, Booker T. Washington, the colored orator, and the former President of Tuskegee Institute, spoke at the Atlanta Exposition. The Negroes were asked to participate in that Exposition. The question arose as to whether or not a Negro representative should be allowed to speak and, if so, who should be the speaker? The Southern whites were considerably disturbed about the matter and hesitant. One group thought it ought to be done. Finally the decision was reached that it should be done and that Booker T. Washington should be the man selected. On that occasion he delivered a speech which made him famous. In the beginning of that speech he used these words: "A ship was lost at sea. It saw a companion ship coming. It ran up the distress signal, 'Water, water, or we perish.' The approaching ship sent back the signal, 'Cast down your buckets where you are.' Not understanding, the first ship sent up the signal again, 'Water, water, or we perish.' Immediately came the reply, 'Cast down your buckets where you are.' A third time went up that distress signal. A fourth time came back the same reply. Finally the ship sent down its buckets where it was and drew up fresh water out of the mouth of the Amazon River."

Then Booker T. Washington made this application: "To the members of my own race who are looking for the betterment of their welfare, I say: Cast down your buckets where you are, cast them down among the people who know you,

the people who understand you, the people who believe in you, the people who love you." Then, he went on to say, "If I were permitted to say to the whites of the South exactly what I think about their employment problems, I should say to them: Cast down your buckets where you are when you are in search of labor; do not go abroad, cast them down where you are."

I want you to notice two things about that attention-getting incident. The first is that it is an interesting incident. There is a bit of the dramatic in it; it holds you. The second thing is that it leads right into the thought that he has in mind, which is the proper relationship between the whites and the blacks of the South. I do not know of any citation that I could point out of an effort on the part of the speaker to get sympathetic attention that is better than this one.

In your safety business there are incidents that you can use that are striking, or there are striking facts, which may be the summary of the work that you have done, or striking facts showing a lack of activity somewhere along the line, that in and of themselves will be attention-getting.

A third problem confronting the speaker is the matter of sustaining attention. Getting attention is one thing, but sustaining interest, holding interest, is another. I believe it is fundamental to effective talking before a group of people that you can't get them to adopt a policy very well, you can't move them to act, unless you can sustain their interest.

There are a number of things under this general subject of sustained interest that I want to say and to make plain, if I can in the next twenty-five minutes. There are some things a speaker ought not to do. First a speaker ought not to speak as though he had the final word on the subject, to speak in the dogmatic manner. May I suggest that one of the tendencies in speech that I have seen among mature business men, who have accomplished things in the field of industry and in the field of business, is to speak dogmatically; rather than to give the impression of reasoning the subject out together with his hearers. Such a speaker has given the impression of saying the final word that can be said and not calling for any intellectual reactions on the part of those to whom he at the moment is talking. My suggestion is that that method of approach will not get sustained interest, because the impression at once goes out that the speaker does not care anything about what anyone else thinks; he cares only for what he says.

There are two types of men, as I view it, who can speak dogmatically and get away with it. The first man is the type that is a dictator, a Mussolini, who can say, "George, this is so; do it." He can do that sort of thing. The other type of man who can speak dogmatically and be successful in it is the man who knows more about the subject than anybody else in the community or anybody else in the country, and who knows that the people to whom he is talking know that he knows more about the subject than anybody else. He is in a position perhaps to speak with finality. If you know yourself to be in the position of a dictator, if you know yourself to be in the position where you know more about a subject than anybody else and you know that everybody knows that you know more, then you can talk as though you spoke the final word. Unless, however, you are aware of being in such a position, my suggestion is that you cast the speech in a form that calls perhaps for some intellectual reaction on the part of those to whom you are talking.

The second suggestion as to what needs to be avoided, if sustained interest is to be carried on, is the method of the demagogue. What do I mean by a demagogue, anyway? I mean that type of man who bases his appeal purely on emotional responses; or that type of man who bases his appeal purely upon prejudiced points of view; or that type of man who makes facts say something entirely different from what the logic of those facts would say; or that type of man who makes facts say fifty per cent or a hundred per cent more than those

facts will logically or reasonably say. Now, don't misunderstand me. I am a great believer in facts, and I am a great believer in making facts say all they will say, but I warn against the tendency to stretch facts, to make them say more than they will say.

If I may be so bold this morning, I should like to make a suggestion that I think will apply in your own field. Let us assume that you are an executive talking to a group of men in industry and that you are presenting to that group of men a set of facts. If you make those facts say fifty per cent more than the facts justly interpreted will say, don't kid yourself for a moment into thinking that those chaps in front of you don't know that you are stretching the truth. They are pretty apt to know the situation better than you do. Make the facts say all they will say, but don't be a demagogue and attempt to make facts show more than they logically can show.

We are in the midst of a Presidential campaign now. (I am not going to discuss politics at all.) We are in the midst of a Presidential campaign and I hear a lot of things in and over the radio, and I hear now and then a speech. And as is true with all Presidential campaigns, all political campaigns, there is demagoguery evident. I am painfully aware, and must admit it, that there are certain occasions, and for a limited amount of time, when the man who adopts the methods of the demagogue apparently is successful. But you men in industry, where you are going to be for one year, two years, three years, four years, cannot afford to use demagoguery, for sooner or later somebody is going to find you out, and somebody is going to discount practically everything you say because of the methods with which you express yourself.

The third observation that I want to make as to what, it seems to me, sustained interest will not allow is the type of speech that gives the impression of being simply an exhibition, a show-off. We are in our modern days, either because of our materialism or our science or our information or our good sense, growing more and more away from the bombastic, grandiloquent, show-off style of speech. We can't get away from it too fast to suit me. It is empty, folks, and sooner or later the good people of the country are going to find out. What ludicrous things it does sometimes for speakers! Here is an incident. A Congressman from Indiana was delivering a speech on Abraham Lincoln. He was an eloquent speaker in some respects. He warmed to his subject and came to a climax with this sentence: "Abraham Lincoln! Abraham Lincoln! that mystic mingling of star and cloud." He got applause. After the speech was over, one of his friends said, "Say, Congressman, what did you mean by that sentence anyway?"

The Congressman said, "I don't know exactly what it means, but it always gets applause."

If you want results that are permanent, avoid such a style. Another Congressman in Washington (this was in the House of Representatives) was making a speech on the tariff. He was a bit indignant. He got to his feet and said, "Mr. Chairman, I smell a rat. I see it floating in the air. I will nip it in the bud."

I once heard a college student (he was a senior, too) give an oration on democracy. He said: "As college students who believe in democracy, let us go out from these halls determined to be energetic, determined to be courageous, determined to be individuals, determined to have initiative like 'one who wraps the drapery of his couch about him and lies down to pleasant dreams.'"

Those illustrations, of course, are extreme, but after all I don't think they are any more extreme than the realities that we meet every once in a while. Let us avoid that sort of thing, if we expect to have sustained interest on the part of those to whom we are speaking.

Let us turn the subject around a little. Sustained interest on the part of hearers depends, first of all, upon the speaker having something to say, upon the speaker having some information, upon the speaker knowing the facts about which he

is talking. This failure to know the facts about which one is talking is a strange thing. The full significance of it I have never been able to understand. For somehow or other, the moment a man opens his mouth and begins to speak uttering words only, and is not sure of his subject, the lack of facts is detectable in the very quality of the voice that he uses and the inflection with which he expresses himself. Emptiness is unconsciously detected on the part of those who listen. Somehow or other there is a lack of sureness, there is a lack of confidence, with the result that those who listen are but little moved by the man who is uttering only words. An empty barrel makes a lot of noise while a barrelful of apples makes but little. Most American people prefer the barrelful of apples to the one that is only partially filled and makes a lot of noise. That principle applies in this field of thought just as definitely as it applies anywhere else.

Sustained interest then depends, first of all, upon having something to say. Effective speech is not a matter of glibness of tongue, of command of language; it is not an inspiration from the Gods; it is the result of grind and dig and perspiration. Make no mistake about that. I could stand here for half an hour and illustrate that point and enforce it historically in terms of your Webster, in terms of your Churchill, in terms of your Wendell Phillips, in terms of your Grady, in terms of your Woodrow Wilson, and all the rest of the men who did a great deal of speaking.

Once more, sustained interest depends pretty largely upon how well the speaker can communicate with his audience. It is fatal to the effective speaker to lecture at an audience. Communicate with the audience, converse with the audience. Do I mean to say that effective speech is just conversation? Yes, that is about what I mean to say. That is quite different from the type of speech that used to characterize this country fifty years ago.

The main difference between conversation between individuals and conversation between an individual and an audience lies in the fact that in the latter case you have what we call elevated conversation, enlarged conversation. The more intimate a speaker can be and at the same time be large enough in his expression to be heard by a group of people, the better.

Let me give you a striking historical incident of the effectiveness of this point I am talking about. Those of you who remember your American history will remember Wendell Phillips. There are a good many things that could be said about Wendell Phillips in his power of public speech. But, this thing ought to be said. He taught us a new standard, the standard of conversation. How effectively he used it, I can illustrate from an incident in his life. Prior to the Civil War, as you know, he was an agitator, and as you know, the people in the slave States didn't like him and it was very difficult for him to speak near the border cities. One time he was called to one of the border cities. No one was found who would introduce him; they were all afraid to present him. He had been told he wouldn't be allowed to speak. The audience was present. They had waited ten minutes for the speaker. Finally, a gentleman came out from the rear of the platform, came forward and began to talk. The audience thought that it was the Chairman of the evening introducing the speaker. The gentleman had been talking ten minutes before it dawned on that audience that it wasn't the Chairman of the occasion, it was the lecturer of the occasion. So intimate had he been, so conversational was he that he had that direct contact which led him right into his subject and got not only their attention but their sustained interest throughout the whole of the speech.

Any of you who have heard William Jennings Bryan must understand the thing I am talking about. If he had an audience of 150 people his conversation was just that large. If he had an audience of 2000 people his conversation was just that large. If he had an audience of 5000 people he enlarged his conversation to reach that 5000. But, all of the time he was just talking.

Sustained interest in the next place depends upon getting what I call the individual approach to the audience. Three college boys explained the principle. College boy, one, came out of chapel one morning and he said to college boy, two, "I would like to know why Prexy directs his speech at me." College boy two said, "He always directs his speech at me." College boy three said, "You guys are all off, Prexy always speaks to me." What had happened? The Prexy was a good speaker and he had that ability to get the individual approach. When he asked a question, it was so directly put, so simply put that every individual in the crowd thought it was his question. If he made a declaration, it was so directly put, put in such a commonsense, businesslike fashion, that any one in the crowd looked upon it as a declaration directly at him.

There is another phase to this. Why is it that so many men are timid about an audience? I think I know one reason for it. Because they think of the people in an audience as one great composite individual, and that composite individual is so much bigger than they are, that it frightens them. The business man, for example, who, in his office, has all kinds of courage, can jack a man up, call a man down, can say yes or no without any fear at all, if called before 150 or 200 people, is afraid. Why? My opinion is that he is afraid because, unconsciously, he thinks of that body of people as one great individual. He must get the other point of view, ladies and gentlemen, which is the point of view, namely, that he is talking to individual minds; that is, one mind trying to reach another individual mind. You folks here this morning would scare me to death, if I had to think of you as 500 people rolled into one. I am not so terribly frightened at you, when I think of you as 500 different individuals and that my approach to you is that of one individual mind to another individual mind.

Sustained interest on the part of hearers depends pretty largely on the capacity of the speaker to get that individual contact with the people in his audience.

Of course, sustained interest depends upon the capacity of the speaker to be heard. If you are going to allow yourself to speak at all, ladies and gentlemen, be sure you are heard in an audience room of ordinary size. I shall not ask any person to attempt to develop a voice that is large enough to be heard in some of these halls that we have to speak in that will seat 10,000 or 12,000 people and are built like a barn. That is asking too much. But, in the ordinary hall with reasonable acoustic properties, anybody who allows himself to talk at all, ought to appear there with the purpose in mind of being heard. If you can't do that or won't do that, don't take the platform. You really have no excuse for being on the platform unless you intend to get enough force behind that voice to make it heard.

That takes us to the whole matter of the use of voice. I haven't any time this morning and I haven't much inclination to go into a technical discussion of voice production. I will give you just a few suggestions on it. The voice that carries is the voice that is properly produced, properly focused, properly projected. Our whole vocalizing apparatus is the same as our breathing apparatus, the difference being in this: When we breathe, the muscular movements of the diaphragm, the movement of the abdominal muscles and the costal and intercostal muscles, are steady, even movements, while, when we speak they are short movements. The diaphragm muscle, when you inhale, goes down; when you exhale it rises. The throat should be relaxed and the muscular power should start behind the tone, driving it out. (The speaker illustrated this point.) Anybody can obtain some power in voice production, but most people don't practice it any. I am afraid most people don't care. If you are going to speak, do care, because it is important.

Closely related to voice power, if you are going to help sustained interest (I want you to get this thought), is the emphasis that should be placed on speaking so as to be understood. All of this involves articulation. The greatest

weakness of American speakers is indistinctness of enunciation. Wherein lies the difficulty in enunciation that makes people indistinct? It lies in the failure to bring out sharply the consonantal elements in words, particularly final consonants and final combinations of consonants.

Let me illustrate. Take two words, T-R-A-C-T and T-R-A-C-K, tract and track. You have in the one word "ck" a final combination of consonants. In the other word you have "ct." If I were to give those two words to this audience and ask you as individuals to pronounce them while I listen, I venture that in not one-third of the responses of the people in the room would I be able to say whether the word was tract or track, because you would not get that final "t" in the word tract.

Let me illustrate again. Take the word B-O-L-D. You have an "ld" combination. Let me give out that word and ask you to pronounce it. I would get back B-O-W-L; I would not get back B-O-L-D, because you do not stress that final consonant.

Of course, I recognize that you folks in business are not interested in this technical subject, as I am, for I have to teach this subject to college youngsters. But, you are interested in it from the point of view of your job. When you speak, you speak to convey ideas, and the quickest and easiest way to give out ideas and to get ideas grasped is for you to economize the attention and the effort of those who are listening. One of the means of doing that is to speak distinctly; and one of the ways of being distinct in your utterances is to pay some attention to the final consonants.

One other phase of this distinctness arises in long words where whole syllables are eliminated. Take the word M-U-L-T-I-P-L-I-C-A-T-I-O-N. If I asked a dozen college students, to pronounce that word, this is the way I would get it, in half of the cases, M-U-L-T-P-L-I-C-A-T-I-O-N, instead of M-U-L-T-I-P-L-I-C-A-T-I-O-N. That word itself isn't important, but as an illustration of a difficulty that we have in our enunciation, it is important.

Anybody with a normal articulating apparatus, that is, anybody that does not need to go to a doctor or a surgeon, can learn to speak distinctly, if he will have patience and if he will give time to the technical side of the matter.

I have one more idea that I want to suggest. If you are to get sustained interest on the part of an audience listening to you, you must put your thought, in terms of the other man's experience, not in terms of your own experience and your own information. Put your thought in terms of the other man's experience and the other man's information.

You and I, like everybody else, judge of things in terms of our own information and observation. I defy you to form an opinion of anything that you can't relate to, refer to, and judge of, in terms of your own experience.

I ought to elaborate on this subject a little, but my time is up. If you people have the leisure and the patience to come back tomorrow morning, I am going to talk about the selection of a proper subject and some things in the choice of thought materials.

ADJOURNMENT

October 3, 1928**LECTURE NO. II.****The Speaker and His Material**

In our talk yesterday, I made some attempt to suggest some of the preliminary problems that a speaker, I care not who he was or is or when he speaks, would be faced with. I think, perhaps, in order that we may keep these talks tied together and see how one grows out of the other, it might be well for me this morning just to sketch what I attempted to point out yesterday.

I attempted to point out, first of all, that the speaker for practical purposes, such as the purposes that businessmen have in mind, when they use speech, thinks of speech not as an end in and of itself but as a means to an end. In other words, the speaker uses speech as a tool with which he attempts to accomplish results.

I attempted to point out, secondly, that one of the first problems that meets the speaker is the problem of getting attention. I tried to outline by a suggestive method one or two ideas on putting the introductory matter in a striking fashion in order to get that attention.

In the third place, I attempted to point out in that talk the problem of sustained interest, how to get sustained interest, how to keep interest. And in pointing that out I drew attention to some things not to do, some methods not to use, such as dogmatism, demagoguery, and the general method of the individual who is trying to make an exhibition of himself.

I further tried to point out that sustained interest rested, first of all, in having something to say. I did not point out as I would have pointed out, if I had had time, the importance of analyzing and thinking in the material that one attempts to use. I tried to point out the importance of communicating with a group of hearers rather than lecturing at them. I tried to point out the importance of speaking so as to be heard, of speaking so as to be understood, of throwing the thought in a persuasive form.

Lastly, I attempted to point out the importance of the speaker clothing his own thought in the experience and the understanding of those to whom he is at the moment delivering his address. That in a sketchy fashion constitutes the substance of what was said yesterday.

The lecture today is simply one step forward. In brief, I am going to attempt to discuss the speaker and his material from two points of view; first, the selection of the proposition and the finding of the particular argumentative or explanatory points which, after once found and developed, make the speaker's talk effective; and, secondly, I am going to try to present in this lecture some observations on the fundamental matters that need to be borne in mind in the selection of detailed materials by means of which one attempts to illustrate or enforce the point of view that is for the moment under consideration.

I am not going to say to you men this morning anything that is particularly new. As a matter of fact, I will be perfectly frank with you and say that I am talking about old stuff. How old it is I believe I can perhaps illustrate by relating a little anecdote that I heard a very distinguished man relate about a youngster who, when about five or six years of age, lost his mother. He was a playful, cheerful, optimistic youngster. Upon the death of his mother, his grief knew no bounds and it was months before he returned to his normal self. About the time he began to take on his normal, playful, optimistic habits, his father thought that a sufficient length of time had passed for him to take unto himself a new wife. He did so. He married her away from home. Little Willie had never seen this lady that was to be his new mother. His father brought this new Mamma home, took her into the front room and left her there. He went out into the backyard, where he found

Willie playing in the dirt. His father took him up to the kitchen sink and washed his face as well as fathers under those circumstances usually do—you ladies know how artistic a job fathers can do when they attempt to wash the baby's face. Then, he took the youngster by the hand and brought him into the parlor and said, "Now, Willie, I want you to meet your new Mamma."

Little Willie stuffed his chubby hands into his pockets, looked his new Mamma over very carefully, and then said, "Dad, they soaked you. She ain't new; she's as old as the hills."

This material with which I shall deal this morning is old; it is as old as human reasoning is old. I am sustained, however, in going ahead with this because I know that one of the fundamental educative principles that we pedagogues have to bear in mind is that the educative process goes forward on the basis of frequent recollection and real reflection on fundamental elements. In the Illinois State Bill of Rights, that part of the Constitution known as the State Bill of Rights, there is written this sentence: "A frequent recurrence to and reflection upon some of the fundamental principles of liberty are the surest guarantees against the encroachments of tyranny."

Adopting about the same form of phraseology and applying it to our purposes, we can come to this: "A frequent recurrence to and reflection upon some of the fundamental elements of good speech making are the surest guarantees against that result which is nothing but wandering about aimlessly and pointlessly in speech making."

If there be anything worth while for you in what I shall say, it will not be because it is new, but perhaps because of the individual way in which I put it or the individual way in which I throw these fundamental elements.

Most subjects that we have to speak upon are too broad; we have to limit them. In my academic career we say to our students, "You must limit your subject to that breadth of view that you can discuss with some degree of accuracy and adequacy within the space of time that is given to you."

One of the greatest difficulties, and I think the greatest weakness of most of us when we attempt to make a speech, is that we cover too much ground or attempt to cover too much ground and we spread ourselves out so thin that you can scarcely see us anywhere.

The important point is to study the occasion, to study the nature of the audience that is present with you on the occasion, find out what the relationship of that occasion is to that audience, what your relationship to that occasion is, and your relationship to that audience, and then limit your discussion to that particular phase of the whole broad subject that you can cover, with some degree of intensive discussion, in the amount of time that is given to you to make the talk. If you are to have five minutes, then it will have to be a very limited point of view. If you are to have ten minutes, it may be a little larger point of view. If you have an hour, it is still larger.

Every subject must be limited in its extent, as I shall try to illustrate in a moment. That is what I mean by limiting the subject to the compass of the time that may be allowed you.

After you have limited the subject and found a way to phrase it in an understandable form, then comes the question of dividing that subject into its principal parts or its principal explanatory or argumentative issues, which if you develop adequately, clearly, make the subject as a whole impressive.

That, in general terms, is what I have in mind. Let me see if I can illustrate it. I recall when I was a boy, I couldn't have been more than fourteen years of age, Bishop Fowler, then one of the great orators in the Methodist Church of this country, came to a town in Western Iowa. I was then living with my father on a stock

farm, and father and I rode sixteen miles with a team and a spring wagon to this little town to hear Bishop Fowler make his address. Even today I remember that address, and I remember it because Bishop Fowler so successfully limited his subject and so successfully stated his particular points of view. He said when he began: "Ladies and Gentlemen: My subject tonight is Abraham Lincoln. That is a big subject. That is too big a subject for me to cover. What I am going to try to do in that subject is to limit it to this: Why Abraham Lincoln has the position that he has in history, and why Abraham Lincoln will have a larger place in his story in this country than any other historical character we have up to date produced."

Then he said, after he limited his theme, "I am going to say three things under that theme. First, Abraham Lincoln as a great character. Second, Abraham Lincoln as a master in State papers. Third, Abraham Lincoln as a leader of men."

In my mind's eye I can yet visualize Bishop Fowler limiting his subject and stating his points of view. He rigidly held to his outlined plan. It was interesting to note, and I still remember it, how as he got into the discussion of Abraham Lincoln State papers he would say, "Great, I say, in his State papers." Then, he would take up a State paper, analyze it, discuss it, and then come back to his theme, "Great, I say, in his State papers." Then he would take up another State paper, analyze it, discuss it and come back to his point by saying, "Great, I say, in his State papers."

He followed this plan, I suppose, in discussing that phase of his theme, for at least thirty minutes in his hour and a half of discourse. Then, he turned from the subject of State Papers and began to discuss Lincoln's mastery of men, but followed the same plan.

What I am trying to point out, men, is nothing more or less than this: The importance of getting a clean-cut idea that you want to express and then dividing that clean-cut idea into its two or three or possibly four parts, and then discussing each one clearly, distinctly and distinctively before you pass on to another.

I hear a lot of speeches. I have an insatiable appetite for speeches, the good and the bad, and I am constantly astonished at how many times even good speakers miss this fundamentally important element of clean-cutness of outline.

There are one or two things I want to say further about this phase of the subject. The first is that an audience will remember what you say by points and not by detailed information. Let me repeat that. Your hearers can and will remember your argumentative points or explanatory or illustrative points, call them what you will, if you will make them clean-cut and distinct. They will not remember the details by means of which you present those points. Statisticians, and I suppose I am talking to some statisticians this morning, from the point of view of public speaking, make some mistakes here. They present their statistical information as though they expected the members of an audience to carry such information in mind. They are not likely to do so. The statistician needs to present his statistical material around and in support of a point which his hearers can grasp. They will carry that point with them, if it is made impressive to them by means of the statistical material.

I need to say the foregoing with a reservation, because there are now and then some statistical facts that need to be remembered as such. I am speaking in general terms now that apply to all speeches, and if there are exceptions, we will have to bear them in mind and take them for granted. But, in general, what I have been saying is true.

The second reason why this matter is so important is this: An audience hears you but once, hears you while you speak rapidly. If they understand you easily, and at once, they will follow you. If it becomes necessary for them to stop and to reflect on what you have said to see whether they understand it or not, usually

that moment that audience is lost. You have gone on, you have brought in new material.

Note the difference between your situation as a speaker and the author who presents written matter to his readers. The man who presents written matter to his readers can be sure that, if the reader does not get the idea upon the first reading of the paragraph, he can go back and read it again, can reflect on it to find its meaning. But you as a speaker, if you are not understood at once, are not going to be understood at all. It then becomes increasingly important for you to outline your material so clearly that it can be immediately grasped.

I remember, when I was a college student at Northwestern University, there was a preacher in Evanston by the name of John Hugh Boyd, who, on the whole, was the greatest minister I ever heard. He followed the plan of the outline that I have been making here. In fact, he was the first man that gave me a great lesson on that. He would stand before his audience in the morning, usually 1,000 or 1,500 people, and say, "Now, my text this morning is so-and-so. From that text I propose to draw this inference," and he then stated the subject as he limited it. "On that subject, friends, I propose to say two things or three things," and he usually named them all before he began a discussion of any one and he never said more than the two or three that he named and you could always carry away those points with you.

This whole matter applies in your case just as definitely as it applies in Bishop Fowler's case or in John Hugh Boyd's case.

Suppose we are discussing, for example, the safety movement. Immediately the question ought to come into your mind, "What shall I say on this safety movement? Shall I discuss it from the point of view of saving human lives? Shall I discuss it from the point of view of safety devices? Shall I discuss it from the point of view of a new note in business in its relationship to human welfare? Shall I discuss it from the point of organization to promote safety? Shall I discuss it from the point of safety as a dominant idea in the development of modern civilization?" All of those ideas are under the general thought of the safety movement, and the individual who is confronted with the task of discussing safety, it seems to me, needs to limit himself somewhere along this line. I have simply arbitrarily, for illustrative purposes, suggested several views on safety.

Now, suppose we say we will discuss this morning saving human lives as a movement in safety. How shall I get my points of view? Here are three. We want a safety movement to save human lives because of its relationship to the welfare of the women and children in industry; because in the second place, it shows that business is taking a new point of view, not purely materialistic but humanistic, and because saving human lives, in the third place, is the greatest modern movement in the welfare of civilization.

You probably wouldn't consider those ideas at all. You know more about this subject in one minute than I would in a week. I simply make those suggestions as a method of analysis.

We have our proposition, we have it limited, we have our points of view that we are going to discuss.

Let me now make a few observations in the second part of this morning's talk; namely, some principles that need to be borne in mind in the selection of the material. The first observation I want to make is this: Let the speaker at the outset examine the content of his own mind. What does he know about the subject? How much detailed information does he have in his mind about the particular point of view that he wants to develop? Any man who has had anything to do with education and the educative process knows that usually, when anyone is assigned a subject to discuss or to investigate, the first step that individual has at least a temptation to do is to rush off to find out what the authorities have said upon the subject, to go to the library and find out what others have said upon the subject,

to take up Nation's Business or take up an industrial magazine that is making a report or to consult the files of the National Safety Council; go somewhere, anywhere, except to your own head to get your start.

I suggest the proper process is to reverse that, examine first the content of your own mind on the subject. Why do I say that? I say it principally because the only commanding, the only lively speech that you will give utterance to comes out of yourself, not out of a library book and not out of the files of the National Safety Council.

Let me illustrate that with a historical illustration, if you please. It is the principle I am interested in making dominant this morning. Daniel Webster in about 1830 made his famous reply to Hayne in the United States Senate. Hayne had made his speech on one day and Daniel Webster replied to it on the next day. In his reply he talked for four hours. It is an amazing argument from the point of view of its thought, from the point of view of its evidence, and certainly from the point of view of its rhetoric. It caught the nation's eye; it stirred the nation's soul, particularly in the North. His friends were amazed. They said to Webster, "How did you do it? How could you do it with so little preparation?"

Webster's reply is historical, "Little preparation—I have spent my whole life preparing for that speech and all that I did was to take out of my mind what was there and had been there for years."

Study that principle in connection with a man like Webster and you find that his great work on the platform was the expression of the theme of his life. He had lived it and breathed it and was stirred by it.

I emphasize this, folks, because I am as sure as I stand here that none of you will ever make a vital speech until you make a speech that grows out of the inside of you, out of what you know, out of what you feel about the subject. And so, when you begin to select material with which to develop points, let the first step be an examination of the content of your own mind.

The second step that I want to emphasize is the selection of material that is interesting in and of itself, in so far as that is possible. When you approach your task of selecting material from that point of view, you are taking advantage of one of the basic psychological principles that is in all of us. There was a time when many of our teachers were saying to students, "It does not make any difference whether you are interested in a subject or not, you can learn it, you can get concentration upon it."

In that view there is some truth, but modern psychology has been teaching us that, if you want to get concentration upon a subject, get first of all interest in the subject. If you want to get people to concentrate upon a subject, first of all arouse their interest in the subject. As an educator, and of course I occupy a very modest place in the educational world, I am thoroughly convinced that the way to get a modern student interested in a subject is to get a modern subject and to get him to master it by first getting him interested in it. That applies to the public speaker just as definitely as it applies to me in my classroom at Northwestern University.

I think that the advertisers and the journalists have something to teach us on this subject. Are you students of modern advertising? Are you students of the feature stories in some of the leading journals of today? What does the feature story writer do? When he examines his events, whatever they may be, he is especially interested in selecting from those events just those human interest facts, human interest stories that, in and of themselves, will catch attention. The advertiser does the same thing; in a little different way, to be sure, but nevertheless he follows the same principle. He is after those facts, in connection with his subject material, that, if presented will be interesting.

I have of recent date been reading all of the feature stories of James O'Donnell Bennett in the world's greatest newspaper in Chicago about Alfred E. Smith. It

is an interesting study to me in the development of material that will catch attention. He selects interesting data, in and of itself, relative to this man. Isn't there something there that is worth while for you and for me to note as speakers?

My third suggestion is that in the selection of material try to find that material that is not too remote, either in space or thought or time, from the subject that you are at the moment discussing. Let me illustrate that (I can teach better by illustration than any other way). Just recently, some of my colleagues and myself were discussing some social conditions. My colleague was saying this: That if we are to have a harmonious social welfare in the immediate future, we need to get back to the same type of society that you had in England when the Guilds were active. Well, that interested me very much and I encouraged him to go on. He discussed the value of the Guilds in England, their organization and so forth. He said, "That is what we need here." It left me cold. Why? Because the condition about which he talked was so remote that it seemed to me to have no connection whatsoever with modern times.

Let me illustrate again. In 1920, or just before 1920, we had a great deal of discussion in this country as to whether or not the League of Nations should be adopted. There were a good many arguments for and a good many arguments against. There was one argument that did not impress me very much. That was that we should not adopt the League of Nations because George Washington, in his farewell address, warned the country against foreign entanglements. I may say here frankly, lest I be misunderstood, that I was not particularly enthusiastic about our joining the League of Nations, but my objection to joining the League of Nations, I assure you, was not based upon what George Washington thought about foreign entanglements. The point I want to make with you here is that we have here an argument, a bit of evidence which was used to keep us from joining the League of Nations that was so remote from the actual circumstances, and the importance of the facts in 1920 or just before 1920, that it seemed to me to have no worth while bearing on the matter at all.

Let me illustrate again. A few years ago, I should say a half dozen years ago, one of our distinguished Western Senators made a good many speeches in this country about the advisability of cooperation among farmers. He made a trip to Europe. He studied cooperative marketing among the farmers in Denmark. He came home and in several speeches, one of which I heard, he drew attention to the organization in Denmark, how it was functioning and how it was financed, how it was advertised and so on, and then wound up by saying, "There is no reason why the farmers here in the Middle West, the wheat growers of our fourteen States, should not organize a cooperative association or cooperative associations just like they have in Denmark."

What ever may be said about cooperative marketing or cooperative organizations among agriculturists to solve the farm problem in this country, it does not strike me that the argument brought from Denmark, as to what they do in Denmark, is particularly vital in its bearing on what ought to be done in this country.

All I am trying to do is to point out that you have, in this case, a man with a subject of today supporting his argument with evidence entirely too remote from the situation about which he was speaking.

Let me carry that same idea just a little bit farther and say that in the selection of evidence or illustrative material, let it be in so far as possible from the most recent events discoverable. Suppose you were to discuss the safety movement on the basis of the figures and the experiences of twelve or fifteen years ago. It becomes at once apparent to you that you would not be able to get much of a hearing. Why? For the reason that the facts in connection with safety in this country have been revolutionized, have been changed very materially within ten years.

I hold in my hand here this morning this manual for speakers. I picked it up yesterday afternoon. I have been examining it a little. I think for tomorrow

morning I will select, for illustrative purposes, a few figures out of this. Here, it seems to me, if you are talking safety, you have the most up-to-date and the most reliable, though I suppose not altogether reliable, information obtainable upon this subject. It is recent. My point is that in the selection of evidence let it be as recent as it is possible for you to get it.

In the next place, select that material which falls within the experience of your hearers. I said something about this idea in general interest yesterday but from a different point of view, namely, sustaining self-interest. I want to say something about it today from the point of view of the selection of material that comes within the understanding and the experience of your audience.

I heard a man make a political speech just the other day. In the body of that speech he discussed the value of protective tariff, and it was interesting to me to note that he discussed protective tariff from the point of view of protection of infant industries, the line of argument that was offered on protective tariff fifty years ago.

What does the modern man know about infant industries and the protection of infant industries? You don't and can't call the United States Steel, General Motors, our coal organizations, our railroad organizations, infant industries. There was a day when they were all infants. That was not an argument that came within the purview, the experience, the information, the intellectual and emotional reactions, of those to whom the speaker was talking. There may be all kinds of arguments for protective tariff. I happen to be not particularly opposed to protective tariff. I am not interested in discussing it. What I am interested in showing is that, if you are going to discuss protective tariff or any other subject, get your material right out of the thought of those to whom you are talking.

We have a splendid illustration of that in our political history in this country. Do you remember the time Bryan nominated himself for the presidency for the first time in 1896? He did it by a speech, a speech that took him about twenty minutes, in the Coliseum of Chicago, to deliver. There was nothing new in that speech. Bryan himself said there was nothing new in it. There was just one paragraph that he hadn't used dozens of times. What did Bryan do on that day? What Bryan did on that day was to gather together the thought, the sentiment, the ambition, of a majority of those who were in front of him and put it into a language which they understood. Put that idea the other way. What Bryan did that day was nothing more or less than to state his idea in terms of the experience and the understanding and the ambition of those to whom he was talking.

Select material which appeals the most dominantly to the most active motives of those to whom you are at the moment talking. What do I mean by that? I mean about this: That we all act on motives. We think we are reasoning beings. As a matter of fact, not many of us, in many of our reactions in human life, act on the basis of reason, we act on the basis of other motives. I have tried to get the psychologists who study this thing all of the time to give me an answer as to what percentage of our reactions to whatever comes to our mind is based upon reason or logic and what percentage is based upon other motives, sentiments and whatnot. I can't get a definite answer. I have, however, this general answer, that about ninety per cent of our responses in human life to advertisements, to speeches, to salesmen, are based upon motives other than reasoning. What are some of those motives? There is selfishness, there is self-interest, there is ambition, there is desire for power, desire for reputation, there are our tastes, our ambition to be associated with our fellows, our gregarious instincts, our patriotism, our love of the beautiful, and there are others that might be named. All of those are motives that dominate our thinking and dominate our feeling.

The point I want to make is that in the selection of evidence that you are going to use at a particular time, select that evidence which makes an appeal to the motives of those to whom you are talking, whatever those motives may be.

May I make just one or two other suggestions here? Select material that comes from classes of facts, the least complex. Why? The A-B-C form must dominate the public speech. I have already stated why. You have an aggregation of people of average intelligence, and average intelligence is not expert on every conceivable subject, not by any manner of means. If that be true, then you have got to get your material in as simple a form as possible. To get your material in as simple a form as possible, it must come from classes of facts that are simple in and of themselves, wherever it is possible.

I understand that there are exceptions to that, that there are times when you must be complex, in the very nature of your discussion, but not to the general public, not to the general average hearers.

I have just two or three minutes left. I want to illustrate that. Two or three years ago an engineer came to me. He was trained in the technological schools of Germany. He was one of the most highly trained men I have come in contact with. He was a master of information in his particular field. I said to him, "What are you coming to me for?"

He said, "I find there is something the matter with me. I know my subject but I can't convince anybody else that I know my subject. I can't convince my Board of Directors that the scheme I have in mind is a good one. I want your help so that I can put that information in the proper form."

I said, "I don't know anything about your material, but if I can be of any help I will."

He was going to construct an ice plant in St. Paul. I said to him, "You come to me a week from today and make the speech that you propose to make to the Board of Directors about this ice plant." He did. I gave him a blackboard. He first drew a picture of this ice plant. I then said, "Now, go ahead and make the speech that you intend to make to your Board of Directors." He did, and he used all the technological terms that he had learned in Germany. It was a very, very fine discussion from a technological point of view. When he got through I said, "Is that the kind of a speech you would use when you would present this material to your Board of Directors?"

He said, "Yes, that is."

I said, "You know your subject, there is no question about that, but if you know any more complex facts than you have used, I don't know where you can find them. (Laughter) If you know any more technical language than you have used, I don't know where you can find it. Remember this: You are talking to a Board of Directors that are financial men, they are men not versed in the technical side of the subject; they have hired you to look after the technical phase of it. What you have got to do is to show that this thing when installed will make money, will bring in dividends."

Light dawned on the fellow. He never thought of it from that point of view. Why? He was a technical man, the whole background of his experience had been technical (I am not criticizing him at all); and when he got his illustrative material, he selected all of it from that background of experience and put it into his language just to ordinary folks.

I happen to know his Board of Directors. I know how much technical information they have, which is pretty nearly zero with the rim knocked off. (Laughter) They just didn't have any technical information. Yet they were able men in their own field. When he got his explanation into their field and into their motives he began to get somewhere with his subject.

I must stop at that point. Just a word about what I am going to do tomorrow. Tomorrow I am going to try to apply these general principles, and these general tests that I have been discussing, to the final statement; that is, the use of evidence and the statement of evidence.

ADJOURNMENT

October 4, 1928

LECTURE NO. III.**The Speaker and His Statement**

In the discussion yesterday, I went one step beyond the discussion of the first day. I think perhaps it might be well this morning to begin very much as I began yesterday morning and call attention to what I attempted to do yesterday as a way of leading into what I shall attempt to do today.

Yesterday I drew attention to what seemed to me to be two important propositions. The first was limiting one's subject to a compass which could conveniently be discussed in the amount of time that the ordinary speaker is given to discuss the subject. Second, as a part of that first half of the lecture, I drew attention to the importance of dividing the subject into its main issues or its subsidiary points and getting each one of those main issues clearly stated. I attempted, at least, to make the point that the successful speaker needed to do that because audiences could remember by points or divisions of a subject, when they could not remember and would not remember by details. Some details will be remembered; most of them will not. Now and then a striking presentation will be remembered, but for the most part nothing but the main lines of argument will be held or can be held in mind by the hearer.

Yesterday I attempted to point out certain fundamental principles that I thought ought to underlie one's selection of materials with which to develop, to explain, to enforce or to argue the points that he, during his discourse, attempts to develop. I said that I thought it was important, first of all, for the speaker to examine carefully the content of his own mind; to do his own thinking. I was interested in that primarily because, in my judgment, if you are going to get vital speaking, you will have to have vital thinking, and vital thinking comes out of one's own head and not from a printed page.

I said, secondly, in the selection of material that it was important for the speaker to get material that was interesting just in so far as it was possible. I said, in the third place, to get material that was not remote, if that was possible. I pointed out, in the fourth place, that it was important for the speaker to select his facts from as close a date to the particular occasion as possible. I pointed out, in the fifth place, that, in the selection of material, it should be selected so as to make an appeal to the experience of those to whom he was at the moment talking. Then, I said in the last place, that it was very important, in my judgment, that the speaker bear in mind the motives of those to whom he was talking.

In this discussion today, I want to say something about final statement, that is, the final form in which a speaker shall put his material; the dress, so to speak. Up to this point we have been discussing fundamental principles of outline, of organization. Now, I want to discuss some of the basic elements or basic suggestions that apply to final statement.

The first suggestion is, that final statement is but little, if indeed any, less important than the organization of material and the selection of evidence. A final statement, ladies and gentlemen, may spoil or it may make a speech. It is in the final statement that after all the individual makes himself clear or fails to make himself clear. If you will examine the history of what has been done by great speakers on this point, you will discover, I am sure, that a very large part of the power of a man like Webster, like Abraham Lincoln, like William Jennings Bryan, like Woodrow Wilson, was in their capacity to make a statement.

William Jennings Bryan says somewhere (I think it was in his speech on Abraham Lincoln) that truth is self-evident and that what you need is just a

bare statement of the truth. He drew attention to the fact that the great strength of Abraham Lincoln lay in his ability to state a truth, and to state it in such language that the ordinary individual could understand him.

Words: Is there anything to be said about words? I think there is from the point of view of the public speaker. Let his words be simple words. If he is an American, certainly let his words be Anglo-Saxon words, if he can find Anglo-Saxon words with which to express himself. I wish I might take time this morning to select certain paragraphs from the very best speeches that Abraham Lincoln delivered and then count with you the number of little, single-syllable, Anglo-Saxon words that the man employed in the most eloquent passages that he used. Consider his Gettysburg speech, which I suppose is recognized as one of the most eloquent, if indeed not the most eloquent short speech that has ever been delivered in America, and you will find that most of the words are in your vocabulary. I doubt if there is a word used in his speech that is not in your vocabulary. Did you ever make a Gettysburg speech or anything like a Gettysburg speech? Greatness of speech, then, does not depend upon unusual words, colorful words, and involved terms.

Sentences: Get simple, understandable sentences; short sentences, if you will, but not necessarily so, but a sentence that the average man or the ordinary individual can follow. I am spending a good deal of time emphasizing this. The fundamental element that lies here, I think, is illustrated in the difference between the mind of a philosopher and your mind and my mind. Your mind and my mind works in specific terms, commonplace terms. We do not think a thought out into its ramifications, into its implications. The philosopher does. He is trained to do so. But in your case and in my case, our thinking is such that it is very important that the speaker do the work for us in his final statement.

So much for final statement in general. There are four or five means to enable one to make this final statement that I want to draw specific attention to this morning. One can make his final statement by the use of one of them; he may make his final statement by the use of two of them in combination, or possibly three of them in combination, or he may make his final statement by the use of all of them in combination.

Let me run through them with you. First, restatement of the proposition as a means of developing the idea; second, the use of details, specific details in the development of the final statement; third, the use of illustrations; fourth, the use of authority or the citation of references to authority; fifth, if we get time before we get through, I want to discuss the possible use of humor as a means of final statement.

We will go back to the first; restatement as a means of development of the idea. We begin with an assertion; we affirm something to be true or we deny something to be true. At times that affirmation or that denial is sufficient. Usually for spoken discourse it is not sufficient. We must amplify, we must enlarge upon the assertion. How shall we do it? Well, one means of doing it is restatement; stating the same thing over and over and over all of the time, using different language, but emphasizing the same fundamental idea. Examine the best that you will find in speeches and you will discover that a very large proportion of those speeches are made up of this type of development.

I have this morning before me, a speech by W. C. Redfield, who used to be Secretary of the Department of Commerce at Washington. This is a speech which he made on the general subject of "Some elements that are basic in success in business." He doesn't call his speech by that subject, but that is its subject matter, if you attempt to give it a theme. I want you to note, first of all, that he specifically states the subject that he is going to develop; second, he divides that subject into three parts. He says: "Get facts; see far; think through." That is exactly what I said yesterday was important in the development of a subject, to

get at the special issues or the special points which, if developed, would make the subject impressive.

Of course, I am not going all through this speech. The first point then is to get facts. The first element in the success of business, according to Mr. Redfield, is to get facts. I want you to note how he uses restatement to emphasize the idea of "get facts." I will read one paragraph. Note that he virtually says the same idea in a number of different ways.

He says: "First, then, get facts. If we apply this principle as a measure to the business world, we shall soon see that men who live up to this principle are relatively few and lonely and that those of us who deal to a greater or less extent with fancies or with fallacies which we hope or believe are facts, are not. Few of us will go so far in practice as the man who said to me, 'If I don't know why I know what I think I know, then I want to know.' Most of us are content with assumptions, and few follow the scriptural maxim to prove all things and to hold fast to that which is good. Yet, facts, as has been well said, are stubborn things, and you may make up your mind now that during your business lives, if you do not get the facts, the facts will get you. It is not always easy to get the facts. On the contrary, it is commonly hard to get them, and because it is hard, we are apt to accept assertions as to the facts from those who think we ought to know instead of exerting ourselves to learn them directly. A business man feels, for example, that his competitor uses unworthy practices and is tempted himself to follow the bad example, lest in competition he be outdone. He does not know that his competitor does these things; he is told it and believes it, because he cannot otherwise explain some of his competitor's accomplishments. It is commonly a mistake. If he sought patiently for the facts, he would often find them, and they would save him from an error of judgment respecting another and from business mistakes upon his own part. Again I say to you, first of all get the facts."

Perhaps that passage isn't particularly interesting as read to you, but if Mr. Redfield were here on the platform and said to you, "First of all, men, if you are to be a success in business get the facts," and he should go through the quotation with lively interest, by the time he got through, his final statement would have emphasized in your minds the value first of all of getting the facts; and he would have done nothing but restate the same idea in a half dozen different ways.

This development of the ability to master restatement is not easy. It demands a lot of imagination. It demands that you see the idea that you have in mind from all of its points of view. You are never tiresome in restatement so long as you keep your idea revolving, so long as you keep your hearers seeing that idea from just a little different angle at every restatement.

I pass on now to details. What do I mean by details? I mean the statement of your general proposition as it works out in human life in one specific instance. What we need in speech to be more clear, to be more impressive, in my judgment, is details and more details and more details, provided—one reservation—you constantly keep the idea moving forward; provided that every time you introduce a new detail your idea moves forward one step farther.

I want to illustrate that. I am going to spend most of my time illustrating. You will probably get tired of me for it. Yesterday I drew your attention to William Jennings Bryan's famous cross of gold speech. I said that in that speech there was just one new paragraph, one that he had not used before. I want to use that paragraph this morning to illustrate going into details, or taking the general statement from the general and expressing that general statement in details. I am not going to be able this morning to give you the exact language of Mr. Bryan in this paragraph. I am speaking purely from memory. I haven't

seen the printed page of the speech for a half dozen years, and I don't have the speech with me.

In this paragraph the general idea is this, speaking of the opposition: "You have made your definition of a business man altogether too narrow. We do not agree with you in that definition and we propose to present our principle upon another definition." That is the general statement. Now, watch how he follows that into detail. He says: "The farmer who goes forth in the spring and plants his harvest, who goes forth in the morning and toils all day, works all summer, harvests his crop, is just as much a business man as the man who goes to the Board of Trade and bets upon the price of wheat; the merchant at the cross-roads store is just as much a business man as the merchant prince in the metropolitan center; the banker in the village, in the rural district, is just as much a business man as the group of magnates who control the money at Wall Street. The miner who goes down into the earth hundreds of feet or climbs to the mountain top thousands of feet, digs into the ground and takes from it the treasures of the earth and gives them to the human race, is just as much a business man as the man who gets in a back room and corners the money market of the world. I say to you that it is for this larger group, this larger division of business men that we are here to speak."

Note the general statement, note how he goes into details; then, after he has gone into details and shown how his idea works in specific instances, he comes back to his original proposition. That is what he meant by saying, "You have made your definition of a business man altogether too narrow."

This takes me to the third step, the use of illustrations. There is, of course, considerable relationship between the use of illustration and the use of detail. Men, if you don't think anything important, in all of these four talks that I shall deliver, I do not believe you can escape the importance of this one, this point, if you expect to deliver talks to general audiences. If you don't remember anything else that I say I beg of you to remember this and to apply it.

What do I mean by an illustration? By an illustration I mean the way a general idea, when it is applied to human experience, works. Why is it so important? Why does it get hold of an audience as it does? It goes back to the principle I mentioned in the opening of my remarks, that we, as a people, have the ability to see a general idea when it is at work, when it is applied, when we don't have the ability to think it out into its implications, unless that is done for us in a specific illustration.

I want to examine carefully the use of illustration. I want to illustrate the thought in two or three different ways. First, I am going to take an illustration from Russell H. Conwell's great lecture, "Acres of Diamonds." Russell H. Conwell, as I suppose some of you remember, was the President of the Temple University in the City of Brotherly Love to the south. He delivered this lecture 6500 times. Do you know how often that is? That means one lecture every day for more than eighteen years. Why do I mention that? I mention it to show that this lecture had vitality. Wherein was its vitality? In my humble judgment, its vitality with great masses of people rested in the skill with which he used concrete illustrative material.

Let me show you, from just one section of that speech (I have used this paragraph in the presence of a few of you before, but it is well to repeat it) how Conwell expressed himself. The general theme of this lecture is this: Your success lies in grasping the opportunity that lies next to you and not going somewhere else. Again and again throughout this two hour discourse he uses illustrations to enforce that idea. Here is one of them:

"Professor Agassiz, the great geologist of Harvard University, that magnificent scholar, told us at the Summer School of Mineralogy, that there once lived in Pennsylvania a man who owned a farm, and he did with his farm just what I

should do if I owned a farm in Pennsylvania, he sold it. But before he sold it, he decided to secure employment selling coal oil. He wrote to his cousin in Canada that he would like to go into that business. His cousin wrote back to him, 'I cannot engage you because you don't understand the coal oil business or anything about its production or anything about its marketing.'

"Then said the man, 'I will understand the coal oil business,' and with commendable zeal he set himself at the study of the whole theory of the coal oil subject. He began away back in the second day of God's creation. He found that there was once another sun that shone on this world and that then there were immense forests of vegetation. He found that the other sun was put out and that this world, after a time, fell into the wake of the present sun. It was then locked in blocks of ice. Then, there rose mighty icebergs that human imagination cannot grasp and as those mountains of ice did ride those stormy seas they beat down this original vegetation. They planed down the hills and toppled over the mountains and everywhere buried this original vegetation, which has since been turned by chemical action to the primitive beds of coal and in connection with which we find our finest supply of oil. So, he had found where oil originated. He studied it until he knew what it looked like, what it smelled like, and how to refine it, how to sell it, and where to sell it.

"Now," said he, in a letter to his cousin, 'I know all about the coal oil business from the second day of God's creation to the present time.' His cousin replied to him, 'Come on.' So, he sold his farm in Pennsylvania for \$833,—even money, no cents.

"After he had gone from the farm, the farmer who had purchased his place went out to arrange for watering his cattle, and he found that the previous owner had already arranged for that matter. There was a stream running down the hillside back of the barn. Across that stream from bank to bank the previous owner had put a plank edgewise, for the purpose of throwing over to one side of the brook a dreadful looking scum through which the cattle would not put their noses, though they were perfectly willing to drink on the lower side of the plank.

"Thus, that man who had gone to Canada and who had studied all about the oil business had been himself damming back for twenty-three years a flow of coal oil which the State Geologist, in 1877, said was worth to the State \$100,000,000. The City of Titusville, Pennsylvania stands bodily on that farm now. And yet, though he knew all about the theory of the coal oil business, he sold that farm for \$833, and again I say to you, no cents."

There are two or three things in connection with that illustration I want to emphasize. Let me take you back to the point from which we started. This is rather a large class, but nevertheless this is an academic class. This is a school-room this morning. I want to take you back to the point from which we started. I said I wanted to point out the value of the use of illustration. I want you to note how he states his theme, which is, that the greatest, finest chances any man will ever have for success will be found in grasping the opportunities that lie next door to him. Then, with that general principle in mind, he goes forward to use this illustration, which is taken from life.

The first thing that I want you to note is that the illustration is interesting; it is an interesting incident in human life; it has human values in it. You listen to it as a delightful story of human experience. If it didn't have any thought-developing or thought-arguing or thought-explaining value, it has interest in and of itself.

The second thing I want to point out to you about that illustration is that it is simple, it is conversational, it is just common sense.

The third thing about that illustration to which I want to draw your attention is that it moves his thought forward; it amplifies, it enforces. The last thing I want to draw to your attention about that illustration is that it is enertaining.

It has just a touch of delightful humor in it; gentle, to be sure, nothing biting, nothing stinging, nothing sarcastic about it. It isn't ridicule; there is just a touch of humorous observation. The finest humor in the world, certainly of American humor, is of that kind.

The man who expects to make speeches needs to learn to be a master of illustrative material. Let me go a little bit farther. Suppose we want to illustrate our ideas by the use of statistical material, and that is a good way for a business man to develop an idea, if he is skillful in his use of statistical material. Let us take a proposition, and I will take some facts that I happen to have in my head with which to illustrate it. Let us take this proposition: The marketing of food commodities in the United States is a complex, interdependent and interlocked business. The people living in one section of the country—we will use a little restatement here—are very materially dependent upon the people living in another section of the country. Let us state that idea again. The people living in one section of the country are very much dependent for their food commodities upon the people living in another section of the country who are responsible, let us say, for transportation, or interested, let us say, in manufacturing.

Note how the idea works in actual application. I am indebted to Superintendent Johnson of the Pennsylvania Railroad for some figures which I think illustrate my point. He says that in a given year there were loaded and shipped in this country 60,921 carloads of fresh vegetables and fruits that had their origin west of the Mississippi River. The average per car haul between the source of the production and the source of ultimate consumption was 2503 miles. He goes on to say that there were 5222 carloads of these commodities, these food commodities, that had their origin south of the Mason-Dixon line and the average per car haul between the source of production and ultimate consumption was 1030. There were 20,060 carloads of these fresh vegetables and fruits that had their origin north of the Mason-Dixon line, and east of the Mississippi River, and the average per car haul, between the source of production and ultimate consumption, was 433 miles. That shows over 85,000 carloads of fresh vegetables and fruits shipped in this country in one year with an average per car haul of 1520 miles.

All I am trying to do here is to show how one can use statistical facts as illustrative material to bring out one point which is that our marketing of foods in this country is complex. You may say in general terms as eloquently as you are capable that our marketing system of food commodities is complex and I don't believe you can make it as vivid, that you can make it as impressive as you can make it impressive and vivid by the use of some such statistical material as I have pointed out.

We are engaged in the safety business in this convention. I want to point out by way of illustration the use of just one figure that I find here in this book. Suppose we are interested in safety as a means of preserving human life, and we want to show how serious a problem it is in the United States. I may turn to this speaker's manual which I hold in my hand and I discover the statement made here that the total accident fatalities in the United States in 1927 was 95,500 people. That is a detail, that is statistics. How much does 95,500 mean to the average hearer? It may mean a good deal. It will mean a good deal more if you, as a speaker, somehow or other can take that figure, hold it up to view, analyze it, compare it with something else and make its bigness apparent.

There might be many ways in which to do that. I want to suggest one way. Beginning in 1917 and running to November 11, 1918, we were in the World War. We left a lot of soldiers buried over in France. Yet I call your attention, friends, to the fact that we kill in industry and in social life in this country, each year, nearly twice as many American people as were killed and buried in France as a result of the World War. We are horrified at the loss in war; yet we just move easily along in our industrial life and scarcely reflect upon the significance of the

industrial and social loss. All I am trying to do now is to show how, by the use of illustrative material, you can enforce an idea.

I said that perhaps it was possible now and then to use humor to amplify and to enforce one's idea. I don't happen to be a humorist. I wish I were, that is, sometimes I wish I were a humorist. Humor is an excellent thing in speech making, provided you know how to use it and don't overuse it. Humor is a dangerous thing for the speaker. Let me make this suggestion to you humorists. If you ever expect to be taken seriously don't get a reputation for being a funny man. It will ruin you as an effective speaker if you desire to be taken seriously. Tom Carwin, who used to be one of the great orators and statesmen from Ohio, always thought, I think went to his death thinking, that the only reason he was not nominated for the Presidency of the United States on one occasion was because he had the reputation of being a funny man.

An overdose of humor defeats itself but a judicious use of humor can be very, very effective in this matter of final statement. Let me just illustrate with a story that I think is a bit old. I know I have used it before. I heard one man, at least, besides myself use it. Let us take our general proposition now. Suppose we are trying to illustrate the significance of the United States as a geographical and a business and a social unit, its extent, its magnificent accomplishments and magnificent distances; and anybody who travels around over this country, if he uses any imagination at all, must be tremendously impressed with the extensiveness of the United States. That is our general idea. Let us see if we can use humor to illustrate the significance of it. An Irish traveler who considered himself very much a traveled man, who had been all over Ireland, planned to come over to this country and to take in the United States. He landed in New York. After considerable confusion, he found himself in one of the rear Pullmans in the Grand Central Station, and with his ticket for Chicago, San Francisco, Los Angeles, El Paso, Tulsa, New Orleans, Birmingham, Washington, Philadelphia and back to New York.

As you know, if you have gone out from the Grand Central Station, it takes a long time for the conductor to come back to collect your ticket, especially if you happen to be in one of the rear cars. By the time the conductor got back to collect the ticket, the Irishman was considerably disturbed, and as he pulled out his yard and a half of green paper he said to the conductor, "Now conductor, you won't let me go by, will you?" (Laughter) Just remember, he is on his way to San Francisco. The conductor promised he wouldn't let him go by. The train went north through Harmon, Yonkers, Poughkeepsie and Hudson, and after two hours and a half stopped in Albany. Here the Irishman got up, picked up his bags and started to get off and was considerably surprised when it was announced that he hadn't reached San Francisco yet.

The train went on through Syracuse, Rochester, Cleveland, Toledo and into Chicago. Here, you know, in the nature of things, he must change trains. He was very indignant when the red cap insisted upon his getting on another train. He did so. He was on his way west, out across Illinois and Iowa and Nebraska and through Wyoming. After three days and nights of rather tedious travel, the train rolled into San Francisco. By this time the Irishman was completely subdued. He sat back in his Pullman seat in a sort of a semi-comatose state. When the train stopped, he made no move to get off at all, until the porter came in and said, "This is San Francisco; this is as far as you go."

The Irishman got up, picked up his bags, stepped down on the platform and stood there looking over the Golden Gate of California. Then he said, "So, this is San Francisco, is it? And they say it is wonderful that Columbus discovered America. It is not wonderful; how in hell could he have missed it."

Well, that is a good yarn even though you have heard it before. I get a kick out of it every time I hear it. What I am trying to suggest is that one may use

humor to illustrate, to enforce, to amplify his idea, and wherever it is possible to use humor in that way, it is an excellent thing to do.

Abraham Lincoln was one of the greatest masters in the use of humor. He was known as a story teller. Examine his history, as I have gone to some pains to do, and you will find that nearly always, when Abraham Lincoln used humor and at times when he was criticized for doing it, he had a thought, an argument to make by his application of it.

May I suggest, just in closing on this particular point, that the speaker be careful about the use of ridicule just because it is funny. If you expect to be taken seriously, use ridicule guardedly is my suggestion. I don't mean to insist that there are not some values in certain types of ridicule. I mean to suggest this, ladies and gentlemen, that when men get to be masters of ridicule, and some of them are, they want to ridicule everything. When ridicule has a sting in it, you don't win, you repulse. Avoid it, is my suggestion.

When you use humor, let the element of human kindness and human sympathy get into that humor. One need not be less humorous because he is kindly or sympathetic. Such humor is likely to be in the long run more effective.

There is one other form of support that I won't have time this morning to discuss, but just suggest, namely, the use of authority. In a complex age such as we have, it is very important now and then for us to depend upon authority. When we do so, let me suggest the importance of testing that authority. Is it mere hearsay, is it prejudiced, has the man you quote been in a position to know, does he understand what he is talking about, is there too much dependence put upon one authority, is the authority supported by other evidence?

Lastly, is the authority cited by you, as a part of your final statement, likely to be accepted by those to whom you are talking? Such are some of the general tests that need to be applied to this last form of support, the citation of authority.

Tomorrow morning, I expect to get the speaker on the platform and to say something about his performance there. If you still have endurance, I shall be glad to see you again tomorrow morning.

ADJOURNMENT

October 5, 1928**LECTURE NO. IV.****The Speaker on the Platform**

In our talk yesterday, we spent some time trying to develop the important elements that needed to be observed in making the final statement. In that discussion, I made an effort, at least, to emphasize the importance of final statement, saying that even a good argument backed up by thorough-going, thoroughly analyzed evidence might be very materially marred because of the ineffective way that the final statement was put together. I tried to illustrate that thought by drawing attention to how masterfully such men as Webster and as Lincoln had illustrated the importance of final statement.

As a means to get final statement, I pointed out five different steps. I drew attention to restatement as the first step, which means nothing more or less than this, holding the single point of view up to attention long enough for those who are listening to be impressed by the importance of it. Sometimes a mere statement of the point of view is sufficient. At other times, it is not sufficient.

I made some distinction between putting a point just for the purpose of clearness and putting a point for the purpose of impressiveness. An idea may be expressed so that it is clear but yet not be particularly impressive. The main step in getting impressiveness is to hold the idea before the hearer long enough for him to examine it from many points of view. It takes restatement to do that.

The second step I emphasized was the matter of putting your statement in details.

The third step, I emphasized yesterday and I suppose so long as I live will emphasize, was the importance of the concrete illustration, which is nothing more or less than an enlarged detail. There was one thing I neglected to say about an illustration that perhaps I ought to say, lest I be misunderstood somewhat. An illustration in and of itself is not argument. It may help an argument. It may clarify an argument. But, since it is but one detailed bit of evidence, extended and applied in life, one cannot rely upon it as the sole body of evidence that he uses. But, for the purposes of clearness, for purposes of persuasiveness, for purposes of getting attention and sustaining attention, I do not believe, as I tried to point out yesterday, that there is any step, in this whole matter of speech, that is quite so important as the correct, the adequate use of the illustration.

Then, I tried to point out that humor might be used as a means of getting final statement. I offered one or two bits of caution on this matter of entertainment. The last form of support to which I alluded was the matter of use of authority.

There was one phase of that that I did not get time to emphasize yesterday that perhaps I ought to emphasize a little bit more today. I think we have too much tendency, as speakers, to rely too soon, and perhaps too frequently, upon authority. As a matter of fact should we not become so thoroughly familiar with the material with which we deal that we are authorities ourselves upon it? Should we not get such a grasp of the evidence, upon which our conclusions are based, that we ourselves become authorities and don't have to rely so frequently upon the statements of others? But, as I pointed out yesterday, in this complex age that is not always possible. We must rely in some cases upon the judgment and the conclusions and the investigations of others.

In this talk today, I call the speaker to the platform. That is rather a large subject. I remember that Opie Reid, the author, appeared one summer on the program of a Lyceum and Chautauqua Association. He always began his address by saying, "Ladies and gentlemen: My subject for this lecture is 'First one thing and

then another.' I select that subject because I can say anything I want to say on it and never get off the text."

That is pretty nearly what I can do with this subject that I have in mind this morning, the speaker on the platform. I am afraid this talk will be a bit scattered, not particularly well organized, because there are a number of hasty suggestions I want to make, and they will be suggestions only.

When the speaker steps upon the platform before an audience, what is the sense that is first appealed to? The first impression that an audience gets from a speaker is, how he looks. Does he look the part? Can he be made to look the part? I do not mean that the man who is handsome or large. A balloon is large, but the inside of it is light of weight. I have seen speakers that were not so very far from that characterization. I do not refer to anything of that sort. Does the speaker, when he takes his position before a group of people, give the suggestion of command of the situation, or does he give the suggestion of being afraid? Does he, as it were, pull away? Let me make this suggestion to you: Either you will command the situation or the situation will command you.

I don't know of any more painful experience through which a man can pass than to step before an audience and feel that that situation and that audience commands him instead of him commanding the situation. The speaker under such circumstances simply dies by inches. You need, first of all then, before a group of people, to give a sense of command in the way you step before them. You are eager; you, for example, are not afraid to look that crowd straight in the eye. Have you, when you step before a group of people, the command of your thinking and emotional machinery so that you can look a man in front of you right in the eye and keep on thinking? It is an unusual relationship, it isn't quite normal, but it is a relationship in which the man must learn to take the aggressive, the commanding attitude.

I am so fond of using William Jennings Bryan as an illustration that you will think I am one of his enthusiastic supporters. I never agreed with William Jennings Bryan on anything. (Laughter) I never agreed with him politically, and I may say religiously. I wouldn't say I entirely disagreed with him on matters of religion, but certainly on matters of politics I do disagree with him, and sometimes I have been mistaken, too. I never disagreed with the proposition that William Jennings Bryan was a master on the platform. I do not believe in my generation we have had his equal. When he stepped upon the platform, you knew by the way he looked at you, by the way that personality of his radiated energy that he had a command of himself and a command of the situation. Can you get it?

You are not William Jennings Bryan's nor am I, but we can develop some power by thought, by practice, by getting a mastery of material and thinking through ways and means of controlling one's self.

Secondly, as that audience looks at you, when you step before it, does it get the impression of a friendly individual or an unfriendly individual? One good speaker that I know is a thorough-going, natural born, aristocrat. When he begins his speech he is distant to his audience and his audience feels it. It is only after the man gets emotionally warmed up that you begin to feel anything like communication between the hearer and the speaker. Among the incidental things, there is nothing I think that is any more important than to give the audience the impression that you like them. If you know yourself not to like them, if you know that you do not have patience with the mistakes of folks, patience with human foibles and idiosyncrasies, I doubt very much if you ought to try to approach them through the medium of public speech. If on the other hand you do like folks, there isn't much of any reason why you can't give the people the impression of liking them.

Let me give you a striking illustration of this principle as it worked out on a great occasion. I quoted yesterday from the Commoner's speech in 1896. Just preceding Mr. Bryan on the platform was a Senator who was no mean speaker; a

man of a good deal of power. I do not remember which side of the resolution he was debating at the time. It does not make any difference. I remember this, and this is the record, that the Senator had not been speaking more than a minute or two, when somebody in the audience who was opposed to his proposition, shouted at him. Immediately the Senator clinched his fist and for the next thirty minutes just shouted and smashed at that audience and they jeered back. He was not heard by more than 100 people in that crowd of 15,000 people.

When William Jennings Bryan took the platform, what happened? The first thing that William Jennings Bryan did was to smile. His smile was persuasive. The first thing that he did was to radiate good nature. He liked folks. He showed that he liked folks and before he had gone a half dozen sentences that radiating, friendly, personality was out over that hall. He got his hearing. And one element in it, not the only element, there were many of them, was the fact that instead of slashing that audience with a bitter tongue, he appealed to them with a friendly approach. The speaker as he faces an audience gives that impression at once or he fails to give that impression at once.

Now, the third suggestion, which is a very general one, is on the matter of sincerity. The very position you take before a crowd, the very way you look at them has a good deal to do with whether or not you suggest sincerity for the occasion. I know that there are those who attempt and sometimes simulate sincerity, but I am one of those who believe you can't do it very long. If you don't know a subject, and if you do not have conviction within you about the subject, very soon that limitation gets out into the personality; it becomes a part of the inflection and the quality of the voice that you use and, without your knowing how gets to the crowd and gives it just the impression you do not want given.

The second impression that comes to an audience is through the sense of hearing. They hear what you say, and that goes to the whole matter of voice. In the first lecture I said something about the voice, the production of the voice, the projection of the voice, and so forth. I am not going to repeat what I then said.

There is one phase of the matter of voice to which I do want to make allusion, because the question has been raised with me, how to avoid the speaker's sore throat, how to avoid strain so that the man isn't completely tired out? I have just one suggestion on that. Usually the speaker's sore throat does not arise from a wrongly produced voice, a wrongly placed or focused tone. It usually arises out of an overuse of the voice with the result that there is muscular strain. Let me see if I can amplify that just a little. Your whole vocal mechanism is delicate. It is delicately adjusted and, when you subject it to the same strain at the same rate for too long a time, it is going to get tired and, of course, it is going to wear out.

I had a splendid illustration come under my observation some time ago of a young preacher who talked three times on Sunday. He always got hoarse about midway in the second sermon. He came to me for some help. When he talked to me, he had an excellent conversational voice that seemed to be properly produced. He didn't have anything physiologically the matter with him, and I told him so. Then, I suggested that he get some passage like Lincoln's Gettysburg address, commit it to memory and come to present it to me as nearly as he could the way he preached. This he did. It was interesting to me that he began just as vigorously as he could and as rapidly as he could, with that simple conversational bit of English, never varying the loudness or the rate. He hadn't spoken a minute when I had discovered his difficulty. It was not a matter of voice production, nor placement at all, it was a matter of overuse of his voice on the same dead level. We don't allow that in music. If a musician would attempt to do that, you would either egg him or run out of the hall. But, we allow it again and again and again with our speaking. We lack variety.

That leads me into the four or five main suggestions I want to make in connection with the oral effectiveness with which we can express thought.

Why do we have speeches anyhow? We have speeches because we believe that through the medium of speech we can make thought effective, in a way that we couldn't make thought effective without the medium of vocalization. If we didn't believe this we wouldn't have our preaching, we wouldn't have our after-dinner speakers, we wouldn't have our oral discussion of any kind. The basic elements of this effectiveness, from an oral standpoint, lies in emphasis, ways and means of emphasizing thought by the use of the voice and the personality. What is emphasis anyhow? No technical definition will here be given. I have one suggestion. Emphasis is contrast. You make an idea emphatic because you make it stand out above or beyond or aside from that general level of expression that we call the normal.

You folks in earnest conversation are emphasizing all the time and are unaware of the fact that you are using contrast in oral discussion to bring out emphasis. There are five means of getting this emphasis and this contrast that I want to present to you. I will name them. The use of slide, the use of change of pitch, the use of change of force, the use of change of rate, and the use of change of time. Let us look at them very briefly, each one of them. What do I mean by the use of slide as a means of emphasis? The slide of the voice, 3-4-5-6, notes on the musical scale on the keynote word of an idea to make that idea impressive. You grip the idea by a vocalized slide upon the important word in the midst of other words that clothe or express the idea. Every time my finger falls I drive the word home. Let us take a sentence. "The world will little know nor long remember what we say here, but it can never forget what they did here." That is a line from Abraham Lincoln's Gettysburg address. Let us emphasize it a little bit. The world will little know nor long remember what (The speaker here illustrated the use of the slide by his own emphasis.) we say here, but it can never forget what they did here. The "saying" is made to stand out against the "doing" by the use of the slide of the voice.

I have illustrated the use of slide, where you have contrasting ideas, but you use slide in every sentence whether you know it or not. What I am suggesting to you or wanting to suggest to you is this: That if you will study what you do in earnest conversation and then will enlarge the emphasis on the keynote word in the use of that same sentence before an audience, letting the slide be twice or three times as long as in conversation, you will have produced the emphasis that meets the demands of the public speech. Anybody who will give attention to this matter can develop some ability in the use of slide.

The next step is variety in pitch. Here we American speakers have not developed, I think, as much facility as we should. We speak almost entirely upon the same dead level of pitch. Let us draw three lines here, imaginary lines. I have a blackboard and I am drawing three lines. Here (indicating) is our normal level, and this is high pitch and this is low pitch. For the most part, we speak right on this level (indicating). Remember that emphasis is contrast. We can emphasize an idea by shooting it up to the higher level, and that idea will be emphatic just in proportion as the line is long between this normal level (indicating) and this higher level (indicating). We can, by dropping the idea to the lower level, get a contrast. We do not have much facility in doing that because we haven't paid much attention to it. There isn't any reason why we shouldn't get more facility than we have.

There is just one phase of this thought that I want to draw special attention to. I said emphasis was contrast. Why don't we, when we speak, go quickly from high pitch to low pitch? Note the sharp contrast? I submit to you, you don't do that sort of thing very much. Have you ever given it much thought?

I suppose a number of you listening to me heard Rabbi Wise the other night. I did not hear him, but I have heard the man. I know something about the methods unconsciously used by him. One of the striking elements of emphasis he uses to make his thought emphatic is this wide range in the use of the various

pitches of the voice. Rabbi Wise has a voice of marvelous range. It is not uncommon for him at all to be up here (indicating) and to have the next word drop down here (indicating); and every time he does, he gets attention, every time he does he arouses a little intellectual curiosity as to what he is talking about. We can develop some of this power.

The third suggestion, because I see I must hurry on, is as to variety in force. Once more I want to say that we, as American speakers, have just one direction in which we use force as a means of emphasis, and that is more force and more force and more force. My minister friend in front of me here will remember the day, I am sure, when the typical Methodist Bishop was thought of value as a preacher, just about in proportion as he could shout himself up to Heaven. What I want to suggest is that force is emphasis in proportion as there is variety in its use.

Let us think of it in lines now. Here (indicating) is our normal level. If you increase in volume up to that point (indicating) there is emphasis. If you stay there too long, it ceases to be emphatic because there is no variety, there is no contrast. Too much force, for too long a time, lacks emphasis just as much as a dead level conversation for too long a time lacks emphasis; and loud force is unpleasant, if you have to listen to it for any great length of time.

Is there any reason why the speaker in his address, provided the thought allows it, should not use a great deal of force at one moment and then the lighter degree of force the next, thus getting sharp contrast? To get facility at this point is worthy the effort of any man who wants speech power.

I now come to the fourth suggestion, which is change in rate. Once more I say that we speakers express ourselves almost entirely at the same rate. If we have any change of pace, it is from the slow to the fast and then to the more fast. Why not change that pace and give your audience a rest? May I pause here to emphasize the psychological, almost the biological phase of this? You folks, as you sit out there in front of me are imitative creatures emotionally, whether you are conscious of it or not. If as I speak, I speak at a continuous strain, without any change of rate or of force or of time, very soon you drop into my tenseness and I wear you out. You imitate, but you are not conscious of it. That is the way we are made up. We are delicately adjusted nervously. The speaker who does not remember that the people with whom he is dealing are thus made up, is not using the strongest devices that he has.

The fifth and last suggestion is the change of time, the use of pause as a means of emphasis. Few American speakers, excepting those who are intensely dramatic, or perhaps are dramatically trained, use pause very effectively. Let me illustrate that by one sentence. I will take a sentence by Charles Dickens in which he is characterizing or describing a little girl. He speaks about her poverty and about how hard it is for her to get a breath of fresh air, and then he says: "Nobody came to see her, nobody asked about her, nobody (indicating pause) cared about her." Do you see how you can hold attention on that word "cared" and bring out the full meaning of it? You don't do that very often, friends, in speaking. The change of slide, change of pitch, change of force, change of rate and the use of pause, all of these elements can be used more effectively than we have used them.

I said in my first lecture that the outstanding fault of the American speaker was his indistinctness. In my judgment, the outstanding second fault that I would emphasize in connection with the weaknesses of American speakers is their lack of variety, and you as businessmen, who are called upon to speak, never give any attention particularly to the subject. Don't misunderstand me, I am not criticizing you or blaming you for this, I am simply stating what I believe to be a fact as a result of my experience with a great many businessmen and of my attempts to help them.

Here is an interesting situation. If any of you were to attempt to sing, and probably some of you do sing, how long would you take in training yourself to be singers? If any of you were attempting at any time in your lives to attempt to be artists, painters of pictures, how long would you give to the subject of training to be painters or sculptors? You know well enough that no musician would give a public performance of any kind without spending a large part of a lifetime in mastering the technique of his art. Yet, we have, in this country, a notion that if you have something to say all you need to do is to get up and say it and the result is the best possible. The art of expressing ideas orally effectively, persuasively, pleasantly, is just as complex an art, as the art of oral expression of music. The musician, however, has this advantage over you, the path over which he is to go is written out, he goes up, he comes down, he changes rapidly, he moves, or he pauses according to his written page. What do you do? As speakers you make your own music as you go along. We are continually doing that sort of thing without any preparation at all. I want to emphasize the use of these elements I am talking about this morning as a difficult thing and it takes time to use them well.

So much for the use of the voice. There are two or three other suggestions I want to make. What about action, physical action, gesture and whatnot? I usually avoid talking about gesture and physical action. But just as sure as I do, before I get out of that door somebody will come to me and ask me about it. Shall there be any physical action? I am not particular whether there is physical action or not. I have no pet rules or pet hobbies at all on the matter. Some of the best speakers I know scarcely have any action whatever and some of them act a great deal. A great deal depends upon the individual. I would not, if I could, make model speakers out of you. I would not standardize you, if I could. There are two or three suggestions, practical ones, that I do want to make. If you are going to act at all, don't let that action get in the way of your effectiveness. I have no doubt at all but you have seen speakers begin on the platform with their notes here, they will get down over a note, look at it, and then with their hands behind them, they will walk over here and talk at you and then before they finish that portion of the subject will be back over here where they will get another note and start over here and then walk back over here. (Speaker indicating.)

There are two things to be said at this point. The first is that the speaker who does that is constantly suggesting to his audience emotional unrest on his own part. That unrest, without his being conscious of it, is getting from him to that audience. An important item to be borne in mind in this matter of movement is this: That nearly everyone in an audience likes to have the speaker in line of vision. Every time the speaker moves from this position to that position, the heads out there in front of him have got to change to keep him in line of vision, because as the speaker moves, a head comes between somebody's eyes and him. But, as he gets over here and talks to his audience and gets them all nicely settled, he at once takes it unto himself to walk somewhere else (laughter) with the result that there must be a complete adjustment with a very large number of people out in the audience.

I had a very striking illustration of that come to my attention with a friend of mine who was quite active, almost athletic upon the platform. He said to me, "I don't seem to be able to get people to rivet their attention upon me. I work for everything that is in me and I can't hold their attention for any length of time. You are in this business, tell me what is the matter." I couldn't tell him what was the matter. I said to him, "You tell me when you are going to deliver the next speech and I will go and listen to you." I watched him with his parade. I had the answer to the question. He was an interesting speaker. He had interesting material. I had to get him to stand still.

I don't know how many of you are going to speak to large audiences, that is, audiences of 5,000 people. (Laughter.) That seems to be funny. You may get a chance to do that sort of thing before you know it. Let me make this suggestion to you so far as action is concerned. If you have a large audience, don't talk to the man over on this side and then talk to the man over on the other side. Every time you do that, you cut off a much larger percentage of your audience than it is necessary to cut off. If you talk straight in front of you, you are going to get the direction of your voice and the direction of your thought to the largest number of people possible in that audience. It is true that these people on the side will not get the same direct address that these people in front will, but they will get much more effectiveness when you are talking here than these people over here will get when you are talking over there (indicating). I saw this matter illustrated with an audience of 5,000 people most capitally in Rochester, New York, many years ago where one speaker stood still and held his audience riveted. The other speaker did this sort of thing (indicating) and a large part of the time when he was talking over here, nobody over here got anything. A little thing, I repeat, but worth attention.

I don't suggest that you attempt to eliminate all of the individual characteristics that you have, not by any manner of means. I think Clarence Darrow of Chicago would spoil his effectiveness before a crowd a great deal, if he would take the hunch out of his shoulders. I don't know whether any of you have heard him or not. He has a peculiar hunch in his shoulders. That is a mannerism of his. I wouldn't suggest that he take it out, because when you see that, you know something is coming and you listen for it. It really is an asset. If you know that your mannerisms are assets, keep them. However, this general rule ought to be applied: whenever a mannerism gets in the way of your thought and fastens the attention of an audience upon it, it ought to be eliminated.

For example, I have a very good friend, a teacher, who, when he lectures to his class has just three things he does. First, his notes; second, the corner of the room; third, the window. He just cuts that triangle for a solid fifty minutes. He never looks at a student. What happens? I will tell you what the students tell me happens. They take out their watches and time him, see how long it takes him to make the rounds. A little extreme, surely, but I have seen things almost as bad as that. I know a man who speaks a great deal who does this constantly (indicating). His collar is plenty large enough and for the most part, I think, it is comfortable because when he isn't on the platform he doesn't have any trouble at all. When he is on the platform he does this sort of thing (illustrating) quite continuously until he begins to attract attention and the folks wonder when he is going to do it next. An individual characteristic that becomes a mannerism of that kind ought to receive a little attention.

I have just one more thing. If you are going to gesture, let the gesture correspond to and be a natural outgrowth of the type of thought that you are using. Let me give you one or two extreme illustrations of that. One of my old college professors used to be very fond of telling us in chapel how he loved us as students. He would say, "I love you." But, every time he said so, he would say it this way: "My dear students, I do love you," and then he would shake his fist. I suppose he wanted to emphasize the depth and height and breadth and thickness of his affection. We college boys used to sit down in front, and we caught nothing of the intensity of the dear man's emotions; we watched his pugilism.

I have heard men talk about the immortality of the human soul and just pound the pulpit until it hurt. That is a strange misfit. If we are going to have action, let us get it to fit the occasion and in proportion to the thought and the emotion and the coloring of the expression. The important part of a physical action, if used at all, is the finish. A gesture like this (illustrating) is terrible. A man

begins to talk enthusiastically about a subject and his hand will begin to rise, and you see it quiver with emotion, and just about as he gets the important part he finishes up this way (illustrating). The strength of the action is in the finish.

My time is exactly up, and there are one or two other things I wanted to say but can't.

Speech is my hobby, but one phase of it is also my hobby, stop when they ask me to stop.

Friends, you don't know what a joy your presence here and your attention and your long suffering, patience and endurance has been to me this week. I want you to know that I appreciate it. I am going to take my train in a few minutes. Before I do, I want to wish you good luck and a safe, safe year for the next one. Thank you.

R. B. MORLEY (Secretary-Manager, Industrial Accident Prevention Association, Toronto, Canada): Gentlemen, I think, if we left this room without a formal motion of thanks to Professor Hardy, that we would be doing a thing that no safety man would do, and that is an ungracious thing. I want to move, if I may, and I would like one of the ladies to second the motion, that a hearty vote of thanks be extended by his good friends to Professor Hardy for what he has done for us in these four days.

(The motion was seconded.)

(The audience arose and applauded.)

ADJOURNMENT .

SEVENTEENTH ANNUAL SAFETY CONGRESS
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October 2, 1928

R. McA. KEOWN, Chairman

Engineer, Industrial Commission of Wisconsin, Madison, Wis.

The first session of the American Society of Safety Engineers—Engineering Section of the National Safety Council—was called to order at 2:15 o'clock by the chairman, R. McA. Keown, engineer, Industrial Commission of Wisconsin, Madison, Wisconsin.

CHAIRMAN KEOWN: Gentlemen, the meeting this afternoon is in the nature of a public hearing on topics which have been the subject of considerable study by two committees of the A. S. S. E.—Engineering Section. The first is on the annealing of chains. I will turn the meeting over to Mr. R. F. Thalner, the chairman of that committee, who will conduct this part of the meeting.

(Mr. R. F. Thalner, Safety Director, Buick Motor Company, Flint, Michigan, took the chair.)

CHAIRMAN THALNER: You undoubtedly know that this research has been under way for a year and a half. Just previous to this meeting I was asked: Why is it taking us so long to make this research and get the information that we are after? The answer to that question is this: We have all been discussing the annealing of chains question for the past twenty or twenty-five years. The practice has been in vogue to anneal chains by heating them to various temperatures all the way from 1,200 to 1,700 degrees. Probably no two formulas are similar. This research requires a good deal of work and thought.

We must be sure of our footing. We must know the research has been conducted properly and that the results are correct. Your committee is endeavoring to complete the subject as rapidly as possible. Professor Harold A. Thomas of Carnegie Institute of Technology and his assistants are working diligently on it. In addition to the many other problems he has, such as his regular work, a recent appointment to the War Department, and a special survey for the City of Pittsburgh, he has completed the report you have today.

Progress Report of Research Committee on the Effects of Annealing on Chains

By R. F. THALNER, Chairman

Safety Director, Buick Motor Company, Flint, Mich.

The history and scope of the committee were given in the progress report presented before this Section last year. That progress report also contained the plan of procedure which had been approved by the committee.

Causes of chain failure were discussed at the meeting mentioned above. Professor Harold A. Thomas led the discussion of the progress report and described the work that had been done at Carnegie Institute of Technology in connection with the design of an impact testing machine.

Immediately following the discussion of the progress report submitted last year, Professor Thomas submitted a report of progress and a revised program of tests. That report was submitted to all members of the committee and approved by them. The report is found in *Appendix A*.

During the past year, Professor Thomas has made numerous preliminary tests on the fundamental properties of the grade of steel ordinarily used in the manufacture of chains. These properties are considered to have an important bearing on certain questions arising in connection with chain failure and annealing. Fatigue tests were made on straight bar chain stock with a rotating beam machine. Impact tests were also made to determine the effect of impact upon various specimens. In addition certain tests were made to study the effects of annealing and reannealing. The report on preliminary tests as submitted by Professor Thomas is found in *Appendix B*.

According to the report submitted by Professor Thomas, it is necessary to withhold a final statement of conclusions until the completion of all aspects of the research. Certain inferences, however, are pointed out which appear to stand out clearly as a result of these preliminary tests. These inferences are understood to be strictly of a tentative nature and subject to recall if later work proves this necessary. They are as follows:

1. Summary of General Tentative Conclusions.

(A) Our tests do not afford any evidence that the "surface impacting" received in service is a contributing cause to the failure of chains. On the contrary our tests on soft steel chain stock invariably show that surface impacting strengthens and toughens the metal, so that its tensile strength is somewhat increased and its fatigue resistance is greatly increased.

(B) Our tests do not show any evidence that the effects of fatigue in soft steel are cured or relieved in any way by annealing. In other words the total number of repetitions of loading which can be carried by a specimen of chain before failure cannot be increased by stopping to anneal the specimen at intervals.

(C) Annealing is capable of reducing the fatigue resistance of chain stock, if extreme care is not taken to exclude all air from the surface of the metal during the annealing process.

(D) There is no surface indication that a sample of chain is at the point of incipient failure due to fatigue from repeated heavy loading.

(E) It is not possible by any pulling test or proof test to discover the fact that a chain is at the point of incipient failure due to fatigue from repeated heavy loading. Even though the fatigue cracks may have penetrated to a considerable depth in the metal at the point of impending failure, a chain may still show its full original strength in a tension test, and finally pull apart in a different place from that at which the fatigue break would have occurred.

2. Practical Application of Tentative Conclusions.

(A) We have not been able to discover any fact regarding the properties of soft steel chain stock which supports the theory that periodic annealing is beneficial in any way to chain used for lifting *cold* loads only, or that such periodic annealing will afford the slightest protection against sudden failure of chain subject to repeated overloading with *cold* loads.

(B) The only possible method for insuring safety against the sudden fatigue failure of chains after long service in handling *cold* loads is a rigid prohibition against using the chain to lift loads greater than safe working loads, such as those recommended by the National Safety Council. These working loads are far less than the chain can carry without breaking in a single lift, but cannot be exceeded without stressing the metal in certain parts of the link beyond its endurance limit, and causing its eventual failure.

3. Hot Loads.

Although the effects of *hot* loads have not as yet been taken up in connection with these preliminary tests, it seems desirable to mention the fact that periodic annealing of chain used for carrying *hot* loads is unquestionably necessary as a safety measure for eliminating or minimizing the weakening due to "Stead's brittleness." This is a brittleness which develops in soft steel or wrought iron which has been subjected to high temperature for a considerable period of time.

No change has been made in the personnel of the committee during the past year except that Mr. A. C. Badger, Assistant Metallurgical Engineer of the Youngstown Sheet and Tube Company, Youngstown, Ohio, has kindly consented to act as a member. The remainder of the personnel of the committee is as follows:

Chairman, R. F. Thalner, Safety Director, Buick Motor Company, Flint, Michigan, representing Automotive Section, National Safety Council.

Secretary, Stewart J. Owen, Jr., Safety Engineer, representing National Safety Council.

E. F. Blank, Safety Director, Jones & Laughlin Steel Corporation, Pittsburgh, Pa., representing Metals Section, National Safety Council.

L. E. Frazier, Metallurgical Engineer, representing American Chain Company, Inc., Bridgeport, Conn.

R. H. White, Engineer of Construction, American Locomotive Company, Schenectady, New York, representing American Society of Mechanical Engineers.

W. J. Merten, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., representing American Society for Steel Treating.

F. M. Waring, Engineer of Tests, The Pennsylvania Railroad, Operating Department, Altoona, Pa., representing American Society for Testing Materials.

Carnegie Institute of Technology, represented by: Professor James Aston, head of Department of Mining and Metallurgy; Professor F. M. McCullough, head of Department of Civil Engineering; Professor H. A. Thomas, Associate Professor of Civil Engineering; Professor L. R. Van Wert, Assistant Professor of Mining and Metallurgy; Professor J. M. Daniels, Instructor, Civil Engineering Department.

Frank A. Bond, Vice-President, U. S. Chain & Forging Company, Pittsburgh, Pa., representing Chain Manufacturers' Institute.

A. R. Markel, Resident Manager, representing The Columbus McKinnon Chain Company, Columbus, Ohio.

M. H. Christopherson, State Insurance Fund, New York State Department of Labor, 432 Fourth Ave., New York City, representing International Association of Industrial Accident Boards and Commissions.

George C. Ramsdell, Engineer, The Travelers Insurance Company, Chamber of Commerce Bldg., Pittsburgh, Pa., representing National Bureau of Casualty and Surety Underwriters.

Horace H. Thayer, Naval Architect & Marine Engineer, Witherspoon Bldg., Philadelphia, Pa., representing Society of Naval Architects & Marine Engineers.

David Arnott, Chief Surveyor, American Bureau of Shipping, New York City.

Sydney V. James, Engineer, Casualty & Automotive Departments, representing Underwriters Laboratories, Chicago, Illinois.

Frank A. Bond, Vice-President, representing U. S. Chain & Forging Company, Pittsburgh, Pa.

Lieut. Com. H. N. Wallin, Construction Corps, U. S. N., Bureau of Construction and Repair, representing the Navy Department, Washington, D. C.

APPENDIX A

By J. M. DANIELS and H. A. THOMAS
Carnegie Institute of Technology

(1) *Division of the Research into Periods:* In response to a suggestion made at the recent meeting of the National Safety Congress at Chicago, the following brief summary has been prepared, covering the work already accomplished by the Research Committee on the Annealing of Chains, together with a revised outline for the program of tests to be carried out in the immediate future. For this summary the research may be considered as being divided into the following three periods:

I. *The Period of Reconnaissance.* This has now been completed.

II. *The Period of General Investigation of the Effects of Annealing on the Strength of Chain.* This is intended to bring out the fundamental relations between the failure of chains and their annealing. A primary object of the work of this period will be to discover which tests are of most value and significance in studying this relation.

III. *The Period of Specific Investigation to Determine the Best Temperatures and Conditions for Annealing.* The detailed outlining of the work of this period is to be postponed until after the full or partial completion of the work of Period II.

(2) *Summary of Work Accomplished During the Period of Reconnaissance.*

(A) By officers and other members of the committee.

a. Organization and outlining of the work in general.

b. Correspondence with firms, individuals, and organizations in this country and abroad who have had experience bearing on the effect of annealing on the strength of chains. Much valuable information has been received through this correspondence.

c. Securing numerous samples of chain which has failed in service in manufacturing plants in different parts of the country, together with descriptions of the causes and conditions of failure.

d. Preparation of a printed report of progress by Chairman Thalner. The presentation of this report before the Engineering Section of the American Society of Safety Engineers, at Chicago, Sept. 29, 1927, secured an extensive discussion from members of the society. A number of valuable and constructive suggestions were received from this discussion.

(B) By members of the Committee of Carnegie Institute of Technology:

a. Preliminary tests to study the behavior of chain under ordinary tensile loading.

b. Search for and careful study of available published information having to do with the strength of chains.

c. Visits to plants manufacturing and using chains, including close inspection of various details of the process of manufacture, conversation with superintendents and workmen on the causes of failure in chains and the

utility of annealing, and inspection of numerous broken or damaged chains and links in the scrap piles of the repair shops.

d. Preliminary tests to study the properties of soft steel bars on which a hard surface skin has been produced by numerous blows with a light hammer. (1) Effect on tensile strength, (2) Effect on resistance to repeated bending.

e. Preliminary tests to determine how much the tensile strength of soft steel bars is reduced by repeated bending.

f. Preparing of preliminary plans of two special machines for use in these tests.

(a) A machine for subjecting chain to repeated loading.

(b) A machine for impact tests on chain links.

(3) *Summary of the Causes Tending to Produce a Crystalline Fracture in Chain Links.* As a result of the work now accomplished, it has become evident that out of the numerous causes for the failure of chains, there are only certain ones that produce an effect which could be remedied by annealing. The latter are apparently all of a type tending to produce a crystalline fracture in the metal of the links. Failure with this type of fracture is accompanied by little or no elongation of the metal, and under certain conditions may occur without warning and at comparatively small loads. The following list summarizes the causes which have been brought to our attention as being capable of producing a crystalline fracture in a wrought iron or steel chain link, aside from original defects in the metal.

a. Fatigue of the metal due to repeated loading.

b. Failure caused by a load applied suddenly.

c. Crystalline structure produced in the metal of certain parts of the link during the welding operation by high temperature and insufficient working.

d. Crystalline structure caused by prolonged exposure of the metal to dull red heat (Stead's brittleness).

e. Cracks starting in a brittle surface skin produced by numerous blows and impacts received in service.

f. Cracks starting in a brittle or weakened surface skin produced by rusting or other corrosion.

g. Severe bending and abuse of links in certain parts of the chain, involving a much greater deformation of the metal than is ordinarily considered in fatigue tests.

h. Effect of extreme cold weather in decreasing the ductility of the metal and lowering its resistance to the actions listed above as tending to produce crystalline fractures.

Note: In addition to the above items, mention may be made of the belief which is current among workmen and others that iron or steel of good original quality can deteriorate or "crystallize" in ordinary service without being subjected to heating, corrosion, or to severe or repeated loadings. Although few men of technical training share in this belief, it would seem desirable to include in our program a fair experimental demonstration of the existence or non-existence of such an action in connection with failures of chain.

Outline of Work for Period II. General Investigation of the Effect of Annealing on Chains. On the basis of the work now completed it seems desirable to alter some of the items of our original program, as published in Mr. Thalner's report, and to include other items which have come to our attention since this program was prepared. The revised program is as follows:

(A) *Preparation of Test Specimens.* From each sample of chain as received, the following types of test specimens are to be prepared, each specimen con-

sisting of a number of links. (Detailed explanation of the different items is given on a subsequent sheet.)

Type (1) Chain as received.

- " (2) Subjected to surface impacting.
- " (3) Subjected to repeated loading.
- " (4) Subjected to both surface impact and repeated loading.
- " (5) Subjected to prolonged exposure to dull redheat.
- " (6) Subjected to surface corrosion.
- " (7) Links subjected to severe abuse in bending.
- " (1a) Type No. 1 annealed.
- " (2a) " " 2 "
- " (3a) " " 3 "
- " (4a) " " 4 "
- " (5a) " " 5 "
- " (6a) " " 6 "
- " (7a) " " 7 "

(B) *Standard Tests.* On each of the above types of test specimens the following standard tests are to be carried out.

- (a) Tension tests to destruction.
- (b) Impact tests to destruction.
- (c) Repeated load tests to destruction (except types 3, 4, 3a and 4a).

(C) *Auxiliary Tests.* These are to include:

- (a) Analysis of chain metal as received.
- (b) Metallographic studies of internal structure and composition of metal, (as required).

(c) Use of straight specimens of chain stock, plain and welded, to investigate the fundamental effects of fatigue, impact, surface hardening, etc., on the metal before and after annealing.

(d) Study of the effects of extreme cold in increasing the brittleness of chain.

Comment on the Above Outline. It is not thought that all the combinations of specimens and tests outlined above will give equally valuable and significant results, or even that all will give positive results. These combinations are included to make the work complete and to furnish experimental data to answer as many inquiries or criticisms as possible. As soon as the work has progressed to an extent sufficient to show that certain combinations are not necessary, these may be omitted from the subsequent tests.

Explanation of Items Under Preparation of Test Specimens.

Type 2. *Surface Impacting.* This is to be produced in a foundry rattler using a standard charge of metal balls. A standard number of revolutions will be determined by trial, to give a degree of surface impacting similar to that attained in six months of ordinary service.

Type 3. *Repeated Loading.* A standard loading and its number of repetitions will be chosen to represent approximately six months of ordinary service.

Type 5. *Prolonged Exposure to Dull Red Heat.* Standard temperature and duration of heat to be adopted after preliminary tests to bring out "Stead's brittleness" effect.

Type 6. *Surface Corrosion.* Surface to be corroded with sal ammoniac to correspond with condition of chains lying six months on the ground.

Type 7. *Severe Abuse in Bending.* Links to be gripped at one end in a vise and bent back and forth through a given angle for a given number of times, to be determined by preliminary experiments.

Annealing. A standard temperature and method of annealing is to be adopted for all tests of Period II.

APPENDIX B

By H. A. THOMAS

Carnegie Institute of Technology

1. *Purpose of Tests.* The purpose of these tests was to investigate certain fundamental properties of the grade of steel ordinarily used in the manufacture of chains. These properties are considered to have an important bearing on certain questions arising in connection with chain failures and annealing. In particular it was desired to determine:

(A) How the endurance of this steel under repeated loads is affected by the occurrence of "surface impacting" such as chains receive during service, and

(B) Whether the effects of fatigue in this steel are relieved or obliterated by annealing.

2. *Advantages of Tests on Straight Bars.* The fundamental fatigue properties of a metal can be studied more satisfactory by tests on the material in the form of straight bars than in the form of chain. In standard fatigue tests on straight bars, the various factors affecting endurance can be readily separated and studied individually. In fatigue tests on chain the irregularities in the welding, heating and hammering of individual links necessarily produce a considerable "scatter" in the numerical results of tests. In testing chains, this "scatter" has a tendency to obscure the effects of individual factors, so that a much greater number of tests must be averaged to secure positive conclusions than when the tests are made on straight bars.

3. *Description of Specimens.* The test specimens were made of soft steel chain stock, which was supplied through the courtesy of the United States Chain and Forging Company. The specimens were from the stock ordinarily used in making $\frac{3}{8}$ inch hand-welded chain, this being a continuous coiled bar, approximately round and about $\frac{13}{32}$ of an inch in diameter. These specimens were cut to a length of $13\frac{3}{4}$ inches, this being the length required by the fatigue-testing machines at Carnegie Institute of Technology. The material of these specimens is a dead-soft steel having a tensile strength of about 48,000 pounds per square inch. Before testing, the specimens were straightened with a copper hammer. In general, the specimens were tested with the surface of the metal in its original condition or as modified by annealing or hammering. In a few of the tests the surface skin was removed by filing and polishing, as noted in the record.

4. *Description of Rotating-Beam Machine for Fatigue Tests.* In a repeated stress machine of the rotating-beam type, the specimen to be tested consists of a horizontal bar of circular cross section. At its ends this bar is encircled by two ball bearings which support it and permit it to rotate freely as a shaft, and near its middle it is encircled by two more ball bearings by which it supports a heavy weight. This weight can be adjusted to produce any desired tensile stress in the bottom fiber of the bar considered as a beam. When the bar is rotated, the stress in any given external longitudinal fiber varies from this tension to an equal and opposite compression as the fiber moves from its lowest to its highest point. The bar is rotated by an electric motor, which is stopped by a circuit breaker when the specimen breaks. A revolution counter registers the number of revolutions required to produce failure.

Machines of this type are simple, inexpensive, and positive. In adapting these machines for tests on chain stock, which could not be made perfectly straight beforehand, it was necessary to construct a device which permitted the load to be applied to the specimen gradually, thereby straightening the bar and centering its rotation automatically.

5. *Severity and Scope of Tests.* Ordinarily, fatigue tests are made to determine the "endurance limit" of a metal (that is: the greatest stress at which it would be safe from failure under many millions of repetitions of the load). In these tests on chain stock, however, the object was not to determine the endurance limit, but rather to subject the metal to a stress sufficiently severe to cause it to fail under a number of repetitions of load which might be obtained by an ordinary lifting chain in constant service. With this in mind, preliminary tests were made to select a load which would cause the original or un-annealed bars to fail after about 200,000 repetitions. In service this number would correspond to a lift once a minute, ten hours per day for 330 days. After being once selected this same load was used in all the subsequent tests. With the machines running at 1,500 revolutions per minute, the time required to run off 200,000 revolutions would be two and one-third hours. As it required about one hour's work to center the specimen in one of the machines, the time required for making a single test would ordinarily be from three to five hours.

A number of ordinary tensile tests and cold bending tests were also made on some of these specimens of chain stock.

6. *Nature of Fatigue Failure.* In an ordinary tension test on a ductile metal, such as chain stock, failure of the specimen is accompanied by extensive elongation and deformation of the metal in the neighborhood of the fracture. In a fatigue test no such deformation occurs but the metal breaks off suddenly and without previous deformation or warning. This type of failure is particularly dangerous in the case of chain. It is well known that fatigue failures are caused by the spreading of a minute crack, which usually starts at the surface of the specimen. In some of the tests of this series the existence of these cracks in the incipient stage could be made clearly visible by making a tensile test on one of the pieces of a specimen which had failed in the fatigue tests. The stretch due to the tension would open up the minute fatigue cracks and make them visible to the naked eye.

The condition of the surface of a fatigue specimen has much to do with the starting of cracks, and therefore has an important effect on the endurance of the specimen under repeated loads. In these tests it was considered that the results could be most practical if the specimens were left with their original surface, and were not filed or polished. As fatigue resistance is affected by the chance location of tiny surface flaws, there is more "scatter" or variation in the results of such tests than in those of ordinary tensile tests.

7. *Tests to Study the Effect of Surface Impacting.* The first tests of this series were made for the purpose of investigating the effect of "surface impacting" on the endurance of chain stock under repeated loads. Some time ago the National Safety Council received a letter from a well-known British scientist, expressing the emphatic opinion that sudden failures of chain were caused by cracks starting in a hard and brittle skin produced on chain links by the effects of a multitude of surface impacts received during service. For the purpose of planning our future tests on chain, it appeared highly important to determine at the start whether this theory of failure was a correct one. In order to duplicate in the laboratory the effects of surface impacting received in service, the surface of each of several specimens was subjected to several thousand blows with a small hammer. These blows were sufficiently heavy to slightly indent the surface, but not heavy enough to affect the interior of the specimen or reduce its diameter. Certain preliminary tensile and cold bending tests on these "surface impacted" specimens brought out the fact that the impacted surface should not be described as "hard and brittle," but rather that it should be described as "strong and tough." In the tensile tests, failure invariably occurred outside the impacted portion of the specimens, thus indicating that the tensile strength of the metal had been raised by the cold working

of its surface. In cold-bending tests in which the metal received extremely great deformation, the surface impacted specimens showed no more tendency toward cracking than was shown by the original bars.

The comparative results of rotating-beam fatigue tests on original bars and on surface-impacted bars are given in tests No. 3 to No. 10 on the "Log of Experiment" sheet. From inspection of these results it is clearly evident that the surface impacting has in no case decreased the endurance of the material, and in some cases has increased the endurance enormously. The explanation of this phenomenon probably lies in the fact that the cold working of the outer skin has given it higher strength and elastic limit than are possessed by the original metal.

The results of these tests, therefore, seem to point strongly to the conclusion that there is no truth or merit in the theory that sudden failures of chain are caused by the effects of surface impacting.

8. *Tests to Study the Effects of Annealing and Re-Annealing.* The second object of these tests was to study the question as to whether the effects of fatigue on chain stock could be obliterated by annealing.

Tests No. 11 to 28, inclusive, indicate the results obtained in this connection. The treatment referred to as "annealing" consisted in normalizing the specimens for 30 minutes at a temperature of 1,500 deg. F. in an electrically heated muffle, followed by air cooling.

Tests 11 to 16, inclusive, when studied in connection with tests 3 to 6, inclusive, indicate that a single annealing does not necessarily improve the fatigue resistance of chain stock, but on the contrary, that it may lower this resistance. The cause for this action is probably found in the formation of an oxidized surface on the metal by air penetrating within the muffle used in annealing. This oxidized surface, though hard to the file, is relatively brittle and probably tends to start and localize the cracks which cause fatigue failure.

Tests 17 to 22 when studied in connection with tests 23 to 28 clearly indicate that the effects of fatigue in chain stock are not in the slightest degree relieved or obliterated by annealing. This same fact has been noted by other observers in tests on various other grades of steel. (See Moore and Kommers; "Fatigue of Metals," pages 56 and 220.) The explanation of this phenomenon evidently lies in the fact that annealing temperatures are far too low to produce any welding together of the walls of the tiny incipient cracks whose spreading will eventually cause the failure in fatigue.

Tests 29 to 32 when studied in connection with tests 11 to 16 and 23 to 28 bring out the fact that no considerable increase in the fatigue resistance of chain stock is produced by removing the scale from the surface of the metal. This point has an important bearing on the fatigue resistance of chains under service conditions, where surface scale is removed by wear.

9. *Tensile Tests on Fatigue Specimens.* In the case of specimens 3 to 13, inclusive, tensile tests were made on one of the two fragments of the specimen obtained after failure in the fatigue tests. In explanation of these tests it may be noted that the clear span of the original specimens between the end bearings was 12 inches, and that the ends of the specimen projected $\frac{7}{8}$ of an inch beyond these bearings. The two bearings applying the load were spaced 3 inches apart, each being $1\frac{1}{2}$ inches from the middle of the bar. As the fatigue break seldom occurred at the exact center of the specimen the longer of the two fragments would furnish an opportunity for making two tensile tests, pulling the specimen apart at the two following points: (A) at the point where the loading bearing had been applied, and (B) at the point where the supporting bearing had been applied. At the first of these points the material had been subjected to an intensity of stress and number of repetitions exactly the same as at the place where the fatigue

failure had occurred. At the second point the material had been subjected to no stress and was in its original condition.

The results of these tensile tests bring out the remarkable fact that the tensile strength at the first of these points is invariably as high or higher than that at the second point. This was true even when the incipient fatigue cracks at the first point had become sufficiently deep to be plainly visible after the specimen had been stretched in tension. The explanation of this phenomenon must lie in the fact that the repeated stressing of the specimen has the effect of cold-working the metal until it is stronger than in its original condition.

Two conclusions of much importance can be deduced from these tensile tests:

(A) That absolutely no warning can be expected in case of fatigue failure of chains. Up to the very instant of failure there will be no change in the appearance or dimensions of any parts of the links, nor any diminution of strength which could be detected by a proof test in tension, or by any other known test.

(B) In planning research tests on chain it is futile to adopt any program which depends on pulling tests to determine how much a chain has been weakened by service conditions or repeated loading.

10. *Summary of General Tentative Conclusions.*

(A) Our tests do not afford any evidence that the "surface impacting" received in service is a contributing cause to the failure of chains. On the contrary our tests on soft steel chain stock invariably show that surface impacting strengthens and toughens the metal, so that its tensile strength is somewhat increased and its fatigue resistance is greatly increased.

(B) Our tests do not show any evidence that the effects of fatigue in soft steel are cured or relieved in any way by annealing. In other words the total number of repetitions of loading which can be carried by a specimen of chain before failure cannot be increased by stopping to anneal the specimen at intervals.

(C) Annealing is capable of reducing the fatigue resistance of chain stock, if extreme care is not taken to exclude all air from the surface of the metal during the annealing process.

(D) There is no surface indication that a sample of chain is at the point of incipient failure due to fatigue from repeated heavy loading.

(E) It is not possible by any pulling test or proof test to discover the fact that a chain is at the point of incipient failure due to fatigue from repeated heavy loading. Even though the fatigue cracks may have penetrated to a considerable depth in the metal at the point of impending failure, a chain may still show its full original strength in a tension test, and finally pull apart in a different place from that at which the fatigue break would have occurred.

11. *Practical Application of Tentative Conclusions.* While it is necessary to withhold a final statement of conclusions until the completion of all aspects of this research, it seems desirable for the benefit of those who are waiting for practical results, to point out certain inferences which appear to stand out clearly as a result of these preliminary tests. These inferences are understood to be strictly of a tentative nature, and subject to recall if later work proves this necessary.

(A) We have not been able to discover any fact regarding the properties of soft steel chain stock which supports the theory that periodic annealing is beneficial in any way to chain used for lifting *cold* loads only, or that such periodic annealing will afford the slightest protection against sudden failure of chain subject to repeated overloading with *cold* loads.

(B) The only possible method for insuring safety against the sudden fatigue failure of chains after long service in handling *cold* loads is a rigid prohibition against using the chain to lift loads greater than safe working loads, such as

Results of Fatigue Tests on Specimens of Chain Stock
Observers, H. A. Thomas and C. R. Cotton, Carnegie Institute of Technology
May-June, 1928

Specimen No.	Condition at Start of Test	Preliminary Cycles	Treatment After Preliminary Cycles	After Cycles	Total Cycles to Produce Failure	Average
3	New				219,840	213,540
4	"				210,480	
5	"				205,520	
6	"				218,320	
7	Surface-Impacted				228,000	599,520
8	"				392,600	
9	"				630,440	
10	"				1,147,040	
11	Annealed				133,270	174,678
12	"				136,680	
13	"				252,040	
14	"				180,800	
15	"				189,360	
16	"				155,920	
17	Annealed	100,000	Re-annealed	164,920	264,920	190,260
18	"	100,000	"	102,800	202,800	
19	"	100,000	"	183,880	283,880	
20	"	100,000	"	43,640	143,640	
21	"	100,000	"	44,640	144,640	
22	"	100,000	"	1,680	101,680	
24	Annealed	100,000	Rest 2 days	190,280	290,280	202,312
25	"	100,000	"	140,520	240,520	
26	"	100,000	"	62,200	162,200	
27	"	100,000	"	67,280	167,280	
28	"	100,000	"	52,840	152,840	
29	Annealed; Scale filed off				182,200	208,060
30	"				124,120	
31	"				228,800	
32	"				297,120	
35	New; scale filed off				215,680	

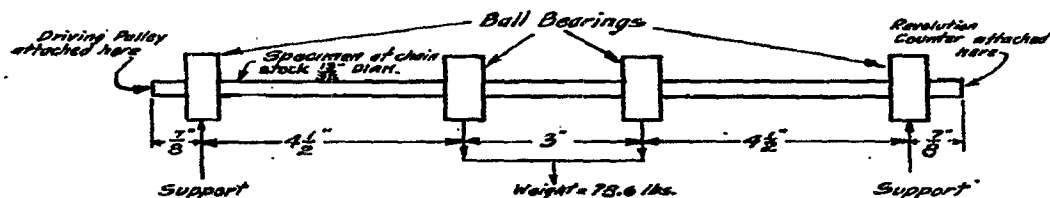


DIAGRAM SHOWING SET-UP OF APPARATUS USED FOR
 ROTATING-BEAM FATIGUE TESTS ON CHAIN STOCK.

Mean diam. of specimen = $13/32" = 0.4063"$.

Bending moment in middle 3" section = $\frac{78.6}{2} (4.5) = 176.8" \pm$.

Max. fiber stress = $\frac{10.18 (176.8)}{.4063^3} = 26,800 \pm 2/0"$.

Explanation of terms used in table and diagram on preceding page:

"Annealed": Subjected for 30 minutes to temperature of 1500° F. in a closed muffle, followed by cooling in air.

"Surface impacted": Surface of middle of specimen subjected to several thousand blows with a small machinists' hammer, each blow being hard enough to produce a perceptible indentation.

"Cycles": Each cycle represents one complete revolution of the specimen.

"Scale filed off": Surface filed and polished in lathe with fine emery cloth.

Note: Some of the specimens varied by a few thousandths from the nominal diameter of 0.4063". The corrections for these variations are not included in the table on sheet 1, as these corrections do not appreciably affect the final averages in the last column of this table.

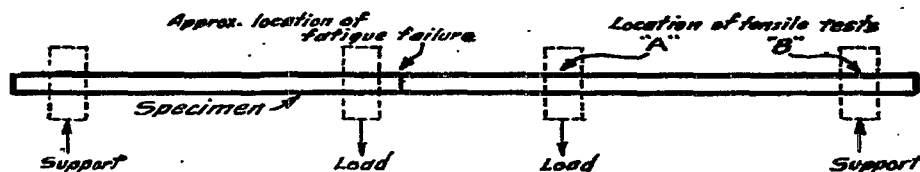
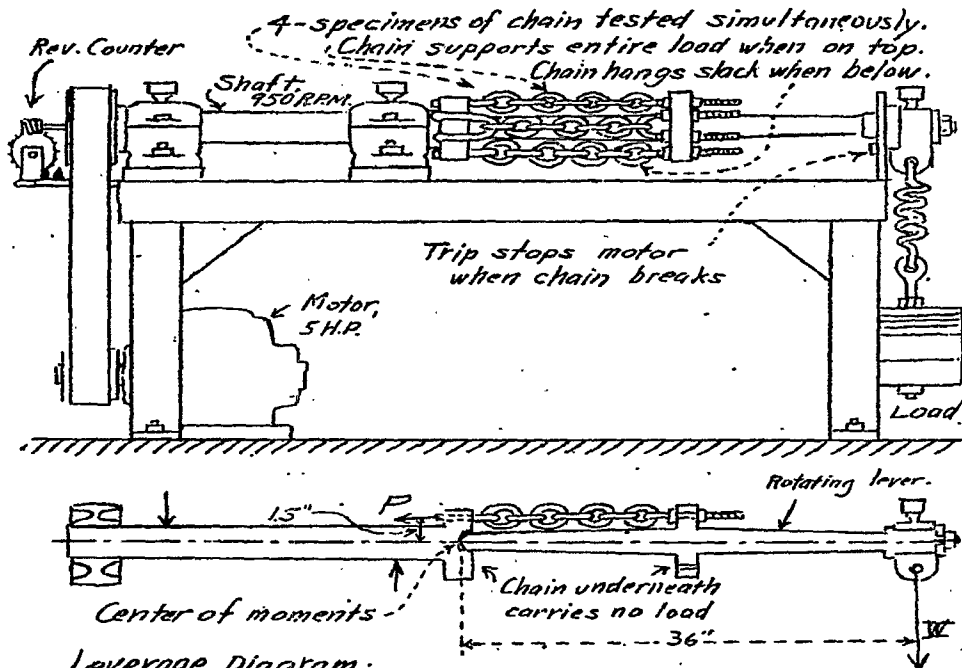


DIAGRAM SHOWING
LOCATION OF TENSILE TESTS ON BROKEN FATIGUE SPECIMENS

Specimen No.	Dimensions of Cross Section			Tensile Strength at Location "A"		Tensile Strength at Location "B"	
	Min. Diam. In.	Max. Diam. In.	Area Sq. In.	Total lbs.	Unit lbs./sq. in.	Total lbs.	Unit lbs./sq. in.
3	.403	.414	.1310	6,650	50,800	6,630	50,600
4	.405	.419	.1332	6,770	50,800	6,470	48,600
5	.400	.412	.1293	6,740	52,100	6,700	51,800
6	.401	.418	.1316	6,550	49,800	6,310	48,000
7	.397	.410	.1278	7,100	55,550	6,860	53,700
8	.400	.415	.1293	6,550	50,700	6,400	49,500
9	.405	.413	.1313	6,980	53,100	6,830	52,000
10	.396	.408	.1268	6,680	52,700	6,550	51,700
11	.400	.415	.1293	6,180	47,800	6,370	48,300
12	.401	.415	.1307	6,060	46,400	6,020	46,100

DIAGRAM OF MACHINE FOR REPEATED-LOAD TESTS ON CHAIN.

Installed in Materials Laboratory at Carnegie
Institute of Technology. Design by Prof. H.A. Thomas.
Materials and labor donated by Jones & Laughlin Co.



Leverage Diagram:

W = weight at end of rotating lever, plus $\frac{1}{2}$ weight of lever itself, lbs.

P = pull on chain when at highest point of rotation, lbs.

By the principle of moments: $P = \frac{36W}{1.5} = 24W$

TABLE I: REPEATED-LOAD TESTS ON CHAIN

The sample for each test consisted of 9 links of $\frac{3}{8}$ " hand-welded soft-steel chain. Figures in table give number of repetitions required to produce failure.

Series 1		Series 2		Series 3	
Chain as received. Unannealed. Max. value of repeating load = 4880 lbs.		Chain as received. Unannealed. Max. value of repeating load = 3500 lbs.		Chain annealed, 40 min. at 1500°F. Max. value of repeating load = 3500 lbs.	
Spec. No.	Reps.	Spec. No.	Reps.	Spec. No.	Reps.
1	155280				
2	87520	29	169720	46	252440
3	102360				
4	86040	33	251880	47	190440
5	50840				
6	57160	34	50720*	48	240560
7	37000				
8	116880	35	502440	49	218240
9	24860				
11	109080	36	625280	55	149680
12	203440				
13	221640	37	780720*	56	166240
14	91080				
15	162276	38	455280	57	209480
16	59520				
17	52680			58	81320
18	53240				
19	48960			59	226360
22	182200				
23	37640			66	137480
24	95680				
25	95060			67	252200
26	71520			68	108160
27	82640			77	162760
28	82640				
Av.	138000	Av.	410920	Av.	184260

* Omitted from average.

TABLE II: TENSILE TESTS ON CHAIN.

The sample used for each test consisted of four links of $\frac{3}{8}$ inch hand-welded soft-steel chain. The specimens listed in the first three groups consisted of unbroken portions of the samples of chain which had passed thru the repeated load test listed in Table I.

Group 1		Group 2		Group 3		Group 4		Group 5	
Unannealed chain after passing thru repeated-load test of Series 1		Unannealed chain after passing thru repeated-load test of Series 2		Annealed chain after passing thru repeated-load test of Series 3		Unannealed chain as received. (Unfatigued)		Annealed chain (40 min @ 1500°F). (Unfatigued)	
Spec. No.	Tensile Strength, lbs.	Spec. No.	Tensile Strength, lbs.	Spec. No.	Tensile Strength, lbs.	Spec. No.	Tensile Strength, lbs.	Spec. No.	Tensile Strength, lbs.
1	10250					1 a	10020	1 b	7760*
2	9810	29	10550	46	8490	2 a	10520	2 b	8570
3	10450		70420			3 a	9690	3 b	9000
4	10680	33	10420	47	6550*	4 a	10540	4 b	8670
5	10250					5 a	10170	5 b	8875
6	9280	34	9590	48	8610	6 a	10100	6 b	4800*
7	10250					7 a	10560	7 b	8860
8	8880	35	10980	49	9080	8 a	10550	8 b	9010
9	9340					9 a	9130	9 b	8900
12	9230	36	7950*	55	8660	10 a	10300	10 b	8580
13	9310					11 a	10720		
14	10520	37	—	56	8920	12 a	10660		
15	10070			57	9120	13 a	10780		
16	10490	38	10310	58	9280	14 a	10190		
17	10610			59	8860	15 a	10840		
18	10430			66	9080	16 a	9360		
19	10180			67	8980	17 a	10450		
22	10580			68	4140*	18 a	10570		
25	10000					19 a	10620		
26	10420					20 a	10730		
27	10100					21 a	9630		
28	10700								
Av.	10288		103700		8908		10292		8801

* Omitted from average

PRINCIPLES AND DATA RELATING TO CHAIN TESTS

Relation between Pull and Stress:

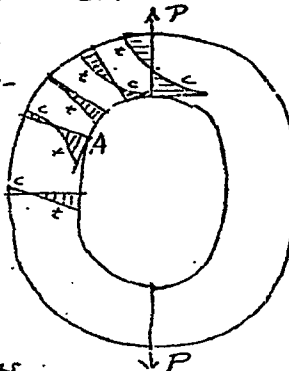
For chain links of ordinary shape the theory of elasticity gives the following relation between the pull on the link and the tensile stress in the metal at the critical point A.

$$S = \frac{2.5P}{d^2} \quad (\text{Univ. of Ill. Bull. 18})$$

where, S = tensile stress in metal at A, lbs./sq. in., P = pull on link, lbs., and d = diam. of bar, inches.

This formula applies only to cases where the metal is initially unstressed and the deformations are within the elastic range of the material. If initial stresses exist or plastic deformations occur, the same formula $S_r = \frac{2.5P_{max}}{d^2}$ is used to compute the "modulus of rupture" S_r or a fictitious fiber stress occurring at A at the time of failure under the load P_{max} .

In repeated-load tests on chain links, plastic deformations during the early loadings produce initial compression in the metal at A, so that the modulus of rupture is higher than the actual fiber stress at A.

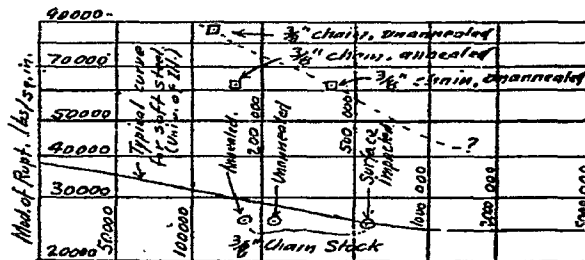


Loadings

for
3/16" Chain

Loading	Load P, Lbs.	Mod. of Rupt. S_r , lbs./sq. in.
Load corresponding to ordinary working stress for soft steel	901	16000
Safe load recommended by Unwin.	1576	28000
Load Used in Series 1	4880	86700
Load Used in Series 2 and 3	3500	62200

Results of Repeated-Load Tests on Soft-Steel Chain and Chain Stock.



Number of Repetitions of Loading.

those recommended by the National Safety Council. These working loads are far less than the chain can carry without breaking in a single lift, but cannot be exceeded without stressing the metal in certain parts of the link beyond its endurance limit, and causing its eventual failure.

12. *Note on Hot Loads.* Although the effects of *hot* loads have not as yet been taken up in connection with these preliminary tests, it seems desirable to mention the fact that periodic annealing of chain used for carrying *hot* loads is unquestionably necessary as a safety measure for eliminating or minimizing the weakening due to "Stead's brittleness." This is a brittleness which develops in soft steel or wrought iron which has been subjected to high temperature for a considerable period of time.

CHAIRMAN THALNER: We have until three-thirty for the discussion of this particular subject. Prof. Harold A. Thomas of the Carnegie Institute of Technology will lead the discussion on this subject.

Discussion of the Committee Report

By PROFESSOR HAROLD A. THOMAS
Carnegie Institute of Technology

I desire to emphasize the fact that these conclusions are of a tentative nature. We are eager to receive comments and discussions, either favorable or unfavorable, any facts which will throw light on these conclusions which are startling to ourselves and probably the same to you.

The first diagram of Appendix C shows a diagrammatic sketch of the machine which has been designed and built for making repeated load tests on chains. This machine was designed by myself after several attempts to design a machine of reciprocating type. The machine is built on the principle of having no reciprocating parts, having rotating parts only.

It has been very successful and has enabled us to test the four specimens at the same time and to get alterations of load at about a thousand per minute.

In a machine of reciprocating type, built by the Yale & Towne Company, in which they lifted a weight and let it down again, it required three years to obtain a test on a single sample of chain, whereas with this machine running at high speed we can obtain a test within a few hours.

I might explain the principle of the machine, although I think it is quite clear in the sketch. The four samples of chain to be tested are bolted on the four sides of a rotating lever. The lever carries a weight at its end and when the chain is in the topmost position the chain carries the entire load at the end of the lever with a multiplication of 24. When the chain is below, it hangs slack and carries no load, and when it is in a side position, it also carries no load.

Table I of Appendix C shows some repeated load tests on chain. The sample of each test consists of nine links of $\frac{3}{8}$ -inch, hand-welded, soft-steel chain. The figures in the table give the number of repetitions required to produce failure.

We designed this machine for $\frac{3}{8}$ -inch chain, with the idea that if there were any errors in the design of the principle, it would not be so expensive as if we designed it for 1-inch chain. We hope some time in the future to have a machine for testing larger chains.

The machine used was donated to the National Safety Council by the Jones-Laughlin Company of Pittsburgh, through the efforts of Mr. Blank, safety director of that company and a member of this committee.

Table I shows the results of the repeated load tests which were obtained during the past months. In Series 1, our tests were made with quite a heavy overload on the chain. The total load was 4,880 pounds. That was possibly 200 pounds at the end of the lever, and the multiplication was 24, giving the total load. The average number of repetitions for loading which that machine carried under the heavy overload was 138,000.

It is interesting, especially, to see the great variation in the results of the individual tests. Specimen 13 carried 221,600 repetitions of this loading, whereas Specimen 9 carried only 25,000, a variation of nearly nine to one.

This extreme variation and the results of the test seem to be characteristic of the chain, and make it somewhat difficult to interpret the results on the basis of averages only.

From the standpoint of safety, we are interested more in the low value than in the average value. Those low values can only be cited by making a great number of tests.

I was not able to discover any surface indications of the reasons why Specimens 6, 7 and 9 gave such low values.

Series 2 and Series 3 were made with somewhat lighter load. Nevertheless they were heavier loads than the ordinary working loads per chain. The specimens of Series 2 were the original links as received, and those of Series 3 were the same links after a single annealing. Series 2 on the unannealed links showed an average number of repetitions of 410,920, and Series 3 on the annealed links shows 184,260.

It is very evident that in these $\frac{3}{8}$ -inch chains the effect of single annealing is to lower the fatigue resistance. I think the explanation is that the working of the chain and the hammering it receives works the material and stiffens it so it has a greater fatigue resistance.

You will notice in Series 2 there is also a wide variation between the maximum and minimum number of cycles, the first perhaps corresponding to a month and a half of service and the second corresponding to a year and a half of service under extreme conditions.

Notice in Series 3 the effect of a single annealing makes the results somewhat more uniform but still does not eliminate all low tests. Specimen 58 carried 81,320 repetitions, whereas Specimen 48 carried 240,560 repetitions, a variation of about three to one.

Table II of Appendix C gives the results of tensile tests on chain. The samples used for each test consisted of four lengths of $\frac{3}{8}$ -inch hand-welded, soft-steel chain. Specimens listed in the first three groups consisted of unbroken portions of the samples obtained from chain which had passed through the repeated load test listed in Table I.

Group 1 is unannealed chain after passing through repeated load test, and it shows the average tensile strength of slightly over 10,000 pounds. Group 4 on the original chain shows practically the same tensile strength.

This brings out the remarkable fact that all this fatiguing of the chain doesn't affect the tensile strength. There may be some tiny, incipient cracks that are invisible to the naked eye and may cause failure. Still, if you attempt to bring those out by tensile stress you cannot do it, because the material at the base of those cracks has been cold-worked by the repetition of loading and is stronger than the rest of the chain, and the chain will break at a different place.

Group 2 shows practically the same thing that is shown by Group 1. Groups 3 and 5 show the effect of single annealing on this $\frac{3}{8}$ -inch chain, Group 3 being on the fatigued specimens and Group 5 being on the unfatigued specimen.

You will note that annealing this material plainly reduces not only the fatigue

strength but the ordinary static strength. Notice how much more uniform the tensile strengths are in the ordinary static tests than in the fatigue tests.

The Principles and Data relating to Chain Tests include certain data with an attempt to reconcile the theory and practice regarding the specimens of chains. The diagram shows the distribution of stresses attained in accordance with the mathematical theory. The greatest strain in the chain link is at point "A." Tensile stress is matched at that point.

Right at the peak of the chain, on the inside, there is a compression stress, which is greater than the maximum tensile stress, but that compression stress does not appear in the chain failure. All your failures come at point "A," where the tensile stress is high.

The table shows various possible loadings for $\frac{3}{8}$ -inch chain. For example: It is desired to load the chain so as to get only a stress of 16,000 pounds per square inch, at point "A." The corresponding load for that chain would be 901 pounds.

A safe load recommended by Unwin, an eminent British engineer, which stresses the material to a load of 28,000 pounds per square inch, at "A" corresponds to a load of 1,576 pounds per square inch at "P."

The load used in Series 1, 4,880, would produce a theoretical stress of 86,700 pounds per square inch. That is higher than the ultimate strength of this material, nearly twice as high, and is evident that it is a fictitious stress rather than a true stress.

The reason for that is in the fatigue test on chains the early part of the loading develops initial stresses in the material, so that at point "A" there is a certain initial compression of the material which relieves this maximum tension so the material never actually reaches 86,700 pounds per square inch, but fluctuates between a value of 30,000 pounds and 40,000 pounds.

In the diagram we have plotted some of the results of repeated load tests on some of the steel chain and on chain stock. There is a line corresponding to the typical curve for some of the steel obtained in a large number of tests in the University of Illinois. Our tests on chain stock fall slightly below that curve. I think the explanation for that is our chain stock has a rough surface, whereas the University of Illinois tests were on stock with smooth surface.

The tests on $\frac{3}{8}$ -inch chain are plotted at the top of the diagram. It is evident the theoretical stresses in that chain are higher than the stresses in ordinary bars of stock.

These values are averages and not low values. If only average values were considered it would evidently be possible to use very high working stresses for chain and loads such as recommended by Unwin, or even greater loads would be perfectly feasible.

When you consider the low individual tests, it seems unreasonable or impossible to make use of these high-working stresses, and it would seem very desirable to hold the working loads per chain to very low values.

I want to emphasize particularly the idea which has continued to impress me during all these tests; that is, the only protection to the user of the chain is the avoidance of overloading the chain. It seems to me impossible to secure the effects of overload. If a chain is habitually and regularly stressed several times, its safe-working load, it will develop flaws which simply cannot be cured by annealing and will eventually cause failure.

The above result will not be acceptable to a great many of the men who have pinned their faith on annealing, because the human being believes the things he would like to believe in a great many cases. A foreman would certainly like to believe he can abuse the chain as much as he wants to and cure such effects by annealing.

My tests convince me more and more that is impossible, and that the National Safety Council's activities through this Section should be in the form of propaganda against overloading chains, and then the question of annealing is a minor question.

Within the past few days the members of the Committee have received a paper by Mr. Merten of the Westinghouse Electric and Manufacturing Company at Pittsburgh, giving a very excellent study on the photomicrographic results obtained in annealing of chains. In that paper it is recommended higher temperatures be used for annealing than have ordinarily been used. The paper is excellently prepared and the work is apparently accurate and scientific, and yet, in my opinion, it does not exactly hit the point.

The author brings out the point that high annealing temperature is required to obliterate the fine structure caused by cold working on chains, and that you cannot obliterate that fine structure without these high temperatures.

My tests seem to show it is unnecessary to obliterate that fine structure. Fine structure is a benefit rather than a disadvantage. The thing which would cause the chain to fail eventually is not the fine structures, but the little, fine, incipient cracks, which you could not find in any individual section, cut and examined with a microscope.

CHAIRMAN THALNER: You have heard some startling revelations. You may have some questions to ask. Prof. Thomas is ready to answer any questions you care to ask.

Bear in mind that the committee is open to any suggestions, and this report, while being of a tentative nature, is a progress report, and as far as we have gone, is the best which can be obtained in the research laboratories of Carnegie Institute.

The completion of this research has not been a matter of six months or a year. We are now on our second year. The subject is an important one. The information we now have at hand seems to indicate we may have been on the wrong track. We should be sure the results we are to give to the public and to our industries are absolutely correct.

For that reason, the research will be continued. It may possibly be finished during the course of this year, so that a complete report can be had, at least at our next annual conference.

But kindly be patient because the committee is doing everything in their power to complete it. We are just as anxious to get the information for you as you are to get it from us.

Numerous inquiries have been received regarding the progress of the research, and undoubtedly there are men in your plants who are anxious to know just what is taking place and what results are being obtained. Kindly pacify them with a copy of this report and tell them that as soon as possible the research will be completed.

We would like to have some suggestions relative to what maximum size of chain you men think necessary to test, whether it should be a $\frac{3}{4}$ -inch chain, a 1-inch chain, a $1\frac{1}{4}$ -inch chain, or $1\frac{1}{2}$ -inch chain. You are the men who are using the chains, and we would like to have the benefit of your experience in conducting the remainder of the research.

May I ask you, Mr. Slaymaker?

S. H. SLAYMAKER (Fairbanks-Morse Co., Beloit, Wis.): We don't use anything larger than $1\frac{1}{8}$ -inch chains.

CHAIRMAN THALNER: Does anybody think we should use chain stock larger than $1\frac{1}{8}$ -inch? Probably $\frac{3}{4}$ -inch is an average.

A. D. BERQUIST (Youngstown Sheet and Tube Co., East Chicago, Illinois): In

these fatiguing tests, was the structure of the chain past the elastic limit before you got the ultimate tensile strength?

PROF. THOMAS: In that chain the elastic limit was extremely low, so the tests were all past the elastic limit; however, not outside the elastic range of the material. The first load we put on the chain stretched it slightly. After that it would run for an hour or so on the machine without any sagging down of weight. I can't answer that question correctly.

MR. BERQUIST: Evidently from the report, the lifting of a load with the load swinging and striking against piles of material will not damage the chain seriously. Also, pulling chains from underneath loads does not have any ill effect on the chains.

PROF. THOMAS: Our tests showed anything that cold-works the surface of the chain benefits it rather than harms it, understanding, of course, the cross section is not affected.

L. W. HOPKINS (American Chain Co., Bridgeport, Conn.): One thing that should be considered in the test is that chains are made of three different and distinct materials—steel, iron, wrought iron. There is a distinction, and I think it should be considered.

I believe the committee's report should make the distinction clear that all the tests have been run so far on steel alone and no reference is made to tests on iron.

There is another thing. Mr. H. J. Gough of the National Physical Laboratory in England saw fit to put before this committee a reference to tests that he had under progress at one time. The National Physical Laboratory has published a 170-page report, covering work over a period of four years, on the failure of wrought iron chains.

There is plenty of evidence in that report, which anyone can obtain, to show that overloading is not causing the failure in chains. I recommend that anyone who wishes to get a fair and impartial story of both sides of the picture should obtain the report and read it over thoroughly. It refers only to the wrought iron chain and is very thorough. The research covers a period of four years.

So far as the surface impact is concerned, I believe an impact test will detect there is something to surface impact. A fatigue test will not. Mr. Gough brings out very clearly in his report that a fatigue test has nothing to do with it.

PROF. THOMAS: We have not completed the impact machine which has been designed. I was much impressed by Mr. Gough's statement, and I made all the tests I could think of to try to discover this brittling effect caused by surface impacts. I have not been able to find any kind of laboratory test that would show such effect.

I have impacted the chain surface by thousands of various blows with a light hammer. Some blows were light, some were heavy. The number of blows also varied. I then tested the tensions. I also put the chain in a vise and slowly bent the chain back and forth. I put it across supports and pounded it rapidly. I have never been able to determine any lowering of the strength or brittleness or cracking caused by that surface skin.

I am open to conviction and anxious to discover any such effect as suggested in Mr. Gough's report, but I have not found it in the tests I have made.

As to the point of not viewing any material other than steel, we have no intention of confining the tests to steel, but that is the material we have worked with so far and have spent all of our time in trying to bring out the facts that need to be discovered. Before making our conclusions at all final, we wish to test the other materials and other sizes of chain and chain stocks.

J. A. NORTHWOOD (Bethlehem Steel Company, Johnstown, Pa.): I was surprised to hear Prof. Thomas make the statement that dragging the chain out from under a load would not injure the links. A report from the American Chain Company on

some trouble we were having gave that as the cause of our trouble. Your statement is just the opposite of the American Chain Company.

PROF. THOMAS: I was referring to the strength of the material rather than to the deformations. I think if the metal were deformed in that process so the shape or cross section were changed, then it would certainly be harmful. But from any tests that I have been able to make there is no reason why the pounding of the metal or the rolling of it or bending it back and forth would lower its strength.

W. N. CLINTON (Staff Engineer, Metropolitan Life Insurance Co., New York City): Prof. Thomas, if the modulus of rupture is higher than the actual fibre stress "A," have you been able to determine yet whether or not that differential is constant and proportionate with the various diameters of chain, or have you got into diameters greater than $\frac{3}{8}$?

PROF. THOMAS: This machine we have now only takes the $\frac{3}{8}$ -inch chain, and we have not been able to follow up that point.

MR. CLINTON: I wonder whether it is your opinion the stress would be the same if it were plotted out on the curve.

PROF. THOMAS: I think we would get the same values in the modulated rupture in larger chains as in the larger bar with straight stock.

E. F. BLANK (Jones & Laughlin Co., Pittsburgh): In view of what Prof. Thomas has said in regard to the cold-working effect on the chain, I would like to ask this question: If the cold working makes the chain stronger, wouldn't it be better to cold-roll the same chain stocks for making chains? Would that raise the strength of the chain?

PROF. THOMAS: I think if it were possible to get a good weld and then subsequently do something to increase the strength of the material, we would have a better chain. I think the principal reason for using the dead cold material is we are getting better welds. If it were possible to use cold-rolled material and then hammer the weld in after the welding, it would give a better chain.

MR. BLANK: I don't mean to use higher carbon steel. Take the same steel we are experimenting with at the present time and cold-roll it.

PROF. THOMAS: If you use cold-rolled steel at the unwelded end of the link, the link would be stronger even at the welded end. After you heated it, the cold-rolled would be gone, of course. If it were possible to subsequently hammer that welded end and it would do the same thing as cold-rolled would do, I think we would have higher property in every way.

C. L. YORK (General Electric Co., Schenectady, New York): Have you tried electric welding?

PROF. THOMAS: The tests so far include the hand-welded chain. I realize the $\frac{3}{8}$ -inch size, hand-welded chain is not established at the present time. We chose that as a representative of the larger sizes, and we are very anxious to get the tests on that welding chain, but have not been able to do it so far.

CHAIRMAN THALNER: Are there any further questions? We have obtained much from this discussion and the questions asked. I hope you will all take these reports with you, thoroughly digest them and give them consideration.

Bear in mind that in any discussion of this report which you may have with anyone else, the report is purely of a tentative nature. Tests have been performed only on $\frac{3}{8}$ -inch steel chain. Consequently they do not cover the range we all wish for. The final tests will take in the various materials and different sizes.

The other point to remember in discussing this report, is the fact that it applies only to cold loads. Hot loads will also be taken up in the research.

MR. NORTHWOOD: In order to get it into the record, I would like to know where we can get the report the American Chain Company man referred to.

MR. HOPKINS (American Chain Co., Bridgeport, Conn.): The title of the report

is, "The Causes of Failures of Wrought Iron Chains." The report is from the Department of Scientific and Industrial Research, 16 Old Queen Street, Westminster, S. W., London, England.

CHAIRMAN THALNER: If there are no further questions, we will bring the discussion of this report to a close. I thank you and hope next year we will have a complete report on the question of annealing of chains.

(The meeting recessed.)

(Chairman Keown resumed the chair.)

CHAIRMAN KEOWN: Gentlemen, the next committee which will report this afternoon is a research committee on Low Voltage Electrical Hazards. They have no printed progress report for you, but Mr. S. E. Whiting, of Boston, is chairman of this committee, and I wish to turn this part of the meeting over to him to conduct as he wishes.

(Mr. Whiting took the chair.)

Report of the Low-Voltage Electrical Committee

By S. E. WHITING
Chairman

Gentlemen, I only wish we could report to you as thoroughly and constructively as your committee on the Annealing of Chains has just reported. Our problem is quite different from theirs. Those of you who have been following our Committee know we began four or five years ago as a very small committee and then about two years ago, with the approval of the main Executive Committee of the National Safety Council, we brought into our organization the representatives of all the different national associations that are interested in this problem. Many of those representatives are here today and I hope that you will have the privilege of hearing from them.

If you were at our meeting in Detroit, you will recall at that time we discussed the technical details of how to prevent these fatalities by proper electrical construction. There is no argument about that part of the program. The electrical industry knows very well how to prevent low-voltage fatalities by proper use of electrical apparatus and devices. Our problem is, how to get this message over to the actual user, and it is not to go into technical details of insulation design or installation rules.

First of all we must decide whether there is any appreciable low-voltage electrical hazard. We have been stumbling along for some time, trying to get statistics. We attempted first, through this A. S. S. E.-Engineering Section, to get you gentlemen to report those statistics, and we got a meagre six or eight fatality reports. We did not think that was the whole story. We were glad you did not have any such death cases in your own plants, but we wanted to get all there were in industry, in the homes and elsewhere.

We did not know how to get this record until, last fall, we learned of one source of such information that is confessedly a very unreliable source, not reporting with any scientific accuracy at all, but yet a record of apparent death cases from apparent exposure to low voltage. We got, in the three months period of last fall from newspaper reports apparently country-wide, made available to our committee, 45 death cases that had occurred on low-voltage equipment. By low-voltage equipment, we mean anything from, say 700 volts down. In some cases we knew from the report or could easily guess what the voltage was. We found some of

those death cases were on 110-volt lighting circuits. We found some were occurring in the homes and some in industry.

Thereupon Safety Council Headquarters approved the attempt to get further statistics from newspaper sources, and that is what we have been attempting to do in this past year. Unfortunately Headquarters did not get complete service of that sort for some time, so we did not begin to get everything that happened until about the middle of last June. Then the cases began to come to us in bunches,—and they are still coming in. All I have had opportunity to do is to analyze three months of such newspaper reports, taking them for what they are worth.

You may recall also that we reported, in this section, at the Detroit Safety Congress, some 80 electric-shock fatalities on low-voltage equipment, but the period and the territory over which that exposure had taken place were entirely indefinite. It was merely the accumulation of past years that we happened to get hold of from insurance companies, mostly. The experience already mentioned (three months in the fall of 1927) was that we were getting a rate of 15 death cases from low voltage per month, country-wide.

I have put on the following chart, a first analysis of the newspaper reports during this summer. Of course, the newspaper reports send in all electrical cases, high-voltage as well as low-voltage. I made the attempt to separate the high from the low. There are no cases here included where the person killed was connected with an electrical power company. Any report saying that a "lineman" of such-and-such a place was doing so-and-so, was thrown out, as also were accidents to power station or substation operators. It is not our function to analyze high-voltage exposure. That is handled by another of our Safety Council sections, the Public Utility Section.

Recent Low-Voltage Fatalities

(Approximate data only)

Principally from newspaper reports throughout United States during three summer months of 1928.

Comprises all utilization circuits below 750 volts including trolley and third-rail circuits of railways, mines and industrial plants.

Excludes all cases on any voltages, occurring among electric power company employees.

General Classification

Type of Utilization Equipment	No. of Deaths
Fixed Machines, Switches & Wiring in Industry.....	59
Extension Lamps & Cords in Industry and Homes.....	43
Portable Tools in Industry and Homes.....	33
Home Electric Equipment (other than Lamps & Tools).....	28
Electric Railways	17
Miscellany	7
Total	187

Average Frequency During Summer Months

Total Cases from June 15, 1928 to Sept. 15, 1928.....	143
Average Rate During This Period.....	10 Deaths per Week

I do not know that all of these cases actually occurred on low voltage nor even that any of them did. All I do know is that they were reported to have occurred in the handling of utilization equipment which would not be operating normally at high voltage. I want to call your attention to one point in this connection. We have been somewhat criticized for saying a man was killed by an extension lamp on low voltage. How do we know it was low voltage? Why was it not possibly a high-voltage charge momentarily on that extension lamp?

When my own company has had the liability for an electrocution in a plant nearby and the equipment was left alone intentionally until I went out there and had a chance to test it, I could not even then, knowing the entire details, say whether it was high-voltage or low-voltage shock. There might have been a momentary high voltage at the time the man was killed, and the low voltage that I measured, as 110 or 220 or 550, may not have been the actual voltage at the time of the accident. The point is, we do not care, from the standpoint of prevention, whether it was low voltage or not. We want to prevent these electric-shock fatalities altogether, and this hazard from improper handling of utilization equipment would be all the more serious if it were true that high-voltage leaks were the real cause of them.

There are reasons that were discussed in a former meeting of our Committee (see Detroit Safety Congress Transactions) why these cases probably are genuine low-voltage fatalities, so we need not take the time to go into that at this meeting.

That is the record—187 cases sent to us this year so far. Fifty-nine were on "Fixed Machines, Switches and Wiring in Industry." That means anything in the factory that is fixed in place. Next in number come "Extension Lamps and Cords," 43 cases partly in the factories and partly in the homes. The group "Portable Tools," wherever used, was 33. The fourth item is 28 cases of "Home Electrical Equipment" not including extension lamps and portable tools. The "Street Railway" deaths of 17 cases are included as examples of genuine low-voltage deaths from trolley circuits. Finally, there are seven from miscellaneous causes.

Some of these latter cases were quite amusing, if a death case can be amusing at all—for example, where a man got tired of life and electrocuted himself. He knew enough about the hazard at least to get into a bath tub first because he wanted to be sure of the job. He would take perhaps a copper plate and tie it on one side of him, and sit on another plate, and turn on some water and, of course, connect the plates up to a lamp circuit, and then pull the chain. His body was found that way. Some cases were apparently where men thought they could give themselves electrical treatment. One man wove electric wires into his bath robe.

That is our present situation. We do not know whether this is the average rate or not. We know merely that we were getting fairly complete newspaper reports during that three months period. I think it is entirely fair to say that since this three months period included an abnormally wet season, the record is higher than we should expect on the average, because wetness is one of the prominent elements of low-voltage fatalities. Some of the accidents are where the man was out in the rain at the time or came indoors with his clothes wet, or perhaps had gone into a basement to start a pump where the cellar was flooded. Such cases would not be normal in dry weather.

There were some other electric fatalities not here included that are of interest to all Safety Council members as public fatalities. Indeed, they are of interest to you all personally in looking out for your own family. I refer to Fallen Wire and Radio Antenna fatalities. The tabulation excludes these because they are both usually in the class of high-voltage accidents. If we wished to include these latter cases, we should have to add about a third more and run the total number

up above 250 in this three months country-wide exposure to non-technical persons, still omitting the specialists like electric power company employees who are handling the problem in a trained manner. Thus, excluding all wiremen, linemen and operators, we have had this summer a frequency rate of one thousand electric-shock fatalities per annum throughout the United States. That gives us some rough quantitative measure of the severity of this hazard to the layman. In comparison with the automobile hazard, it is not particularly bad,—only about 4% as bad, but it does equal or exceed the record of other hazards we make a special effort to counteract, such as certain mechanical hazards, chemical hazards, etc.

Now what is the electrical exposure compared to other industrial hazards? The exposure is absolutely tremendous if you consider all the electrical equipment in homes as well as in factories, and the rate of fatalities in respect to exposure is therefore quite low.

However, being safety men, we should like to cut down even that figure if we could, and we get back to the question: What are we going to do about it? We have decided that the electrical industry knows exactly how to prevent these cases. They have a National Electrical Code that has been in existence for a generation, but is kept right up to date. Practically all these cases occur in violation of that Code. Why is the Code being violated? Because you and I in our homes, when we want any electrical connections made, do not hire an electrical contractor to come around and charge us \$5 or \$10 to connect an extension lamp in a safe manner. We go around to some store and buy the sockets and the lamp cord, etc., and wire them up ourselves. That tendency I think is increasing with the use of radios and even radios are no longer confined to the trifling battery voltages but are run right off our lighting circuits.

Some of the reported cases are quite tragic,—for example, the bath tub cases. We must learn to use more care in such situations. A person will take some electrical hair curler, vibrator or heater into the bath room, get into a tub of water and then use that device. Or else, if the lighting wiring is below standard, there may be a brass socket drop cord over the bath tub,—an absolute violation of the wiring rules. The drama comes in when that person is killed. Take one striking case in Chicago last summer. A man of middle age, living with his mother in Chicago, was an invalid. (That will give the skeptic a chance to say he died from a weak heart, but never mind that.) He went to take a bath and had an electric heater from which apparently he received a shock. It is surmised his mother, hunting for him, went in there later and trying to save him, got a shock too and was killed. Nobody had occasion to visit that family until ten days later, when they found the bodies.

Gentlemen, you should keep in mind that there is a possibility—only a remote one fortunately—of catastrophies in connection with electric-shock hazards. By a catastrophe an insurance man means five or more killed by the same accident. In fact there was during the summer period one such case, although it was high voltage. Five persons were killed by a fallen wire down in Arizona. One person got wound up in the wire and another naturally went to his help, and he was killed. A third went and the third was killed; and then a fourth and fifth were killed. This impulse to rescue those in danger is instinctive, of course, but we all need to learn more effective methods than were shown in this Arizona case.

Take industrial exposure if you prefer, where most always you have electric portables of some kind. Consider the ordinary coal yard where power-driven loaders are often used. There is one in a New England city that had such a situation. They were using a 550-volt portable loader in the yard and it had rained during the morning. The loader wiring was not up to the latest standard, but I need not go into the details of that. Three men were pushing that machine closer to the pile of coal and all three of them were killed.

That is not a very nice thing to happen to a poor innocent coal dealer who does not know anything about electrical hazards. I can not blame him for such an accident. I do not know that I blame the electrical contractor who put in the wiring so that, by chance, three men were killed. Many electrical contractors still believe you can not get fatal shocks on low voltage. They are still from Missouri on this danger and so too are many city inspectors. Nobody, of course, would have allowed that triple fatality to occur if they had fully appreciated the possibilities of the situation. That accident was the result of pure ignorance and this ignorance needs to be dispelled. Gentlemen, if any of you have this condition in your own plant, you ought to apply the practical remedy that is already available to you.

I know you will enjoy hearing from some of our Committee members who represent prominent outside organizations. The National Electric Light Association has been very much interested in this problem from the beginning. Practically all electric power companies are members of that Association. Mr. E. W. Gorry of United Electric Light & Power Co., New York, is our regular member, but he was taken ill with a cold last night and can not be here. Mr. Hammer is taking his place.

Report for the N. E. L. A.

H. B. HAMMER (Philadelphia Electric Co., Philadelphia): Mr. Chairman, Mr. Gorry has asked me to make a brief report as to what his committee in the N. E. L. A. is attempting to do toward passing out information relative to educating the public and others upon the low-voltage hazard. Mr. Gorry is Chairman of a Subcommittee of our Accident Prevention Committee, that is dealing specifically with this question. He tells me that a circular or pamphlet has been prepared which contains the fundamental precautions concerning low-voltage hazards. This will be brought up for consideration and probably approved at a meeting to be held in Philadelphia next week. That pamphlet is for distribution to the public, and according to Mr. Gorry's plans, it will be distributed in large quantities. The material has already been prepared, and is now awaiting approval by the Committee which is sponsoring this work.

In addition to this, a similar pamphlet is being prepared for distribution to employees of N. E. L. A. members and to electrical contractors, which will differ somewhat of course from that prepared for distribution to the public. The preparation of this second pamphlet has not been carried as far as the first one, but it is on the way towards completion and it is expected to be available in the near future.

In addition to this, arrangements have been made, in a series of pamphlets put out by the Women's Committee of the National Electric Light Association and known as "More Power to the Home" series, to incorporate our new pamphlets, which bring out the precautions which are pertinent to that particular subject. The precautions will also be incorporated in all existing pamphlets as they are revised and republished. These pamphlets have been given a wide distribution among company women employees and their specific purpose for use in meetings of various sorts is as a sort of hand book on general constructional material, relating to various appliances in the home. I believe, Mr. Whiting, that is practically all Mr. Gorry has to report in the way of specific educational work that is under way.

CHAIRMAN WHITING: There are two other representatives of the National Electric Light Association here. We all know how extensive that organization is. The new chairman of their main Accident Prevention Committee, Mr. C. R. Beardsley of Brooklyn Edison Co., will say a few words.

MR. BEARDSLEY: Mr. Whiting and Friends: It goes almost without saying that our interest in the National Electric Light Association and your interest in the National Safety Council is absolutely the same. There can be no conflict of our intentions or aims in the matter of accident prevention, and in the specific matter of low-voltage hazards, I see no difference in those aims and intentions. Sometimes we do differ slightly in the method of presentation. That is a matter that can be adjusted, and we propose to go about the adjustment of it.

Two Phases to the Subject

Last year the subcommittee Mr. Hammer mentioned was appointed to attack this subject. As we see it, there are two phases. One of the education of the public and that is a long drawn-out process which has been attacked in the manner which he has described. The other side of it to my mind is a good deal more difficult. It is the prevention of the sale of defective devices. I just came across a letter on my desk yesterday, from one of our members. Possibly some of you have seen the publication. It is a description of a lot of wiring devices which are substandard. You can buy an electric toaster for 15 cents. You can imagine what it is.

Possibly that is an extreme comparison, but the same element runs through very many of these devices. It is a problem which is very difficult to attack in any way and yet many people are uninformed and are buying those devices. When we view that prospect and what it may lead to, I think there is reason for our concern. I am very glad that all these various groups are getting after it and are interested.

Now as to the matter of presentation, I think that you will agree, I hope you will, that the more people we can get back of this prevention work, the stronger we shall all be, and we are not going to get other people in our industry back of us until we approach them with a presentation of which they will approve and which they can put out over their endorsement. That is the only point in which we will have to sit in together and come to a little compromise. We are very anxious to combine our efforts. We are very anxious to cooperate in any way possible. We do have to consider some other viewpoints. I do not need to go into the detail of those viewpoints at this time, but I think you will recognize that if the other man is approached in such a way that he will endorse our methods without reservation, his strength is going to be thoroughly added to any efforts we make.

CHAIRMAN WHITING: Mr. Maxwell, being an electrical engineer, you can tell us something about the engineering side of it.

ALEXANDER MAXWELL (National Electric Light Association, New York): There is, I believe, one aspect of the subject which the other speakers have not developed, in which you know my interest very well, and that is the statistical aspect. Our organization has been trying very hard to organize some statistical source that will give us technical information. That, we feel, is indispensable in dealing with the engineering side of the low-voltage hazard.

Mr. Whiting has told you already that there is no recognized source for such statistics. Indeed the chart that he has posted here is the best thing I have seen on the subject anywhere at any time and although we are all indebted to Mr. Whiting for that, I think he would be the first to acknowledge that it is not good enough. We need a lot more information. We need more detail as to the situation and conditions surrounding the individual cases. We need a tabulation according to voltage and various other things. I wish that it could be managed.

I want to say that there seems to be very little prospect for its being managed on any basis of general organization, but even if we could get what exists, it

would help. Here, for example, are some 187 cases. Mr. Whiting on another occasion reported 80 cases. I have heard from time to time of others interested in the subject who have so many cases, perhaps a hundred, perhaps only a couple of score. If all of those could be brought into some central point and examined in great detail and the duplications eliminated, it might not be wholly successful but on the other hand there might be some yield. An effort could be made to secure those essential technical elements that are generally lacking in press notices.

I think we could thus make quite a little progress on it, and I don't mind saying, on behalf of our own office, that if all of those who possess these individual cases would give them to us we would be quite willing to undertake the labor of elaborating them as far as that can be done. In the light of earlier experience, I certainly would not want to promise too much, but we would be very glad to do what we can in that connection. I wish your Committee might be the agency to collect the material.

CHAIRMAN WHITING: There is a gentleman who is connected with the New York Edison Company, who has had the privilege of representing, on our Committee, both the American Society of Mechanical Engineers and the American Institute of Electrical Engineers. Furthermore he presented a paper in the General Session Monday on "Safety Through the Utilization of Electrical Power." I would like to have Colonel Jackson tell us his viewpoint on how we can do some educational work on this problem.

COL. J. P. JACKSON (New York Edison Company): Mr. Chairman, I think it was a year ago that we had a meeting of our Committee in Chicago, and this educational question came up first as a vital problem to be taken up and pushed. At that time I represented Mr. Gorry for the N. E. L. A. as well as my own representation. In the course of the discussion I suggested to the Committee that there was one body in the United States which was well qualified to carry on the electrical hazard educational work, in fact better qualified than any other, and that was the National Electric Light Association, and I believed that Association should be asked to take the lead in that kind of education.

Mr. Whiting and his Committee talked it over, and it was finally agreed that that was the wise move to make. Through that action, the matter was brought to the Committee of which Mr. Beardsley is Chairman, the N. E. L. A. Accident Prevention Committee, and last year at Louisville the matter came up, and the special subcommittee concerning which Mr. Hammer spoke this afternoon, was appointed to go into this matter.

Adhere to the Chicago Plan

In other words, your Committee, at the stated meeting, did all the work that the National Safety Council should do on this subject. I believe, personally, we should adhere strictly to that plan that was started in Chicago. In the first place, the National Electric Light Association has within its membership the great bulk of the electric light and power companies of the United States which have, according to the paper Mr. John M. Lieb gave on Monday, that I had the honor of reading, already reached through the homes 63 per cent of our whole people, through installations of electricity. As to our shops, the electric light and power companies supply 75 per cent of all the power used in the industries of this country. The home lighting, shop lighting, and use of electric power are increasing rapidly, so within a few years practically all power of a character that does not require heat will be from central stations.

That means that the electric light and power companies as a group can reach through their customers practically all our home people and industrial workers. Furthermore the electric light and power companies, through their individual

experience, probably know better than any other industry how to reach the customers and the kind of information and education they ought to have. So I maintain that the policy we adopted in Chicago of following the National Electric Light Association and helping them and cooperating with them through our own publications should be continued.

CHAIRMAN WHITING: I regret one of our members was unable to get here, Mr. W. J. Canada, representing the National Electrical Manufacturers Association, to discuss what Mr. Beardsley mentioned, this 10 and 15 cent stuff you can buy at many stores. The N. E. M. A. is doing what it can to make utilization equipment safe. I have been rather astonished to see in the past some of the reputable electrical device manufacturers in this country making, for example, holders for extension lamps (and not cheap ones either) where they did not recognize fully the possibility of electric shock. They did not attempt to avoid exposed metal parts that could easily become charged when the device gets wet, as any electric lamp holder is bound to get sooner or later. Mr. Canada has already taken up this problem.

You will be interested to have a brief resume of what can be done from the wiring standpoint on some of these electrical hazards, particularly on portables. I will call on our member who represents the Bureau of Standards, Dr. Lloyd. He is also chairman of the National Electrical Safety Code, a most valuable standard for the safe installation and operation of all kinds of electrical equipment, both high-voltage and low-voltage.

DR. M. G. LLOYD (Bureau of Standards, Washington, D. C.): Mr. Chairman and Gentlemen: I think perhaps an assembly of men such as we have here, who are connected to some extent with industrial plants and with utilities, is a good place to give some publicity, and through them to a still larger circle, in regard to the recognized methods for preventing some of these low-voltage accidents.

In this assembly of cases here you will notice more than one-third are concerned either with extension cords or portable tools. The 1928 edition of the National Electrical Code has recognized that hazard by having incorporated within it a new rule covering the grounding of portable devices in an industrial establishment. Probably not many of you have seen this new code yet—the 1928 edition that has just come out during the last month.

A New Code Rule

There is a new rule, No. 908, page 134, under the title, "Method of Grounding Portable Equipment in Industrial Establishments." The rule reads as follows: "In industrial establishments portable devices having exposed metal parts used in industrial operations shall be equipped with a cord containing an additional insulated conductor to be used for grounding purposes only and easily distinguished from the circuit conductors, or with metal armor." And then it refers to recognized types of armor and goes on to make corresponding provisions for polarized plugs and receptacles to be used with such a portable cord.

You will notice there are two methods of grounding in the case of a portable device. One is by having the cord made up with a separate conductor for the grounding purpose, which is connected at one end to the casing of the portable device and connected at the other end (that is, at the receptacle, through a prong of a special plug) to either the steel conduit, if it is a conduit installation, or the armor of the flexible cable, which of course conducts the ground up to the receptacle. That is a new rule in the Code and it is something that has not been generally done. Individual plants have taken steps to carry out that idea before. For example, Mr. Goodspeed told me that they do it in the General Electric plants. In the city of Detroit it has been required for some years that the entire city be

equipped that way, not for 110-volt devices but for 220 and 440-volt devices. The city of Grand Rapids, Michigan, I know has been requiring it.

Hereafter it is going to be a general rule, applying not only to the higher voltages but also to 110-volt portable devices in industrial plants. It will probably take some time to get this new rule into working condition. Many contractors and jobbers around the country perhaps have not been carrying this kind of equipment, but undoubtedly they soon will be if this rule is put into effect in different municipalities and of course by the inspectors of the fire underwriters. Most of these groups generally enforce the provisions of this National Electrical Code.

Just a word about these methods; the one of using additional wires in the cords and the other of using a portable cord which has a flexible armor around it. Of the two, it seems to me the flexible armor is the best practice, because it does two things. It not only carries the ground connection from the wall receptacle to the device itself but provides mechanical protection for the connecting flexible cord itself, which the other method does not do. Looking again at that table, we see 43 cases of death due to extension lamps and cords, and I would guess that a large number of them are due to defective cords which have worn bare, exposing a conductor so that contact can be made with it. I have known of several cases of that kind in my personal experience, and have no doubt most of the 43 are of that type. If you use a cord with an armor around it, it seems to me it is going to cut out that class of accident represented by the 43 as well as the class represented by the 33.

According to this compilation, the 43 group is the more important, and it may be more important to protect that cord from wear which will expose the conductors than it is to ground the case or frame of the portable device itself.

I hope you will all take this thought back home with you and spread the idea of this new rule in the wiring Code and the advisability of carrying it out in order to avoid the casualties that we have been having right along.

CHAIRMAN WHITING: Mr. Barnes represents the Association of Electragists, International. They are the electrical contractors who are as close to the users of electrical devices as any technical group. He will be glad to give the viewpoint of the electrical contractor on this subject.

One Hundred and Ten Volts Can Kill

H. W. BARNES (New York City): When Mr. Whiting was speaking formerly, he mentioned the common belief that 110-volt circuits are "low-voltage and won't kill." It has been my personal experience, and I presume it has been the experience of a good many others, that even 110 volts will kill. I would like to see anyone contest the point by sitting in a tub of water with 110 volts in either hand.

The cases that come up are not very much under the control of the contracting industry because the contractors rather follow the regulations that are made than initiate them. It is, however, the desire and one of the purposes of our group of electrical contractors, who call themselves the Association of Electragists, International, to see to it that their members follow out the rules and provisions of the National Electric Code, and particularly of local ordinances and other standards of installation, taking into account the hazards to life and property which go beyond even the requirements of the National Electric Code.

As the gentlemen representing N. E. L. A. said, we have to take a good many viewpoints into consideration in the electrical industry. The man manufacturing an article which costs the public more money immediately runs into a sales resistance for that article. Consequently he may be interested in another form of article that does not cost so much. Our purpose is to study first, what are

the necessities of life hazard and property hazard protection, and then get out the best article from an engineering standpoint and from a practical point of view for the public to use, but to absolutely squash all materials and appliances which fall short of that standard. The Association of Electragists is always glad to commit itself to such a program.

CHAIRMAN WHITING: I suppose, if the electrical fire inspectors or the city wiring inspectors were entirely onto their job, we laymen would not have to go into this problem ourselves because there would not be any more of these bath tub fatalities. I would like to hear why that is not done, from the representative on our Committee, of the Association of Electrical Inspectors, Mr. Cahaskie, who is also Chief Inspector of the Electrical Bureau of New York Board of Fire Underwriters.

Problem of the Inspection Bureaus

C. S. CAHASKIE: Mr. Chairman and Gentlemen: You have given me a very hard job to explain why all these accidents have not been prevented by the inspection bureaus. I would like to tell you that every accident that is brought to our attention is investigated carefully and notes taken to see whether the electrical equipment complies with the local rules and with the National Electrical Code. If we find it does not comply with the Code, we immediately call it to the attention of the owner of that equipment, and they failing to correct it, the building is "put on a slip," which means that the fire insurance rates are increased up to 50 cents per hundred. A 50-cent rate is almost a prohibitive rate, so that means, if they carry fire insurance at all, they must make corrections immediately.

We cannot force them. We have no police duty nor police authority. The only weapon we have is that of the fire insurance rate. We have found that the people are willing to cooperate with us in most cases. Lighting companies are very much interested in this. They have helped us a lot. They are probably closer to these people than we are and can present the hazard to them forcibly.

In this city we have a rather large committee, representing all branches of electrical industry, of which Mr. J. C. Forsythe, Supervising Engineer of the Electrical Department, New York Board of Fire Underwriters, is Chairman. We have brought sub-standard conditions which exist here before all the large department stores, manufacturers, chain stores, and the smaller contractors. We are gradually reaching out to get every one of them. I am very glad to say that the large department stores and the chain stores that we have reached have all been glad to cooperate with us in this movement to eliminate sub-standard electrical material which I believe is the cause of a great many of these accidents, principally of the 43 mentioned here in this table.

I find that the cords and devices for lamps have been the cause of a good many accidents. The lamp wires put out are pretty cheap. They are made to sell at a price to compete with other stores who are running sales. The devices are not properly made. The conductors are of the poorest. The insulation on the conductors is of the poorest class. All of these people, including the 5 and 10 cent stores and other chain stores have agreed to eliminate this material gradually; that is, when they order new material to put in their orders at Underwriters Laboratories standards and all material and devices will have to be furnished on that basis. We should gradually get rid of all that sub-standard material. With those who do not work with us, we shall have to be a little more severe and use the rate.

CHAIRMAN WHITING: I am going to call on two of your Engineering Section members to close this discussion. Mr. Opp, will you say a few words?

GEORGE OPP (Detroit Edison Company, Detroit, Mich.): I am very happy to see this world-wide interest in this subject. It shows that everybody is thinking about

it. And just as soon as we get our thoughts put together there is bound to be a solution before long. I want to praise each and every one of the speakers for presenting his viewpoint, and I trust that the committee, in getting together for the coming year, will consolidate those viewpoints and accomplish something within the next twelve months. You are on the road, and God speed.

CHAIRMAN WHITING: The last speaker I have a particular grudge against, because he is the man who gave this committee to me. But I will heap coals of fire on his head by calling his attention to two cases that were noted when we made this analysis of newspaper reports. The man who spends all his time at a Safety Congress, playing golf, wants to be pretty careful that he does not get killed by lightning. In all seriousness, a golf player should not, when a thunder storm comes up, run to shelter under a tree. That is the worst thing he could do. He had better stay out in the rain and get his togs all wet than to get under a tree. There were two cases in this three months' period where a golf player ran under a tree in a lightning storm, and that was just where the lightning struck, and he was killed.

Mr. Banash may close the discussion, and tell us anything he wants to.

Human Life Above Monetary Value

J. I. BANASH (Consulting Engineer, Chicago, Ill.): Mr. Chairman and Gentlemen: After those complimentary remarks, I want to announce that I have not played golf yet during this convention. I guess Steve is right; I did wish this job on him. I was the original Chairman of this Committee, but Steve is a fellow who likes to work, so we gave it to him.

Looking at this thing by and large, from our own viewpoint, that is the American Society of Safety Engineers, if the low-voltage hazard has been so insignificant as has been statistically proven, and here shown, why are we taking so much time and trouble about it? One of the answers is probably this: Human life in the volume shown here for that short period is perhaps more valuable than can be measured in money. Another thing is that any such occurrences, which receive the publicity they do, without detailed explanation which the newspapers cannot give, is a detriment to the industry, and a continuation of unsafe practices will gradually accumulate a larger accident record.

I am very glad to hear of the cooperation which is being received from the chain stores in New York. But I wonder if it is going to be possible for those people to remain in any electrical business if they agree with Mr. Cahaskie to handle nothing but the preferred material. Perhaps when it comes to that point there will be a division of opinion, which I hope will not occur.

I have not much to add in the way of contribution to this discussion except one thought. Our friends of the N. E. L. A., who have spoken, have shown considerable progress. This Committee of ours has no definite intention of bringing out specific codes, but it runs in my mind that if the cooperation between the various bodies interested could be extended just a little further, as by giving Mr. Whiting, as Chairman, an opportunity to read and perhaps comment on the proposals which are to be up for adoption by N. E. L. A. at Philadelphia next week, it might perhaps with no change, perhaps with some changes which are not significant, be possible to get our Executive Committee to agree to lend the added weight, if any, of our endorsement to such publications.

MR. BEARDSLEY: I am very glad to commit the Accident Prevention Committee to the proposition of having Mr. Whiting review what we have before us in Philadelphia, after it has received the consideration of our own executives.

(Chairman Keown resumed the chair.)

CHAIRMAN KEOWE: I am sure I express the sentiments of the Section in thanking Mr. Whiting and the members of the Low-Voltage Electrical Committee for the work they have done, and also the speakers of the afternoon, who have contributed to its success.

ADJOURNMENT

October 3, 1928

R. McA. KEOWN, Chairman
Engineer, Industrial Commission of Wisconsin, Madison, Wis.

The second session was called to order at one twenty-five o'clock by the chairman, R. McA. Keown.

Report of the Steering Committee on Research, Standards and Codes

The work of your Steering Committee on Research, Standards and Codes during the past year has been similar to the work of other years. This has included:

1. Giving advice to the Executive Committee of the National Safety Council upon subjects proposed for codes or research.
2. Appointing Research Committees.
3. A general check-up of research, standards and code work which is in progress by members or representatives of the A. S. S. E.-Engineering Section.

At the present time there are six Research Committees:

1. The Effects of Annealing on Chains, R. F. Thalner, chairman.
2. Elimination of Harmful Noise, Dr. H. Clyde Snook, chairman.
3. Low Voltage Electrical Hazards, S. E. Whiting, chairman.
4. Static Electricity, Thomas W. Butler, chairman.
5. Wire Rope Attachments and Connections, Charles C. Sunderland, chairman.
6. Sandblasting Hazards, Dr. Leonard Greenburg, chairman.

Progress reports will be presented at this Congress for discussion on The Effects of Annealing on Chains, Elimination of Harmful Noise, and Wire Rope Attachments and Connections. Work of the Static Electricity Committee has been delayed pending the completion of negotiations which are under way with certain engineering colleges for making desired static electricity tests. It is expected these tests will be started this fall.

Because of the lack of condensed and authoritative data relating to accident and health hazards confronting employees in many industries, seventeen committees have been organized to study the hazards in seventeen industries and to prepare reports of practical recommendations to decrease or eliminate those hazards. It is intended these reports will be used as bases for Safe Practices pamphlets which will be guides for all persons in the industries involved. The seventeen committees are as follows:

1. Bakery Operation Hazards, Walter S. Paine, chairman.
2. Candy Manufacturing, Glenn W. Cook, chairman.
3. Clay Products, H. H. Hamm, chairman.
4. Dairy Products, F. W. Braun, chairman.
5. Dry Cleaning and Dyeing Establishments, Dr. Morton G. Lloyd, chairman.
6. Enameling and Japanning, R. C. Stratton, chairman.
7. Excavating and Pile Driving, M. E. Arkills, chairman.
8. Food Preserving and Canning, H. J. Potter, chairman.
9. Hotel Accidents, W. Graham Cole, chairman.

10. Lacquers and Miscellaneous Pyroxylin Products, John S. Shaw, chairman.
11. Leather Tanneries, Oliver F. W. Cromwell, chairman.
12. Mercantile Establishments, David S. Beyer, chairman.
13. Paper Box Making, W. A. Weir, chairman.
14. Printing and Bookbinding, John J. Lamb, chairman.
15. Rayon Manufacturing, G. E. Minshull, chairman.
16. Structural and Sheet Metal Fabrication, D. L. Royer, chairman.
17. Tunnel and Caisson Work, R. McA. Keown, chairman.

Other committees on additional subjects should be organized as conditions warrant. All members having statistics or other data which will be of value to any of the above named committees are urged to submit such information to Stewart J. Owen, Jr., Safety Engineer, National Safety Council headquarters, Chicago, Illinois.

The A. S. S. E.-Engineering Section is sponsor or joint sponsor under AESC procedure for fifteen safety codes six of which have been approved and published:

1. Forging and Hot Metal Stamping.
2. Ladders.
3. Point of Operation Hazards of Rubber Mills and Calenders.
4. Power Presses and Foot and Hand Presses.
5. Pulp and Paper Mills.
6. Colors for Traffic Signals.

The following nine safety codes are not as yet completed nor published:

1. Compressor Air Machinery—The formulation of this code is well under way.
2. Floor and Wall Openings—A draft of this code is under consideration by the Committee.
3. Gas Mask Canisters Color Code—The work of this code is well under way.
4. Rubber Machinery—Considerable work has been done on this code. One part dealing with the point of operation hazards of rubber mills and calender has been approved and published.
5. Scheme for the Identification of Piping Systems—The work on this code is practically complete.
6. Standardization of Methods of Recording and Compiling Accident Statistics—The sectional Committee has recently been organized for this code.
7. Textiles—The third draft of this code has been sent out to the committee members for their consideration.
8. Walkway Surfaces—The work of this code is well under way.
9. Window Washing—The first draft of this code has been submitted to members of the sectional committee.

The American Engineering Standards Committee has committees on seventy-three safety codes. The 29 approved and published codes are underscored. Where A. S. S. E.-Engineering Section representatives have been appointed the names of such men are given after the title of each code. Copies of safety codes which have been approved and published may be obtained from the National Safety Council.

U.S. Dept. of Labor
Bull. 436

Society of Automotive
Eng. Nees, Inc.

Amer. Eng. Standards Com.
11. S. Del. of Labor
Bull. 350.

1. Abrasive Wheels, Safety Code for the Use, Care and Protection of—W. D. Keefer, G. E. Sanford.
2. Aeronautics, Safety Code for—G. A. L. Beaudoin, G. E. Peterson.
3. Amusement Parks, Safety Code for—S. J. Williams.
4. Automobile Brakes and Brake Testing, Safety Code for.
5. Automobile Headlighting, Safety Code for—W. G. King.

6. Building Exits, Code for—S. J. Williams.
7. Compressed Air Machinery, Safety Code for—A. S. Johnson, Dr. A. D. Risteen, D. L. Royer.
8. Control Apparatus, Industrial (Electrical).
9. Conveyors and Conveying Machinery, Safety Code for—R. F. Thalner.
10. Cranes, Derricks and Hoists, Safety Code for—J. F. Connor, S. H. Libby.
11. Drainage of Coal Mines.
12. Dust Explosions, Safety Code for the Prevention of.
13. Electrical Devices and Materials with Relation to Fire and Casualty Hazards, Specifications and Standards for—J. I. Banash.
14. Electrical Equipment in Coal Mines—R. L. Kingsland.
15. Electrical Fire and Safety Code.
16. Electrical Safety Code—R. W. E. Moore, G. E. Sanford, S. E. Whiting.
17. Electrical Wiring and Apparatus in Relation to Fire Hazards, Regulations for.
18. Elevators.
19. Elevators and Escalators, Safety Code for—W. E. Crippen.
R. C. Stratton.
20. Exhaust Systems, Safety Code for—H. G. Hensel.
21. Explosives, Safety Code for.
22. Explosives, Mine, Safety Code for—John L. Boardman.
23. Explosives, Permissible, Specifications for the Testing and Use of.
24. Fire Fighting Equipment in Metal Mines—R. V. Ageton, J. I. Banash.
25. Floor and Wall Openings, Railings and Toe Boards, Safety Code for—A. W. Benz, E. B. Tolsted.
26. Forging and Hot Metal Stamping, Safety Code for—W. D. Keefer, Thomas Irving, H. L. Johnson, J. L. Thompson.
27. Foundries, Safety Code for the Protection of Industrial Workers in—S. E. Hassell, G. E. Sanford.
28. Gas Mask Canisters, Code for Colors for—E. S. Beaumont, S. H. Kershaw, C. E. Rice, B. F. Tillson, H. J. Weeks.
29. Gas Safety Code—E. J. Reeder.
30. Heads and Eyes of Industrial Workers, Safety Code for the Protection of—G. E. Sanford.
31. Illumination, Coal Mine, Safety Code for.
32. Installation of Pulverized Fuel Systems.
33. Ladders, Safety Code for—H. B. Gaffers, M. C. Goodspeed, W. Newell, W. E. Welch, H. G. Wiberg, C. N. Young, H. A. Schultze.
34. Ladders and Stairs for Mines—Carl Scholtz.
35. Lamps, Electric Mine, Permissible Portable.
36. Laundry Machinery and Operations, Safety Code for—F. F. Beik.
37. Lighting and Factories, Mills and Other Places, Code of—W. D. Keefer.
38. Lighting of School Buildings, Code of—William Darlington, G. H. Stickney.
39. Lightning, Code on Protection Against—F. A. Epps, E. R. Scales.
40. Loading, Underground, Mechanical, in Metal Mines.
41. Locomotives, Storage Battery, for Use in Gaseous Mines—C. D. Woodward.
42. Logging and Saw Mill Machinery, Safety Code for—C. O. Hero, W. D. Keefer.
43. Mine Tracks and Signals.
44. Outside Coal Handling Equipment—H. T. Bannister.
45. Piping, High Pressure—H. M. Toombes.

46. Piping Systems, Scheme for the Identification of—W. D. Keefer, S. H. Kershaw, G. E. Sanford, H. T. Weaver.
47. Plate and Sheet Metal Working, Safety Code for.
- U.S. Dept. of Labor
Bull. #430 48. Power Presses and Foot and Hand Presses, Safety Code for—C. B. Auel, A. L. Kaems, W. D. Keefer, C. Van Horn.
- U.S. Dept. of Labor
Bull. #463 49. Power Control, Mechanical, Safety Code for.
50. Power Transmission Apparatus, Mechanical, Safety Code for—H. A. Schultz, John Williams.
51. Prevention of Dust Explosions in Flour and Feed Mills.
52. Prevention of Dust Explosions in Sawmill Factories.
53. Prevention of Dust Explosions in Terminal Grain Elevators.
- U.S. Dept. of Labor
Bull. #410 54. Pulp and Paper Mills, Safety Code for—R. M. Ahman, G. E. Burns, A. P. Costigane, Holger Jensen, G. E. Williamson.
55. Pulverized Systems for Sugar and Cocoa.
56. Refrigeration, Mechanical, Safety Code for—J. I. Dunsmuir, H. S. Smith.
- Amer. Eng. Soc. Comm. 57. Rock Dusting of Coal Mines, Recommended Practice for—Thomas G. Fear.
58. Rubber Machinery, Safety Code for—E. W. Deth, R. H. Blanchard, J. E. Condon, H. A. Dodge, A. E. Hoener.
- U.S. Dept. of Labor
Bull. #447 59. Rubber Mills and Calenders, Point of Operation Hazards of—Same as Rubber Machinery.
60. Sanitation, Industrial, Safety Code for—L. D. Barlingame, C. F. Horan.
61. Standardization of Methods of Recording and Compiling Accident Statistics—C. B. Auel, E. F. Blank, L. A. DeBlois, E. L. Hewitt, W. D. Keefer, L. R. Palmer.
62. Street Traffic Signs, Signals and Markings, Code of—S. J. Williams.
63. Textiles, Safety Code for—W. D. Keefer, E. F. King, Ignatius McNulty, Harvey Saul.
64. Tools, Machine, Safety Code for—A. F. Dunnebacke.
65. Transportation, Coal Mine, Safety Code for—George C. McFadden.
66. Underground Transportation in Metal Mines.
67. Ventilation Code—W. J. Graves, S. J. Owen, Jr.
68. Ventilation in Metal Mines—Daniel Harrington.
69. Walkway Surfaces, Safety Code for—R. P. Blake, A. S. Regula.
70. Window Washing, Safety Code for—G. E. Burns.
71. Wire Ropes for Mines—B. F. Tillson.
72. Woodworking Plants, Safety Code for—A. S. Regula.
- Amer. St. Ass'n. 73. Colors for Traffic Signals—W. S. Paine, David Van Schaack, M. G. Lloyd.

Our Society is also ably represented by H. Weaver Mowery on the National Building Codes that are being formulated by a special committee organized by Secretary Hoover, and by Walter G. King on the committee on light and safety of the Illuminating Engineering Society.

Mention has been made in previous reports that the work of a code committee is difficult and exacting. Many of the meetings are held in widely scattered places and, therefore, much of the work must be done by correspondence. All of our representatives on the various codes have given freely of their time and advice in order that the section may be properly represented. All members should cooperate with these representatives through submission of information, recommendations

for adoption of the codes, etc. It is only by close cooperation between the members of the section and our safety code representatives that the desired results will be obtained.

G. E. Sanford, Chairman
L. A. DeBlois
M. G. Lloyd
H. W. Mowery
G. C. A. Opp
S. J. Owen, Jr.
D. L. Royer
R. C. Straton

Report of Membership Committee

One year ago we had ~~100 members and 402 associate members~~, making a total membership of ~~502~~.

During the past year, your Membership Committee has secured 25 new members and 33 new associate members, a gross gain of 58.

Unfortunately, however, there have been 45 resignations during the year, of which 25 were members and 20 associate members.

During this same period, 21 of our associate members have been raised to full membership.

Thus, we now have a total membership of 1,005, of which 648 are members and 393 associate members. This is a net gain of 7.

S. V. JAMES, Chairman
W. E. WELCH
F. L. HURLBUTT

Report of Steering Committee on Regional Safety Conferences

Through the wholehearted support and cooperation of the local safety councils, industrial sections, Council members, and outside organizations, your committee has the pleasure of reporting that twenty-two successful regional safety conferences were organized and held during the past year under the sole or joint sponsorship of the ASSE-Engineering Section, National Safety Council. This is three more than the total reported for the previous year, and it is most gratifying to note that the total attendance has exceeded the records of all previous years. Furthermore, it is thought that a better geographical distribution was obtained.

In addition to the twenty-two conferences that were held under our recognized auspices, your committee assisted in formulating the plans for twenty-one other safety conferences for which we received no formal recognition. These conferences included such meetings as the New York State Safety Conference, the All Ohio Safety Congress, twelve conferences conducted by the Portland Cement Association, several organized by the National Petroleum Association, and others.

Thanks to the cooperating bodies, ten of our twenty-two conferences were miniature safety congresses and were held in Boston, Mass.; Lansing, Mich.; Kansas City, Mo.; Newark, N. J.; Chicago, Ill.; Oshkosh, Wis.; Janesville, Wis.; Wausau, Wis.; Philadelphia, Pa.; and Los Angeles, Calif. Here, various sectional meetings were held simultaneously, and those who attended emphasized the fact that their individual problems were much more intimately discussed.

The remaining twelve conferences of the year were held in Duluth, Minn.; Erie, Pa.; Pittsburgh, Pa.; Portland, Oregon; Birmingham, Ala.; St. Louis, Mo.; Allentown, Pa.; Providence, R. I.; New Orleans, La.; Seattle, Wash.; Spokane, Wash.; and Tacoma, Wash.

So great has been the interest shown in regional safety conferences that in several instances the demand for tickets for the evening dinner meetings exceeded the available accommodations. Many companies send their entire supervisory forces, particularly to the evening meetings.

The free exchange of ideas and experience has brought about the success of these conferences, and those attending stress the fact that their superintendents, foremen, and others get the spirit of the safety movement more forcefully than in any other way.

Encouragement has thus been given to your committee to proceed with tentative plans for other conferences to be held during the coming year, and on behalf of our new committee on conferences, I bespeak your full assistance and support. If any of our members want regional safety conferences in their communities, just make your wishes known to your committee and an immediate response and offer of complete cooperation will be forthcoming.

E. Ross Farra, Chairman
E. B. Lefferts
A. J. Van Brunt
Cyril Ainsworth
E. W. Bullard
M. J. Flyzik
G. E. Burns.

Report of the Committee on Chapter Organization and Activities

During the last year the Northern New Jersey chapter has been recognized as a full chapter of the A.S.S.E.-Engineering Section. Its membership is largely made up of engineers in the Newark district who found it impossible to attend meetings of the Metropolitan chapter which formerly covered this territory. The new chapter is strongly organized, and the members are taking an active interest in safety and engineering developments.

At Worcester, Mass., another chapter has been organized and will ask the Executive Committee at its next meeting for recognition as a full chapter of the A.S.S.E.-Engineering Section. This new chapter has a membership of 36 men who are enthusiastically interested in this line of work. We expect the organization to grow rapidly and become one of our most successful chapters.

Attempts were continued to interest the California Society of Safety Engineers and the Southern California Society of Safety Engineers in affiliation with the A.S.S.E. After giving the question careful consideration these societies declined membership in the A.S.S.E. largely because of our membership rules which provide that a member of the A.S.S.E. must also be a member of the National Safety Council. We hope, however, to eventually succeed in interesting these men in affiliation.

Unsuccessful efforts have been made to revive interest in the Hartford Chapter. Local politics however, have done much to dampen the ardor of the more active members. Interest is now centering around the establishment of a chapter of the National Safety Council in Hartford and when this is a reality we should be able to reorganize the chapter of the A.S.S.E.

We have also corresponded with the Pennsylvania Society of Safety Engineers, the Ohio Society of Safety Engineers and the engineering Societies affiliated, with the local Chapters of the National Safety Council in Detroit, Kansas City, Cleveland, Atlanta and St. Louis.

This committee has listed a number of arguments for affiliation with the A.S.S.E. which have been sent to several independent engineering societies in an effort to interest them in the A.S.S.E. A definite program is planned to follow up these letters at regular intervals to further emphasize the advantages of affiliation.

In connection with the organization of new chapters the committee compared the Constitutions and By-Laws that were submitted for approval by chapters of the A.S.S.E. Investigation showed that there was considerable variation in the laws and rules governing our different chapters. The committee deemed it advisable to prepare a standard form of Constitution to be adopted by all chapters. This investigation also covered the Constitution and By-Laws of the A.S.S.E.—Engineering Section (parent organization) and in these the committee has suggested several minor changes that will be presented for approval and adoption.

The objections of the California Societies suggested the desirability of creating a new grade of membership in the A.S.S.E. It is the belief of this committee that there is a large number of qualified men who are not members. These men are interested in the work of the A.S.S.E. and would be glad to take an active interest if the qualifications for membership were so changed that they could be afforded the full privileges of the organization without the financial objection of keeping up an individual membership in the National Safety Council. We believe that this is one of the foremost obstacles to our efforts to interest independent engineering societies in affiliation with the A.S.S.E. While such a change in the membership rules would be contrary to past and present custom, we feel sure that in the long run it would be helpful in securing new members not only for the A.S.S.E. but also for the National Safety Council. In conformity with these views we have presented the question to the Executive Committee for consideration.

This committee has also prepared and distributed among chapters of the A.S.S.E. and several engineering societies a list of speakers and the subjects on which each one is qualified to talk. We hope that this list will be helpful in arranging interesting programs.

Plans are now under way to establish a systematic exchange between our chapters, of programs for meetings, minutes of meetings and other information that may be helpful in securing full attendance at meetings and a wider membership for each chapter.

We wish to express our appreciation for the splendid cooperation and help extended to us by all of the chapter leaders. Special mention should be made of the support which we received from Mr. Keefer. Any success that we have had and any progress that we have made should not be credited to the Committee inasmuch as a great deal of the real work was done by Mr. Keefer.

Respectfully submitted,

H. W. Heinrich, chairman
C. B. Auel
S. F. Larchar
B. F. MacDonald
R. W. Pendleton
B. O. Pickard
A. S. Regula
J. M. Waltz

Report of Committee on Accident Prevention in Engineering Colleges

During the past year, your Committee on Accident Prevention in Engineering Colleges prepared the first four of a series of illustrated safety lectures for use in engineering colleges.

Accident Prevention—A Factor in Engineering.
Preventing Accidents on Woodworking Machines.
Safety in Foundries.
Preventing Personal Injuries in Machine Shops.

Copies of these lectures were sent to deans of one hundred and thirteen engineering colleges with letters explaining and urging their use. Unfortunately, many colleges received these letters too late in the closing semester to use them before the start of the summer vacation. Nevertheless, five colleges did use them and reported that they were favorably received by the students. Thirty-eight others acknowledged their receipt, indicated their interest, and expressed their willingness to use them after the start of the new fall term.

This has encouraged your committee to believe that other lectures should be added to this series as rapidly as practicable. Accordingly, six new lectures are now in the making.

To further promote the use of these lectures, your committee has appointed a member of the ASSE-Engineering Section in each college town to serve as a liaison officer between our Society and the local engineering college. These men are helping in no small way to secure greater recognition for the safety movement in the minds of our future engineers and industrial executives.

J. I. Banash, Chairman
R. McA. Keown
J. O. Keller
A. A. Potter
G. E. Sanford
Col. John Price Jackson
Ernest Hartford
A. W. Whitney
C. E. Pettibone
George T. Seabury
Dexter S. Kimball
T. T. Read
Robert L. Schmidt
F. L. Hutchinson
W. Dean Keefer.

CHAIRMAN KEOWN: Each of you has at hand a copy of the reports of the various committees of the section. I wish to briefly touch upon some of the high spots in those various reports. Heretofore it has been the practice to have each of the committees report individually. This year we are trying out the scheme of bringing them all together.

The first report in your pamphlet is that of the Steering Committee on Research, Standards and Codes. This has been a rather busy committee. Mr. George Sanford, vice-president in charge of engineering of the council, has been chairman of this committee.

There are, as the paper shows, six principal research problems under way. Yesterday afternoon we had progress reports on two of them, namely, the Effects of Annealing on Chains, and the Low Voltage Electrical Hazards. Tomorrow afternoon there will be an open meeting of the Committee on the Elimination of Harmful Noise. This report states that the Committee on Wire Rope Attachments and Connections will have a report, but the committee will not report because at the time the program was made up for the Congress their report was not in complete form. They have had a committee meeting during this Congress but are not ready to make their report. The Sandblasting Hazards Committee is being formulated at the present time. I think that will be a very important subject, and we ought to get a lot of good information out of it.

Arrangements are being made now with the Bureau of Standards with a view of having them do the test work for the Static Electricity Committee.

This year it was the thought of your officers that if we could get more of the membership actually doing the work we would have a more successful section.

With that thought in mind and also knowing that we had very little material on a number of subjects, a list was prepared of topics upon which we desired information.

Seventeen different subjects were suggested, and a questionnaire was sent out to the membership of the section asking them to designate as first and second choice those which they would like to work upon. We got a very fine response.

As a result, seventeen different committees have been formed. Your program shows the time and place of meeting of each one of those seventeen committees. I hope if there are any of you who are members of those committees you will make it a point to be at the meeting. There is no report to make, I presume, by most of them, because they are just getting started. I believe the work will be of great value when it is completed. One of the most important things the membership can do, is to assist those committees in collecting material which can be used as the basis of safe practice pamphlets for the various industries involved.

There is also listed here the codes in which the A. S. S. E. Engineering Section is interested. Those codes in which the council is asked to be sponsor are handled by the A. S. S. E.—Engineering Section. All of the various safety codes being formulated under the American Engineering Standards Committee are listed here together with the names of our representatives. This ought to be valuable for reference.

The Membership Committee report is given, and you will notice we have made a slight increase in membership. There are quite a number of new members, but there were also some resignations, so that at the time this report was made up we had one thousand and five members, of which six hundred and eighteen are full members and three hundred and ninety-three associate members. The report doesn't show a very large growth, but I don't think it is necessarily the size of the section that counts. However, if any of you know of men who are eligible and ought to be in this section, we desire you to send in their names to the Membership Committee so that they may be acted upon.

The committee on Regional Safety Conferences has been active during the year. There have been held in the past year twenty-two different original meetings, of which this section has been sponsor, cooperating sponsor at least, for about ten of them. I have personally attended several, and they have been very successful. They are in effect really miniature congresses, with different sections running simultaneously and a general session or two. It is desired the work which has been largely under the direction of Mr. George Burns of the National Council Staff, will continue.

The committee on Chapter Organization and Activities has a report. The statement is made that the Worcester Chapter would apply for its charter. That has

already been taken care of by the Executive Committee of your section since the report was prepared, so that we now have a chapter at Worcester.

The committee on Accident Prevention in Engineering Colleges has made some progress. During the year pamphlets have been printed on four topics. There has been some demand for them, not as much perhaps as there would have been had the list of subjects been larger. We feel, however, that this work should be carried on, more subjects developed, and that we give publicity to the fact that such material is available. Three of these lectures are illustrated, and slides have been prepared for sending out with these lectures.

The committee has appointed liaison members of this section in connection with one hundred and nine colleges throughout the country. Those men should be a valuable help to us in getting this work across. It has always been difficult to get this material to the young engineering student.

I wish to take this opportunity of thanking the various committee members, and especially the members of the headquarters staff, Mr. Keefer and Mr. Owen, who have done such good work during the year in looking after the details, keeping after these committees, and getting the work done. I hope this kind of cooperation will be continued, as I know it will, for the new officers who are coming in.

The next item of business is the proposed amendments to the constitution. Copies of the amendments were sent with a letter ballot to all members of the section. However, the response to the letter ballot was not great. I submit the amendments for your consideration. I think Mr. Heinrich, chairman of the committee, had best speak and tell you what is proposed.

H. W. HEINRICH (Asst. Supt. Engineering and Inspection Division, the Travelers, Hartford, Conn.): I believe Mr. Keefer's letter dated August 30, 1928, sums up in rather conclusive form the way the amendments may be considered. Was it your thought I am to discuss the amendments themselves?

CHAIRMAN KEOWN: Perhaps many of the members here are not familiar with them, or haven't their copies. I wish you would explain the changes proposed.

MR. HEINRICH: It is believed necessary to change the existing statement in the rules referring to the object of the A. S. S. E. Engineering Section. It is thought to be an advantage to change the wording, and the change is a simple one fundamentally.

The rule now reads, "The object of this society is to promote the arts and the sciences connected with engineering in its relation to safety for life and property."

In the suggested change we believe it would be better, instead of referring to the relation between engineering and safety for life and property, to relate engineering to accident prevention and to the protection of property. The change is in no way so fundamental as to upset the line of thought under which the original rule was proposed.

The second change relates to the term "corporate members." It is the thought of the members of the committee on Chapter Organization and Activities that the term corporate is a little bit ambiguous. It is vague, not so clearly understood, and the suggestion is made that full privilege members be substituted therefor.

The third suggestion is that a new section be added to the constitution which will make it possible for the Executive Committee to fill vacancies among the officers or in the Executive Committee by vote of the remaining members of that committee.

It seemed to the committee on Chapter Organization to be a sensible thing to do, in order to avoid delays and the embarrassment that would naturally result if vacancies which occurred during the term of any one of the officers and members of the Executive Committee were allowed to continue unfilled until the term had expired.

The fourth suggestion is that the by-laws be amended by a three-fourths vote of the entire Executive Committee in session or by letter ballot. There is no

particular change there.

If there has been opposition—and I sense perhaps there is some opposition to a change of this kind—I believe it is more the kind of opposition that is based upon a misunderstanding rather than upon any real merit. For example, the rules, as they now read in connection with that point, are very similar to the proposed rules. A very slight change is requested. The present reading is as follows: "A proposed amendment to the by-laws may be presented at any meeting of the Executive Committee and if passed by a three-fourths vote of those present may be finally adopted by a three-fourths vote of the entire committee by letter ballot. Any such amendment after adoption shall be published in the official publication."

The proposed change reads the same; except that a proposed amendment may be presented at any meeting of the Executive Committee and if passed by a three-fourths vote of those present may be finally adopted by a three-fourths vote of the entire committee in session or by a letter ballot. In other words, there is just simply a choice, an alternative. You may adopt by letter ballot or by the entire committee meeting in session, but only after the amendments have first been presented to the committee meeting in session.

The fifth change, I believe, will not be taken up at this meeting.

In all of these proposed amendments there is very little change, and no changes whatsoever, as I see it, that affect the fundamentals of the organized activities of the A. S. S. E. They are merely changes that lead to a better and a clearer understanding of what the real intention is.

It is the recommendation of the committee that these amendments be adopted, and I so move.

(The motion was seconded.)

CHAIRMAN KEOWN: Is there any discussion?

A. J. VAN BRUNT (Director Safety Education, Public Service of New Jersey, Newark, N. J.): I would like to discuss this for a few moments. It is true that we have received through the mail memoranda showing us what these proposed changes are in detail as read by Mr. Heinrich. Mr. Heinrich has not told us how much, if any, opposition was developed in reply to the memoranda received on the subject.

Considerable opposition in my mind has been developed against the adoption of these amendments. If I may speak in a general way, I would say that I consider the phraseology of them entirely too ambiguous.

For instance, the last subject that Mr. Heinrich spoke on—Number 4—he told us there was an alternative. He didn't tell us who should decide the alternative. In a general way it seems to me that the entire matter had better be laid on the table for more intense consideration by those who have been members of the A. S. S. E. for many years, long before the amalgamation of the A. S. S. E. with the National Safety Council. Incidentally, I do not wish to see the A. S. S. E. as a separate organization entirely wiped out.

I come from the State of New Jersey. After the A. S. S. E. activities had assumed a certain magnitude in New York City, we expended considerable time, mental effort and no little amount of money in organizing the Newark section. Progress is apparent. Our meetings have been held regularly. I believe the Metropolitan Section will admit that we have afforded them some assistance.

My objections to these amendments are: first, they are not clear; second, these amendments would ultimately merge the A. S. S. E. into this section. Therefore I move that the entire matter be laid on the table for future consideration.

H. W. MOWERY (American Abrasive Metals Co., New York): In seconding that motion I would like to call attention to another matter. In the résumé sent out to the members there was no mention made of what appeared to me in the list

of the proposed amendments, as another very material change, I think, ought to be called to the attention of the membership. That change is this: It is proposed through these amendments which were not called specifically to the attention of the individuals, to require anyone who wished to have membership in the A. S. S. E. to first have his organization or company take membership in the council and then delegate him to represent them. Then he would have permission to become a member of the Engineering Section if he had the necessary qualifications. There is no door left open for a man like Herbert Hoover to make application for membership in the A. S. S. E. direct without first coming in through the council.

The idea, as I understand it, and always have understood it, is that the other door is to be open, and a man can make application for membership in the A. S. S. E. and then become a member of the council automatically by reason of his membership in this society. I believe that wants to be looked into a little more carefully.

I see no objection to the provision permitting the Executive Committee to fill vacancies, but it seems to me there is a decided objection to amending the by-laws so that three-fourths of the Executive Committee in session may determine upon a policy, or what not. I believe the letter ballot is a protection we all should insist upon retaining. If the entire Executive Committee is present you can have a vote without resorting to the mails. The present provision does not require a letter ballot, and if at any time you have the entire Executive Committee present you can take your ballot there at that time without going into this amendment.

There is also the question of grades of members. We have at the present time two grades of members—members and associate members. There is some distinction between the two. It is slight, but they are both full privileged members, and I don't quite like the idea of being called a full privileged member. I would much prefer to be an associate member or an active member.

CHAIRMAN KEOWN: The chair is of the opinion that this motion to lay upon the table is not debatable, so therefore we will proceed.

W. E. WELCH (Senior Engineer, Engineering and Inspection Division, The Travelers, New York): I would like to know if the present by-laws and constitution as now in effect have worked any hardship to the A. S. S. E.—Engineering Section or the National Safety Council.

CHAIRMAN KEOWN: Mr. Heinrich is more familiar with that. His committee has been dealing with chapter organizations and the promulgation of constitutions for those chapters. Will Mr. Heinrich explain that?

MR. HEINRICH: It is apparent the proposed amendments are of great interest to the members, as they should be. It is also apparent to me there has not been a suitable opportunity for a full understanding and for full discussion of these things which seem so important. Therefore I am wholly in sympathy with the thought they should not be adopted until the majority of the members understand them and have been given an opportunity to consider the various points involved and to discuss them in detail, notwithstanding they were introduced by the committee of which I am chairman.

However, in regard to the particular point that has just been raised, I wish to read one paragraph from the published report of the committee on Chapter Organization, which is:

"It is the belief of this committee that there is a large number of qualified men who are not members. These men are interested in the work of the A. S. S. E. and would be glad to take an active interest if the qualifications for membership were so changed that they could be afforded an individual membership in the National Safety Council."

I am most certainly in sympathy, as an individual and as a member of the A. S. S. E. and also as a member of the Chapter Organization Committee, in getting into our organization men who are not necessarily members of the National Safety Council, a qualification which now stands. The committee on Chapter Organiza-

tion is not adding anything new in that particular way. We are simply repeating the old qualification when we list as a qualification for membership in the A. S. S. E. that a man must be a member or that his company must be a member of the National Safety Council. There are lots of men, lots of good engineers, like Herbert Hoover and hundreds of others, who probably could be induced to seek membership in this organization and would do us a world of good. But there is an objection, which is that of membership in the National Safety Council.

Of course we are members here of the National Safety Council. We want to see that organization grow. We ought to give due consideration to the disadvantage that exists in allowing men to get into a branch of the National Safety Council without being National Safety Council members. But there the proposition stands. It is of wide interest. It is of value. I personally have reported as being in favor—and so has the committee which I represent—of allowing men to enter the A. S. S. E. without necessarily being members of the National Safety Council or of having their companies members of the National Safety Council. That is an objection. I believe it retards to some extent the growth of this particular branch and well deserves consideration.

MR. MOWERY: A point of information, please. Am I correctly informed it is the understanding of the committee that a man taking membership in the A. S. S. E. and paying ten dollars for membership must, in addition, pay a membership fee to the National Safety Council?

CHAIRMAN KEOWN: That is not my understanding.

MR. MOWERY: That is not my understanding either. You pay ten dollars for membership in the A. S. S. E. which also pays membership fees in the National Safety Council.

MR. HEINRICH: You automatically become a member of the National Safety Council by payment of A. S. S. E. membership fees.

CHAIRMAN KEOWN: Or if you are already an employee of an organization which is a member that is not necessary.

MR. MOWERY: But the proposed amendment closes that door, and you must first become a member of the National Safety Council before becoming a member of the A. S. S. E.

CHAIRMAN KEOWN: That is not my understanding.

MR. HEINRICH: That was not the thought of the committee.

CHAIRMAN KEOWN: We have but five minutes until we must adjourn. You have heard the motion made and seconded to lay the entire matter upon the table. All those in favor of the motion signify by saying "aye"; opposed "no." The "ayes" have it. That means if brought up again, it will come up at the next annual meeting, not before.

The next order of business is the report of the Nominating Committee. Mr. Fonda is chairman of that committee.

Report of the Nominating Committee

MR. FONDA: The report of your Nominating Committee for officers for the coming year and also for three directors to be elected for a period of three years to succeed three outgoing directors, is as follows:

Chairman—Mr. J. I. Banash, Consulting Engineer, Chicago.

Vice-Chairman—Mr. Earl F. Blank, Jones and Laughlin Steel Co., Pittsburgh.

Vice-Chairman—Mr. C. B. Auel, Westinghouse Electric and Manufacturing Co., East Pittsburgh.

Secretary—Mr. W. D. Keefer, National Safety Council.

For directors to succeed three directors whose terms expire, these directors to serve three years:

Mr. R. F. Thalner, Buick Motor Company, Flint, Michigan.

Mr. H. W. Mowery, American Abrasive Metals Co., New York.

Mr. H. S. Smith, Prestolite Company, New York.

Proposing the nomination of Mr. C. B. Auel who is at the present time a director with still a year to serve means we must elect another director to finish out Mr. Auel's unexpired term. We propose Mr. H. W. Foster, of Brown, Crosby Co., Philadelphia.

MR. VAN BRUNT: A point of information, please. We have an assistant secretary located in New York City, a very desirable office to be filled. I heard no mention of that assistant secretary's name on the part of the Nominating Committee. I refer to Mrs. Gene S. Wood without whose assistance I doubt very much whether we would function as well as we have in the past.

MR. FONDA: That is correct. Mr. Van Brunt's remarks are to the point, and Mrs. Woods' name is included on the original report as assistant secretary.

CHAIRMAN KEOWN: You have heard the report of the Nominating Committee. What is your pleasure?

MR. WELCH: I move its adoption.

(The motion was seconded and carried.)

CHAIRMAN KEOWN: I would like to have the newly elected officers and directors rise so that you may all know who they are.

ADJOURNMENT

October 4, 1928

DR. H. CLYDE SNOOK, Chairman
Consulting Engineer, New York City

The third session of the American Society of Safety Engineers—Engineering Section—was called to order at two o'clock by the chairman, Dr. H. Clyde Snook, Consulting Engineer, New York City.

CHAIRMAN SNOOK: The Secretary will please call the roll.

(Roll Call by the Secretary.)

CHAIRMAN SNOOK: I will read the Progress Report of the Committee.

Progress Report of the Research Committee on the Elimination of Harmful Noise

By H. CLYDE SNOOK
Chairman, Consulting Engineer, New York City

The personnel of the Committee on the Elimination of Harmful Noise is as follows:

- H. Clyde Snook, Chairman, 175 Fifth Avenue, New York City.
- Stewart J. Owen, Jr., Secretary, National Safety Council, 108 East Ohio Street, Chicago, Ill.
- W. M. Bertram, Morse Chain Company, 50 Church St., Room 1871, New York City.
- F. C. Dockeray, Department of Psychology, Ohio Wesleyan University, Delaware, Ohio.
- H. Fletcher, Bell Telephone Laboratories, 463 West Street, New York City.
- E. E. Free, 175 Fifth Avenue, New York City.
- E. W. Gorry, United Electric Light and Power Company, 130 East 15th Street, New York City.
- Donald A. Laird, Department of Psychology, Colgate University, Hamilton, New York.
- John J. B. Morgan, Department of Psychology, Northwestern University, Evanston, Ill.
- H. W. Mowery, American Abrasive Metals Company, 50 Church Street, New York City.
- Mrs. Imogene B. Oakley, Chairman, Committee on Unnecessary Noise, Civic Club of Philadelphia, 1300 Spruce Street, Philadelphia, Penn.
- A. T. Poffenberger, Department of Psychology, Columbia University, New York City.
- M. C. Rosenblatt, Acoustical Engineer, 1700 Walnut Street, Philadelphia, Penn.
- S. Rosenzweig, Korfund Company, 11 Waverly Place, New York City.
- G. O. Small, General Electric Company, Lynn, Mass.
- C. Van Horn, Travelers Insurance Company, 30 East 42nd Street, New York City.
- F. R. Watson, Department of Physics, University of Illinois, Urbana, Ill.
- H. B. Williams, Department of Physiology, Columbia University, New York City.
- H. S. Williams, Equipment Division, City Department Street Railways, Detroit, Michigan. (Representing A. E. R. A.)

The National Safety Council has been a natural target for a long time in a bombardment of requests for the regulation of noise. Noise is generally disliked and regarded as a probable cause of harmful effects upon the human body. Previous reports of this committee have pointed out some of the known contingencies of noise such as accidents resulting from a lack of warning to impending danger, impaired physical health, increased nervousness, inefficiency, deafness, depression upon the sick, etc.

Certain progressive industrial organizations have recognized the economic value of noise reduction. Substantial economies have been realized. The results have not been generally published but this committee will endeavor to secure and to publish in a report, the decisions already reached.

This year's record shows an increased number of public press announcements of the estimated economic cost of noise. The weekly loss in the United States was recently computed to be \$5,000,000. The continuous effort which is being made to estimate this economic cost of noise, emphasizes the lack of sufficient data upon which such estimates can be made with even a fair degree of accuracy.

The committee's report of last year showed the existing fundamental data as insufficient to justify the drawing of any line between the noises to be tolerated and the noises which should be reduced. With this objective the committee has undertaken a research program to ascertain some of the fundamental effects of noise upon the human organism. Certain research workers who are competent and who desire to assist us in this investigation have consented to become members of our committee.

At a committee meeting held in New York, April 8, 1928, this program was analyzed in detail.

As now planned, the committee desires to ascertain whether physiological reactions may be found which will serve as indices of the effect of noise upon the human organism. For this purpose, Dr. John J. B. Morgan of Northwestern University, is continuing his work with the electro-cardiograph as a detecting instrument. Last year, the committee reported upon preliminary work of this kind which indicated noise does produce a change in the rate of the heartbeat.

Professor F. C. Dockeray of Ohio Wesleyan University, is beginning work to ascertain the effect of noise upon certain factors having to do with the mind. His work will include studies of fatigue, attention, physical and mental activity, emotions, etc.

Dr. Morgan and Professor Dockeray are now equipped to carry out their investigations for this year. Sufficient apparatus for this work has been loaned to us through the generosity of the American Telephone and Telegraph Company and its associate, the Bell Telephone Laboratories, to supplement that made available by Northwestern and Ohio Wesleyan Universities.

The committee's program includes a study of metabolism as affected by noise. Metabolism is the sum of the chemical changes continually going on in the living cells of the body whereby energy is provided for the vital processes and new material is assimilated to repair waste. Variations of metabolism may be a useful physiological index of human reaction to noise and of the effect of noise upon physiological activity. Professor A. T. Poffenberger of Columbia University, has agreed to undertake this work. The General Electric Company has offered to loan certain apparatus for it. Unfortunately, the committee has not as yet succeeded in obtaining the funds needed to provide the necessary special apparatus. This study is of unquestionable fundamental importance and it is hoped the very modest amount necessary for this work may be obtained soon.

I desire to call your attention to the fact we have a new member of the committee with us today, Dr. Harvey Fletcher of the Bell Telephone Company Laboratory, who is interested in the study of noise from the standpoint of hearing.

Later I will ask him to tell you something about the phase of the work in which he is interested.

I will read to you two letters we have received. The first letter is from Professor John J. B. Morgan, of Northwestern University, Evanston, Ill. I asked Professor Morgan if it would be possible for him to be with us today and this is his letter.

My Dear Mr. Snook:

It will not be possible for me to attend the meeting of the committee on October 4th, much as I would like to do so.

I have no criticisms for your report. I think it is encouraging and shall try during the year to fulfill my part of it. I have three graduate students beginning work on different phases of the problem and I feel quite confident that before the end of the year we shall have something definite to report.

Cordially yours,

(Signed) JOHN J. B. MORGAN.

CHAIRMAN SNOOK: You will recall that Professor Morgan, while he was at Columbia University, did a lot of research, a most important piece of research work in the beginning, when interest in this subject, how noise affects the human being, was first inaugurated. His work was published I believe in 1916. Am I right, Professor Poffenberger?

PROFESSOR POFFENBERGER: Yes.

CHAIRMAN SNOOK: It was brought to my attention and as you can see by Professor Morgan's letter, his interest is as great as ever, because he has undertaken to continue this work, especially with the electric cardiograph. As a matter of interest it may be well to state the electric cardiograph is a sensitive instrument which has galvanized strings or coarse fibers. This instrument is used by connecting opposite ends of silver coarse fibers, or gold-plated coarse fibers, to certain parts of the body and observing the magnification of the instrument. The heart responds to very minute electric currents.

When the fibers move from one side to the other as a result of changes in the magnetic field, these changes register the differences in electrical potential of the crude fibers of the heart. This instrument can be applied to the feet, arms, or other parts of the body. Professor Morgan took up this work last year and discovered that the heartbeat is increased or retarded under the influence of noise. He has kept a record of his experiments and he expects to do more work. That is all he promises, but many of us who know Professor Morgan well would be willing to promise more for Professor Morgan than he is willing to promise for himself.

I have a letter here from another member of the Committee, Professor F. R. Watson, of the University of Illinois, Urbana, Ill.

Dear Dr. Snook:

This is a note concerning the activities of the Committee on the Elimination of Harmful Noises. It is not likely that I can attend the conference on October 4th in New York City, and I doubt if I have any constructive suggestions to offer beyond an approval of the program as you have outlined it in your letters.

Concerning financial support for the work of Professor Poffenberger, I may be able to secure some funds, but wish you would send me immediately some idea of how much is wanted.

With best wishes, sincerely,

(Signed) F. R. WATSON.

CHAIRMAN SNOOK: There are several more of the members of the committee who will be with us today but they have not arrived as yet.

Professor Dockeray is here. He has come all the way from Ohio to take part in this meeting.

PROFESSOR DOCKERAY (Department of Psychology, Ohio Wesleyan University, Delaware, Ohio): I have not much to report, no more than Dr. Morgan has. As Dr. Snook has told you, through the kindness of the Bell Telephone Company we have received some apparatus for our experiments and this will make it possible to carry on this work.

We have set up the apparatus furnished by the Bell Telephone Company and it is similar to the apparatus which we used a few years ago in the study of attention and distraction. We dropped the word "distraction" because we get an increase or decrease in the amount or quality of the work, and then we dropped the word "attention" because I don't know now exactly what attention means, perhaps the study of the effect of noise on general activity would be better.

With the old experiment we tried to measure—it is rather complicated—but we tried to cover the reaction in a coordinated way. I have five students who are working with me this fall. They are very enthusiastic at the present time, but how long I can keep them going is a question. We have just started and I wish the meeting had been two weeks from now. I believe in that case we might have had something definite to offer. All I can say at present is I have divided my subject into two groups. I find the students who have the best records in the University generally show an improvement when confronted with noise that is a distraction. With the poor students, the kind that do not readily adjust themselves to the college situation, the opposite seems to be true.

The question then is raised about the better student, and I believe that is the question Professor Poffenberger is going to study and the one that Dr. Morgan made his early experiments with; the better student, the better man, puts more work into the situation when there is something to be combated. I hope to make a study of that and I believe it would be well to consider the work done along that line by Dr. Starr, of the University of Pennsylvania. This question has also been taken up by Dr. Free. I have not started on it as yet but believe by Christmas, perhaps, we may have something a little more definite to offer, the responses to the different degrees of sound, loud and mild noises, as well as high and low pitched noises.

CHAIRMAN SNOOK: I desire to ask Professor Poffenberger to explain something about metabolism and any other thing he may care to bring up regarding the work.

PROFESSOR A. T. POFFENBERGER (Dept. of Psychology, Columbia University, New York City): Mr. Chairman and gentlemen: I am in rather an embarrassing position, the position of one who is soliciting funds. It is not as bad as that because we are going along with the work without them as far as we are able. The University has helped us out very nicely in giving us some money and some equipment we needed.

The equipment is the expensive part because we can make the noise all right, that will not cost us so much but the equipment necessary to measure metabolism will be expensive. I am more interested in that I believe than in the effect of noise. We have a general laboratory problem with a great variety of conditions in this subject of metabolism. One is, the effect of noise. Any support from this organization would be directed, of course, to that noise problem.

When I started out—I am not going to tell you much about metabolism because it is a long story—we took up the question, "What Does Noise Cost the Individual?" We took this up just as you would any problem, as you would take up the question of why an engine did not give the proper results. It might be because of a poor grade of oil or several things might enter into it, a poor lubri-

cant, etc. The same thing applies to noise, whether noise causes a reduction of power in the individual.

There are various ways of trying to find this out. Dr. Morgan has tried to ascertain the effect on the heart and someone else is going to give the physiological effect; now what we want to measure is the effect on the energy consumed by the worker. Just as we can tell the amount of electric energy necessary to drive a certain machine, we want to know how much energy it takes to drive the human being in doing the work under noisy and quiet conditions.

We were forced to do this it seems to me because the other measures we have used for measuring the effect of noise have had something wrong with them. As Professor Dockeray said a few moments ago the human being has a most remarkable capacity for meeting these changes, these changed conditions, and he can keep his output uniform in all sorts of distractions.

You may say that these noises make no difference because a person can work just the same, that these obstacles have no effect, but Dr. Morgan began this work because he became suspicious—and so did I—that something else was involved. There were certain indications that shows us the quantity and quality of the work remained the same but it cost the individual more to produce that same quantity and quality of work.

Now what we want to do is to measure the energy used in a specific way and I am afraid that is too involved to discuss at this time. We don't know whether the noise causes any trouble or not. That is what I want to find out. If the noise does cost something to the individual, when the noise is first introduced, we don't know whether it is not possible to adapt ourselves to it so that it does not cause any trouble later on.

The question in my own mind is, are such noises harmful, and how harmful are they? Can we adapt ourselves to them so they will no longer be harmful? That, I believe, is the question. Some such serious question as that. We would have to make these measurements and see whether the organism does adapt itself so that the operation which originally cost quite a bit of energy now can be performed with relatively little cost to the individual.

The workman in training expends much energy. After three or six months' training, the same noise, the same conditions and the same output require less expenditure of energy. It may be that after living under certain noise conditions the energy expenditures would be reduced and would not exhaust the individual more than working under quiet conditions. I don't know anything about it, it is a question I raise.

I do not care to say any more than Dr. Morgan and Dr. Dockeray have said. I am going to go to work on the question. I told Dr. Snook when I undertook the job I would not guarantee anything inside of five years but if anything did turn up it would be welcome, but I make no guarantee.

We have been working since April getting the equipment ready, such as we had, and our technique developed. In about six weeks or so we ought to be able to get some information.

CHAIRMAN SNOOK: Thank you Professor Poffenberger. I believe it is very good, indeed, to have these men come to us and tell us something about what they think on the subject. We all realize that some fundamental questions are involved in this program—in this problem of noise.

We stated very definitely in one of the reports of this Committee that this work would require a long time and would probably at times be most discouraging. Professor Poffenberger has given us a glimpse of how he feels and what he is doing and he, like the rest of us, realizes the difficulty of this problem.

A little more financial support is certainly to be desired because small sums of money will be needed from time to time over a period of years in order that

worthwhile results may be obtained. There is a matter that involves the function and the purpose of this Committee, particularly as relates to what others may consider the function of the Committee and its work. That, of course, involves the Committee's name. The name of the Committee at the present time is "The Committee on the Elimination of Harmful Noise." The Committee was originally known as the Committee on the Elimination of Excess Noise. Then the question arose, what constitutes excess noise, for what purpose, for what object must the excess noise be eliminated. It was believed the function of the committee would be best described by a slight change in the name.

The function of the National Safety Council is to conserve the safety of the people of the Nation. If noise has an influence that is not beneficial to the people, it must exert some harmful influence on them and so we strove to discover how the Committee might direct its energies toward determining what noise would be harmful to the people.

The study involves conditions affecting the welfare of the people, not only in respect to accident, but also to other causes that involve the safety of the people.

In order not to restrict the scope and work of this Committee it was agreed at the time that the name should be changed.

There is a question among the membership of this Committee whether or not the Committee is bringing to the National Safety Council membership sufficient emphasis upon the function of this Committee in regard to accidents. I desire Mr. Owen to talk to you for a few moments on that subject.

SECRETARY OWEN: The National Safety Council, as you know, is interested in accident prevention, not only in the industrial world but in public places and in the home. Perhaps some accidents have been due to noise. It may be well to change the name of the committee, to make it more expressive. The name suggested is "Noise a Factor in Accident Causation."

One man said this afternoon he is interested in the noise caused by street cars and he wondered if that noise causes accidents. In such cases the public is interested. You may have noises in industry and around the home. If they are the cause of accidents the National Safety Council is also interested and will seek to reduce them.

If the noise in the drop forge plant decreases efficiency of the men or causes accidents, the manufacturer wishes to know what can be done about it.

It seems to us if we change the name of the committee to the one mentioned it will be more descriptive of the work this committee is endeavoring to do.

CHAIRMAN SNOOK: I believe many of us realize the changing of the name of the committee would not alter the necessity for unearthing the fundamental factor with regard to noise. We want to know where to draw the line; noises that are to be tolerated and noises that should be eliminated, in order that a definition may be made regarding noise as a factor, or causation of accidents. Is there anyone present who would like to discuss this subject? Mr. Van Horn, have you anything to say?

C. VAN HORN (Travelers Insurance Co., New York City): I may say as a member of this committee and also because of my connection with the Travelers Insurance Company, that the first thing asked the insurance company was whether we had done any research work with regard to noise being productive of accidents.

As a matter of fact we have not. The average insurance investigator does not go into the question of noise as an accident cause, nor as having any influence on accidents, so having no data along that line, whatever I might say would have no influence on the Council taking any action along those lines.

There is one thing I may say and that is we know accidents are sometimes caused by a mental condition. There are certain types of accidents in industrial

plants that have a direct bearing on the mental condition and reasoning along that line of logic, maybe there are certain types of accidents due to the noise affecting the mental condition.

CHAIRMAN SNOOK: Does anyone else wish to speak on this subject? Have you a better or more appropriate name to suggest for the committee? Have you a name that will bring to the National Safety Council a better idea of what the committee is doing, and what the committee ought to do?

There is another member of the committee present at this time and I desire to hear from him. Dr. Fletcher of the Bell Telephone Laboratories, is our youngest member in point of time of service; he is our newest member. He has made a special study of hearing, he is an expert on the function of hearing, he knows more about how we hear and how we don't hear, than anybody else in the world. He has accepted membership and is going to help us solve our problems. I desire to take this opportunity of introducing Dr. Fletcher. I wish he would tell us something about that peculiar form of deafness, temporary deafness that comes as the result of noise being present. I wish he would talk on any other phase of the work that he desires. Dr. Fletcher.

DR. HARVEY FLETCHER (Bell Telephone Company, New York): I confess I have been very much puzzled this afternoon about what this committee is trying to do.

It is true, you do actually find that many men hear better in a noise. Well, what then? Somebody hears poorer in a noise; what then? What action can you then take? It does not seem to me that either one of these questions will help us. Take, for instance, the heart; I do imagine noise has some effect one way or the other, but I wonder when we get through will we get anything? What answer will the National Safety Council get and if they do get some answer from these experiments will they go out and eliminate noise, or will they not?

I was hit by an automobile last week and I still cannot think very clearly. At the time there was a lot of noise and I don't know whether that had anything to do with it or not.

Now coming down to the question the chairman asked me to speak on, the question of hearing. The chairman particularly mentioned the noise that causes temporary deafness. Take, for example, this room. I am talking very much louder than it is necessary because of the awful noise. It is an effort for anyone to speak in this room and it would not take an elaborated investigation to say the noise should be eliminated. We could get along much better if it were quieter. I don't believe there is anyone in the room who would not agree on that without any investigation. If there were some way of getting rid of that noise we would all be much happier and certainly it would be much less effort to speak. One of the things we have to measure is the deafness, the temporary deafness produced, for example in this room.

We are all about thirty units down; by that I mean, if we are all affected so that our hearing goes down thirty to forty units, we would be able to hear just the same, because of the noise outside. Now if deafness causes accidents, noise causes accidents, that is the only conclusion you can come to, because when you are immersed in noise you are deaf to a certain extent.

I don't know of any activity in the National Safety Council that would say that deafness is the cause of accidents. I know at one time I was of the opinion all chauffeurs ought to have an examination for their hearing in order to prevent accidents, but I'm not so sure of it now.

I am identified with the American Federation of the Hard of Hearing and I have received assistance on the subject, and it is their opinion—and I believe it is correct—that the people who are hard of hearing are more alert mentally and are free from distractions, like noises. They use their eyes more than most

people who have their hearing and as a consequence they have fewer accidents than those who are not deaf.

What I am saying is adding more or less confusion to what has already been said. It was a confused issue before I started, but I don't see clearly where we are going, I confess. Nevertheless, I agree that it is a good piece of research work, a very valuable piece of research work and I believe it valuable because such men as we have here today are interested in it. It is interesting; whether it will have any practical result or not, that is another question. That is all I wish to say at this time.

CHAIRMAN SNOOK: Dr. Fletcher is right; we don't know whether this research will lead to the information that will permit us to do what the committee has been asked to do; namely, to find out how much noise ought to be eliminated and reduced.

The National Safety Council has received a number of inquiries, asking how noise may be reduced or eliminated. The committee was organized to try to plan out what could be done about reducing noise. Unless this committee gets some fundamental information regarding noise and its effect on the human being, the committee never will have the information that will enable it to know where to draw the line.

I don't blame Dr. Fletcher, or any other man or woman, for being a bit confused because the connection between what this committee is now trying to do and what the committee has been asked to do is difficult to see, because the committee is striving to find how noise affects us, that is all, and until we find some answer to that question this committee has no work to do.

If it attempts to reduce noise at the present time without knowing how far to reduce it, then this committee will be in trouble, so we have attempted to get a few of the men of the country who are capable of answering this question, to ascertain how noise affects the human being. That is why we seem at this time to be so far away. As stated in our report of two years ago, I believe it was, it is a long and difficult thing and will require years of work on the part of men who, as Dr. Fletcher admits, are interested in the problem of finding out how noise affects us. They must give time and labor to this work in order that we may find out what is at the present time an unknown factor, these things that are now unknown but which will enable us to see ahead and get ahead, as to how much noise should be reduced.

That is what we are driving at and we want to know whether or not we should continue to drive at that or should we stop it, or should we drive at something else?

This work is interesting as Dr. Fletcher has said, it will enable us to find out the effect of noise on the human body and that is exactly what we have set out to accomplish.

DR. FLETCHER: Would the standard of noise that could be tolerated and still have conversation go on be of any help? That is rather well known. That is something in which we have been interested in the telephone company. We know we will have noise whether people are going to be happier or not. All of these things have to be taken into account.

CHAIRMAN SNOOK: I am sure the line of thought suggested by Dr. Fletcher would be very interesting to the membership of this Committee and to the National Safety Council.

DR. W. J. FRANCIS (Medical Examiner, Department of Commerce, New York City): With regard to people hearing I may say there is the condition where the ear is clogged with wax; about one man out of every six has this condition, the ear is plugged with wax and even when it is possible to take it out the ear-drum has become inflamed so that the ear is then not fundamentally normal.

Certain conditions of the nose and throat may also cause this condition, altering the circulation to the ear. It may sound like an exaggerated statement to say that one man out of every six has plugs of wax in his ears but I have had an opportunity to examine a large number of men in all walks of life who thought they were healthy and who have that plug of wax.

When that wax was taken out they would have in many cases an inflamed or congested ear-drum. I also found that men who are exposed to a great deal of noise fail to protect the ear-drum by wearing cotton or some other protection, so that the hearing is definitely reduced.

CHAIRMAN SNOOK: I hope anyone else who desires to speak on this subject would do so at this time.

L. L. PARK (American Locomotive Co., Schenectady, N. Y.): I desire to ask if the committee can tell us the best type of individual to work under certain noisy conditions. Take, for instance, the boiler trade. It is difficult to reduce the noise but if we knew the type of individual who could best stand that condition in the boiler shop, it would be a great help. If the committee can give us some help, some information as to the correct type of man to employ in the boiler shop, it would be of great help in the industry.

Another phase that might enter into this is that the young man, as a rule, is not affected, but he is bound to grow old in the industry and later on he is more readily affected than when he was young and learning his trade. If it is possible to discover the type of individual who is not readily affected by noise, it would be a great help to us in placing the men in the work.

Perhaps you have also found that men who have become partially deaf, as most boiler makers do, hear better in the noise than people with normal hearing power do. That evidently means the hearing mechanism becomes adapted to the condition by long exposure.

That is one of the problems upon which we have very little information, and it seems to me that if the Committee did find, as the work progressed, some information as to the type of worker who is least affected by noise, it would be of interest.

CHAIRMAN SNOOK: I believe some investigations have been made regarding this very point. I do not have the report of the investigations at hand but I believe the committee can give you some information.

Is there anyone else here who wishes to speak on this subject? Have any of you any information regarding the type of individual best adapted to noise conditions, as the boiler shop, where they work in extreme conditions and apparently have an increased hearing in such conditions. That is something Dr. Fletcher might tell you about.

DR. FLETCHER: That is one of the questions that has been debated by a number of individuals, both pro and con. I believe it is largely a point of view.

If there is a noise that is constantly hammering on the nerves of the ears it will make you hard of hearing, we are told. If that is true then most of the people in New York City would be deaf because of the noise. When you are on the subway you are immersed in noise and the same is true of the streets. This matter was brought up at a meeting and some men advocated a survey and it was believed New York City would have a much lower average hearing, but that has never been demonstrated. I believe it has been demonstrated there is such a thing as boiler makers' deafness, a larger number in the boiler shop become deaf than in other departments, you have found that to be true?

MR. PARK: Yes.

DR. FLETCHER: Apparently the exposure to the severe noise finally causes deafness. We all know very loud noises, such as the firing of a cannon, will produce deafness. During the war we had a number of cases where men had their hearing damaged in this manner, but whether noises such as come from the street are

a help or a hindrance is a question and someone will have to prove whether it increases or decreases the hearing.

There is a little device that perhaps may be used by men working in boiler shops. It is used by aeroplane men because it has always been impossible for them to carry on a conversation. It is a little mechanism which fits snugly in the ear. Aeroplane men have found it is the best possible thing to use in aeroplanes. Perhaps something of that kind could be constructed for workers in boiler shops and other places where there is an excessive amount of noise; it might preserve men's hearing and still allow them to converse with others.

CHAIRMAN SNOOK: Dr. Fletcher just how does it work?

DR. FLETCHER: It is a little mechanism that fits into the ear. You connect it to a telephone if you want to talk; at other times it cuts out the noise.

CHAIRMAN SNOOK: Mr. Rosenblatt is a member of our committee. May we hear from him on this subject.

M. C. ROSENBLATT (Acoustical Engineer, Phila.): I have not much to say. I cannot elaborate upon what has been said. We don't seem to get anywhere; look at the people here in New York, they congregate where there are noises. You can't say they like noises because of the fact that they don't get away from them. It is not necessary for them to be here. They could probably be on a farm or in a less congested center but they seem to like to gather in these congested places. It seems to me that while noise is harmful in a certain physical degree it is compensated for by other activities human beings like, things that bring them into this very noise.

In other words while it is doing harm it is almost compensated for by some other facts. It seems to me that it would be difficult to find a solution.

CHAIRMAN SNOOK: Is there anyone else who would like to speak at this time?

W. D. BURROW (Globe Indemnity Co., Atlanta, Ga.): I am just a layman trying to obtain some information. I am hunting for knowledge that will help me in preventing accidents.

To my mind there can be very little question about the fact that noises do have a harmful effect on the human organism. I am slightly deaf myself in my right ear due to the fact that some years ago I was exposed to a continuous noise on the right side, so I can hear now better with the left ear than with the right.

The gentleman from the American Locomotive Works spoke about the condition in the boiler shop and if there has been anything done to relieve this condition I would like to hear about it, I would like that information.

It seems to me that the telephone company has a proposition that does not present itself to the average person. I refer to the operators. At one time I was connected with the telephone company. I believe you will find the average telephone man can hear better with the left ear than he can with his right, due to the fact that he uses that one more, so that the extraneous noises would occur in the right ear and not the left. A person usually uses the receiver at the left ear.

I believe there has been some effort made by the typewriter people toward the elimination of noise and the reason given is that the noise produces fatigue. The action of the typewriter does that in itself in as much as the sensitive nerves at the ends of the fingers are constantly pounding on the keys.

Now it would take a much better man than I am to disassociate or differentiate one from the other but I want to find out if noise is harmful and if it is how can it be prevented, and if you cannot prevent it as in the case of the boiler maker, is there any protection, any protective device we can use to help us keep away the evil effects of noise?

CHAIRMAN SNOOK: Another member of our Committee has arrived, Mr. Mowery. Mr. Mowery, the Committee has discussed the report and considered in some details the research program that has been outlined and undertaken by some of the members of the Committee.

The matter of a change of name for the Committee has brought out discussion. You may discuss it or any other subject that you wish.

H. M. MOWERY (American Abrasive Metal Co., New York City): I wish to apologize for not being here on time but I give as my excuse that this is a very strenuous week.

In regard to the proposed change of the name of the Committee, I believe it would be desirable to change the name so that members of the National Safety Council who are particularly interested in the industrial phase of accident prevention will see there is a tie-up between the program confronting them and the program confronting us, that there is some consideration to be given to noises and accident causation.

It might be well to review, if you have not already done so, the reason for the existence of this committee. About seven years ago the National Safety Council headquarters received a great many inquiries and as a result of these inquiries a committee was appointed. That committee comprised a number of the leading members of the National Safety Council engaged in different branches of industry. After two years work practically nothing was done, and another committee was organized. I believe this committee was brought into being through a follow-up of the work of the other committee. Finding that nothing had been done the new chairman suggested a new committee be appointed. A committee was appointed to go over the field to find out what had been done along the lines of eliminating excess noise. Because the National Safety Council was interested in accident prevention, it was suggested the name of the Committee be changed from Excess Noise to Harmful Noise. It was changed and the committee was then known as the Committee on the Elimination of Harmful Noise.

After continuing to work for several years we came to the conclusion there was absolutely nothing available to prove conclusively that noise was harmful to the human system, so the present research work was outlined. You have heard about that from Dr. Snook. This work was proposed and something has been done along these lines of research.

The assistance of the Executive Committee of the National Safety Council has been withheld from this research work for several reasons, the chief being they had no funds available for the purpose, but they have generously allowed the committee to go out and secure funds independently. I was told the other day that the Executive Committee of the National Safety Council might be a little more lenient if they could be sold the idea that there is a definite tie-up between the work of our committee and the cause of accidents. If we cannot do that, then the work of this committee will be transmitted to the Health Service Division as being a matter concerning the human body more than the cause of industrial accidents.

There is the situation as I understand it. I believe at the present time we are interested primarily in noise as an accident causation. I believe the fundamental research program which was proposed should be carried out because we must determine whether human energy is lessened or increased by noise and if we can find out then I believe it will be a short step to the conclusion that it is an actual accident causation.

CHAIRMAN SNOOK: Thank you, Mr. Mowery. These gentlemen on the committee are interested, I believe, in ascertaining the effect of noise on the human body and it is upon that basis we have been working and we have been enabled to interest them in this matter. We want the facts that are in their minds, the unbiased facts and we have gone into this in that way.

Many of us believe that noise will be found to be the causation of accidents.

Is there anyone who would like to make a motion with respect to this matter of a change of name for the Committee?

T. S. WORTHINGTON (T. S. Worthington and Co., Ltd., Montreal): I have listened to Professor Poffenberger and the other gentleman over there. I believe the name of the Committee is somewhat misleading. I believe Noise and its Relationship to Accidents might be better, that might be more attractive. I am convinced that the gentleman on my left and the gentleman from the American Locomotive Works agree a man's efficiency is lessened in industry if his hearing is impaired.

I don't know much about the boiler industry. I know more about mining. There is no question that people who are working in the bowels of the earth sometimes have their hearing impaired and that also impairs their efficiency. I move that the name of the committee be "Noises and Their Relationship to Accidents."

CHAIRMAN SNOOK: We have a motion that the name of the committee be changed to Noises and Their Relationship to Accidents. Is there a second to that motion?

C. VAN HORN (Travelers Insurance Co., New York City): I believe the gentleman from the American Locomotive Works might have gone a little further and told us whether they have the more accidents in the boiler shop than in any other department.

MR. PARK (American Locomotive Works): Mr. Chairman, we have not established the relation of noise to accidents in the boiler shop but the boiler shop always stands well up in the list of lost-time accidents. As far as accidents are concerned other departments go for four or five months without an accident but the boiler shop seldom goes more than a month without a lost-time accident.

There are other causes that enter into it perhaps, the heaviness of the work, the work itself is more hazardous and yet when you compare it with other departments handling heavy pieces, the frame shop where the heavy frames are handled, the boiler shop does seem to appear more frequently in the list of lost-time accidents than any other department we have. We, of course, would be interested to know something about the effect of noise upon the individual so we can determine more clearly whether part of that effect is produced by noise or whether it is due to the type of man who is willing to work in the boiler shop, whether they are more prone to accidents than the men in the other shops, whether the work is perhaps of a kind requiring less physical and more mental ability.

MR. MOWERY: We have not yet fully determined whether there is any relationship, that is the thing that has to be solved.

CHAIRMAN SNOOK: That is a five or ten years job.

MR. MOWERY: I believe it would be better to have it known as the Committee on Noise as an Accident Causation. What do you think of it, Mr. Owen?

SECRETARY OWEN: I believe that would be better.

R. V. PARSONS (Johns-Manville Co., of New York): For 18 years I have been in the business of eliminating noise, I believe if you can find the answer as to whether noise is a factor in accident causation you can get the remedy immediately. The minute you touch a man's pocketbook you always have a remedy.

Something was said a few minutes ago about the noise in the subway. The subway could be made just as noiseless for the man who is riding in it as the elevated cars but it would cost money. The boiler shop could be made very, very quiet and so could other industries but it would cost money. It could be done but it might cut down production. Riveting and welding could all be done quietly but it would cost money and take more time and my thought is that the name should be put in the form of a question. I believe in that way you will interest the people and get an answer and if you get an answer you will get a remedy. I believe it should be "Whether Noise Is a Factor in Accident Causation."

CHAIRMAN SNOOK: We have a motion before the house.

MR. WORTHINGTON (Montreal): I withdraw my motion.

CHAIRMAN SNOOK: Mr. Worthington has withdrawn his motion. Now what do you think of the name just proposed? I believe the Committee might have a

happier name than that, something that would indicate to the National Safety Council the direct relationship that we hope to discover sometime. Mr. Mowery won't you tell us again the name you suggested?

MR. MOWERY: Committee on Noise as an Accident Causation.

CHAIRMAN SNOOK: Is there a second to that, that this be known as the "Committee on Noise as an Accident Causation?"

MR. VAN HORN: I second that motion.

CHAIRMAN SNOOK: What about you, Mr. Owen?

SECRETARY OWEN: If the name indicates the purpose for which we are working, it is sufficient.

DR. FLETCHER: I like the other one, the relation between noise and accident, I believe it is simpler.

CHAIRMAN SNOOK: I believe the one Mr. Mowery has suggested is better adapted to selling the idea to people who do not understand the broadness of the problem.

MR. WORTHINGTON: Why not put it this way, "Is Noise a Factor in Accident Causation?"

MR. VAN HORN: I believe there is an objection to a committee with a name that asks a question. As I understand it the committee was formed for the purpose of compiling data to submit to the National Safety Council, whereby they could consider whether this particular thing was important enough to take up, to take some definite action on. If we put the name of the committee in the form of a question the National Safety Council can rightfully come back and say "That is what we appointed you for."

MR. MOWERY: I believe it is chiefly a matter of simplifying matters, whether or not noise is an accident causation, that is what the Committee is trying to determine.

DR. FLETCHER: It is simply a question of noise and not which noise, not whether it is gun-fire or some other noise.

CHAIRMAN SNOOK: Mr. Mowery, may I ask if this broader name would appeal to you as satisfactory? The Committee on Noise and Its Relation to Accidents?

MR. MOWERY: Yes, as far as I am concerned.

(The motion was seconded and unanimously adopted.)

CHAIRMAN SNOOK: Is there any further business to come before the Committee?

DR. FLETCHER: I wish to say we have made some investigations about people hearing better or worse and we found there was no difference between telephone users and non-telephone users in that respect, they hear the same in both ears apparently. The telephone does not seem to affect the hearing. It is simply a case of getting used to putting the telephone to the left ear. You are awkward if you use it the other way, but as far as cutting down the hearing there does not seem to be any difference.

MR. BURROWS (Globe Indemnity Co.): I am only using my own case, I have no comparative figures. After I had worked in the telephone company for a couple of years I was examined for a life insurance policy and they found that the one ear was better than the other.

DR. FLETCHER: We have an instrument for measuring hearing and we have measured three or four hundred people who were telephone users and who always used the phone in one ear and taking the average there is no evidence at all that one ear is better than the other.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Automotive Section

New Section Officers

- Chairman*—E. H. COTCHER, The Murray Corporation of America, Detroit, Mich.
Vice-Chairman—H. L. SAIN, Delco-Light Company, Dayton, Ohio.
Secretary—H. L. FRACHER, Detroit Steel Products Company, Detroit, Mich.
Chairman Poster and Slide Committee—M. J. MCCARTHY, Fisher Body Corporation, Detroit, Mich.
Chairman Membership Committee—K. A. CALLAM, Kelsey-Hayes Wheel Corporation, Detroit, Mich.
Chairman Publicity Committee—C. W. BISHOP, Lycoming Manufacturing Company, Williamsport, Pa.
Chairman Engineering Committee—A. F. DUNNEBACKE, General Motors Corporation, Detroit, Mich.
Chairman Statistics Committee—PAUL J. BRAND, Pullman Car and Manufacturing Corporation, Pullman, Chicago, Ill.
News-Letter Editor—C. M. DOTTERER, Graham-Paige Motors Corporation, Detroit, Mich.
Executive Committee: THE OFFICERS AND—
A. M. WILLIAMS, Chrysler Corporation, Detroit, Mich.
J. S. BURNS, Reo Motor Car Company, Lansing, Mich.
L. E. AVERILL, Packard Motor Car Company, Detroit, Mich.

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October 2, 1928

H. L. SAIN, Chairman
Safety Engineer, Frigidaire Corporation, Dayton, O.

The first session of the Automotive Section at the Seventeenth Annual Safety Congress, was called to order at nine-thirty o'clock by the chairman, Mr. H. L. Sain, Safety Engineer, Frigidaire Corporation, Dayton, Ohio.

CHAIRMAN SAIN: I might say that our old Company name was Delco Light but the first of January, this year, we got a divorce from Delco Light—Frigidaire did. We all are under the same "Daddy," under the same organization, General Motors, but the first of the year we were divorced completely from the Delco Light organization and are now the Frigidaire Corporation of Dayton.

We are proud not only of the record we have in regard to safety but in many other ways. If you will come to Dayton to visit us, not for one day but for two or more, we will try to show you our plan of handling the Safety, Personnel and Employment, and Medical Divisions. They are all so closely related to the human side that I don't see any chance at all to separate the three.

I don't know of a group that generally has any greater personality than that of the Personnel group. You should have a real personality, a real desire and a real urge to help people. If you have not that desire to raise people up to a higher standard of living, you will not accomplish the best results.

If you would come to the Frigidaire Corporation, I don't believe you would find a safety poster in our plant. I don't believe that you would find safety literature in our plant. I don't believe you would hear any definite lectures or talks on safety, but our work is entirely that of building men, building people, as well as Frigidaires.

We have two jobs in Frigidaire, and you fellows in your own plants have two jobs, that of building the product that your company makes and building people. We feel that if we make a few big people, a few real directors, a few safety men, all the rest will follow. We believe that is true. With the great personality that the safety men possess and should possess, with all the great personality the employment men should possess, still there are (as Dr. Myers said in the meeting in the Power Press Section the other day) some who have a greater desire to use authority than to be humble and get people to do things because they want to do them. Too many, like the traffic cop, would rather just say "Stop" than point the way.

If you have not read Van Dyke's "School of Life" you should read it. That is one of the books we recommend to all our foremen in Frigidaire—read things you can apply to your work the next day. No doubt every man here does a certain amount of reading, and I am wondering what you read? Whom do you visit with at night? I venture to say that if this morning it had been announced that Henry Ford or Mr. Chrysler or Mr. Sloane, or any one of the great industrial leaders was to speak here, you would have crowded in by the hundreds to hear him. But did you ever stop to think that Mr. Ford, Mr. Chrysler or Mr. Sloane would probably have traveled all night, as I did Sunday night, and maybe would have come in here with a headache, feeling tired and everything but his best, and that probably you would have gotten about half of what you expected to get?

But you can go to your room any night, you can sit in your own home, in an easy chair, and pick up the book "The Five Automotive Giants of the World," about Ford and Chrysler and Sloane and many other industrial leaders. You can pick that book up and sit in a big easy chair with your old soft slippers on and visit one of them when they are at their best.

Now I ask you—what do you read at night? The murders and suicides and baseball? Yes, we should read a certain amount of that, but how much of it can you apply to your job on your safety work? So we ask at all times in our plant on our program of educating men, not only on safety but to make bigger, better men, we must read more. This has been my experience that we can learn from these books, periodicals and booklets many lessons, if our mind is open to these good lessons.

I remember one of the first lessons I had, by one of the greatest bosses I have ever worked for—and I might say that I am fortunate for I have three bosses, Mr. Fordham, Mr. M. M. Roberts and I would not fail to mention Dr. Harry Myers, who has been the greatest inspiration and help to me in personnel and safety work of any man I know of.

My first idea of safety was this, "I will show them and tell them where to get off" and I started to post notices which read, "Starting today and from this day on and forever, anybody found guilty of violating a certain safety practice will be discharged at once." And I would sign my name, "H. L. Sain, Safety Director."

You know how it is. You put it on the bulletin board, then you look at it, feel pretty chesty over it. Tomorrow morning you go over to it again and wonder what all that scribbling is on it. Well, I found such remarks as "Bologna," and "So is your Aunt Emmy." What has happened? You have challenged the man, and when you tell him not to do a thing that is the very thing he is going to attempt to do.

Don't challenge the man. Take this one little item or quotation and remember it and take it back to the plant with you. In the autobiography of Benjamin Franklin—and I might say we have some 200 copies in the plant—Alexander Pope gives a little quotation, and this is one of the finest things I have ever learned: "Men must be taught as if you taught them not and things unknown proposed as things forgot." And whenever we can get that attitude and not come out with this power and this authority, then I believe men are going to follow us, and certainly no man will follow another unless he can to his personal benefit.

The little article I mentioned from Van Dyke's book is this: "I like the teacher who not only shows me where he stands but how he got there and who can encourage and equip me to find my own path through the mist of books and tangled thickets of public opinion."

So, if you attempt at any time to use your authority as you go through the shop to show the people where you stand, and you fail in your attempt to show them how you got there, you have missed the greatest opportunity of your life.

I would like to say in finishing, "Above all things let's be careful about the printed matter, the things we put out in the shops for the men to read." Ask yourself the question, "How many people ever read it?" A teacher in school one day asked the children, "What is poverty?" A little boy in the front of the room popped up and said, "I will tell you what it is, Teacher; it is hell." She said, "Sonny, aren't you ashamed of yourself?" He said, "Ma and Pa gave that definition of it and I guess they know." The Teacher said, "Sonny, you look it up in the dictionary and tell me what it means." He said, "Teacher, if the dictionary don't say that poverty is hell, it is wrong."

Now, no one can kid you people into believing any thing else but what if you had a couple of hundred or a couple of thousand dollars more than you have, that you wouldn't be happier than you are. But nevertheless there is another kind of poverty than that of going hungry, or a physical poverty. There is a mental poverty, there are mental poorhouses, and whenever you get out literature be careful how you put it out and when you put it out and where you put it out. Ask yourself the question first of all, "How many people actually read as much as the headlines in the evening paper?"

We have just five rules of safety in our plant, in the entire book. The first

rule of safety, which I believe is the thing that has accomplished more than anything else in the Frigidaire Company, is to be clean and orderly. The second rule is to take care of property and materials. The third one is to never wear gloves or loose clothing while working around moving machinery. Does that mean a drill press or screw machine? It means your washing machine in your basement at home or any moving machinery. I got the first idea on that working at Stoddard-Dayton's in Dayton, Ohio. A man got his necktie caught on the pump shaft of an automobile and if it had not been for brute strength or a rotten necktie, his head would have been twisted off. The next rule is, "Always wear eye protection while working where there are flying particles." This does not mean just sawdust or dust. It means any place where there are flying particles. The last is "Never oil or clean machinery while it is in motion." This means any kind of machinery. The only amputation we have had in possibly two years' time was that of a colored man cleaning machinery while in motion. The machine dragged the rag in the gear and crushed his index finger and then we showed ourselves up, as we usually do. Today we marvel at our shortsightedness of yesterday. The machine was running to the right and all we had to do was to reverse it and run in to the left. Now a can cannot get caught.

I never like to pass up the thing that awakened me, and has wronged men in all industries in regard to safety. You can never make any shop safe in terms of Safety Directors or Safety Engineers. You can never clean up the plant in terms of janitors. You have got to put the responsibility where it belongs on the other fellow's shoulders; you can't carry it all yourself.

The thing that awakened me on safety four years ago was one of the saddest experiences I have ever had in industry. An old man who had been a punch press operator for forty years got all four of his fingers taken off. I had that old, cocky egotistical attitude at that time and when the Works Manager sent his Secretary to me and asked for a report, what do you suppose I said? "The dumb son-of-a-gun. Let him get his head cut off. He has been working on Punch Presses forty years and don't know how to operate one yet." In about ten minutes Mr. Fordham, one of the greatest leaders I have ever worked with in my life, walked up and said, "I understand you had another serious accident." We had plenty of them, every week. I said "Yes, Mr. Fordham, we did." He said, "How do you account for that?" I told him the same story. He looked at me a few minutes and patted his hands back of him and he said to me, "I tell you, Mr. Sain, what I think is wrong in this Punch Press Department. I think it is a lack of supervision." Right square on the end of the nose! You know what kind of picture I had—Friday when I got my envelope I could see, "This is your last day."

No, that is not what happened. They wished the job on me to take the old gentleman home to his wife. That is something that I never forget. I went home that night and sat down and rocked and rocked and was accused by my wife of being everything but sane. But I said to myself, "If accidents are a result of lack of supervision, we have had our last accident in the Punch Press Department. That is about three and one-half years ago and we have not had an amputation since that time.

So I ask you, in your own work, in talking to your foremen, get the picture over to them not in a dogmatic way, not in a sense of authority, not in a way that you are going to make them not want to do the thing, but teach them as though you taught them not. And then follow up the proposition and then I believe we can point to that one thing—lack of supervision is responsible for the accidents in our factories today.

Now we are going to ask Mr. Phillip J. Bowen, Foreman, Annealing Department, Michigan Steel Corporation, Detroit, to speak to us.

What's It All About? The Foreman and Safety

By PHILIP J. BOWEN

Foreman, Annealing Department, Michigan Steel Corporation, Detroit, Mich.

Caesar, I think, uttered these words, "I came, I saw, and I conquered." Words to me are fruitless, but the sincere and undaunted efforts of any individual along any line will never go amiss, if he be sincere and have the courage of his convictions to do that which he thinks is right, and for the uplift of his fellowmen.

I am here today because I am sincerely in earnest relative to this great movement, and that earnestness has grown out of twenty-two years of actual service in the great steel industry of America. I have had the privilege of observing this movement from its inception in just a few small industries to its present position of effective and successful effort in almost all of the nation's leading industries. Effective in its policies and successful in its aims for the preservation of human life and limb.

I believe the slogan "Accident Prevention" has been the means of arousing millions of industrial employees from a spirit of lethargy and indifference to that of careful and cautious execution of their daily duties in the mills.

We must not forget that the medium of advertisement has been a great factor in this matter. Illustrated lessons placed upon the bulletin boards in the various plants with the cartoons have conveyed to the mind of the individual worker the aim and purpose of this great movement against industrial hazards. And there is still much need for some agency to awaken us to our great responsibility along this line.

That reminds me of a Greek who, after passing the required examination at Ellis Island in New York, started upon a search to find a suitable location for a lunch room. Finding the desired spot he took a walk down one of the busy streets of Old New York and observing the many signs advertising the various places of business, he stopped and read one which said "Meals Served at All Hours." Then another "Open Day and Night." He scratched his head, turned and walked back to the place that he had leased for his future business, bought a can of paint and a brush. Prying the lid off the can, dipped the brush into the paint and inscribed the following on the window, "Me No Sleep Too." He had caught a true vision of what was needed in order that he might keep pace with the time. We must do likewise lest we fail.

I: From the Viewpoint of a Foreman: This question can only be answered when we know the true attitude of the foreman toward this great life and limb saving crusade. But I am today taking for granted that all foremen are sincere in their efforts, otherwise they would not have been chosen by the executives of the various industries to serve in that capacity. Therefore, the foreman if he lives up to his calling, can be classified as a true representative of the company, the mediator between the company and the employee, or in other words he is the safety-valve in his department. He is an outstanding figure and should be an example to his men, who are placed under his personal supervision.

Today as I make a survey of this body of industrial representatives and employees I assume that I am looking into the faces of some that are serving as production managers, employment superintendents, or safety engineers. I would not be foolish enough to try to give you any set rules that you must apply in all branches of industry, because what might be profitable in one line of work might not be practical in another, but I would say that the application of good horse sense plus a little cooperation on the part of the foreman and his employees will accomplish a great deal toward the salvation of human life and limb. Past experience has proven that. If I only had the time to produce to you some facts concerning the thousands of industrial employees, who have become

physically incapacitated by accidents brought about by indifference and carelessness on the part of their fellowmen, if I could only picture to you some of the agony and humiliation brought about by that damnable "I don't care spirit," that in itself would be sufficient reason why you and I should stand and work for accident prevention.

II. *Humanitarian Standpoint:* When I speak from this viewpoint you may say that I am sentimental or weak kneed, but I am not. I am far from being such. But I do believe that there is a vital relationship existing between the home and the industrial life of our nation and one cannot exist without the other. An employee that is a good provider or a good husband and father will also be found to be a good employee. That fact cannot be denied. What I am trying to get at is this—accident or injury of any nature is a stunning blow to the home and the dependents of the employee. Have you ever had the misfortune of being called to the home of a friend or a relative who had been fatally or seriously injured, and then have the heart breaking experience of watching the expression upon the faces of those loved ones? Words cannot describe the sorrow and anguish of that home. Then think of the other conditions which confront them, such as financial responsibilities to be met by a mother and little ones, which may lead to poverty and starvation.

It is not only the thought of being the object of suffering and charity, but to see the home ties broken by a condition which by a little effort on the part of others might be remedied or eradicated.

III. *The Foreman's Responsibility:* In my early remarks I classified the foreman as a safety-valve or a true representative of the company. Therefore I can consistently say that the foreman is in one sense of the word directly responsible for whatever happens in his department. Especially the safety and training of his men.

The greatest aim and desire of every good foreman should be efficiency in his department, because if he has an efficient organization he will have the biggest asset for obtaining the best possible results. This, in my estimation, is: *producing the largest quantity of the very best quality of material at the very lowest cost.* In order to reach this ideal condition it is needful that the foreman in charge get a true vision of his great responsibility. If he does that he will immediately adopt and place in action a safe and well organized plan of working instructions to govern his men at all times.

The first big step is that every foreman know his men. Knowing your men means that you understand thoroughly their temperament and characteristics. Above all put forth your best efforts to gain their confidence by being consistent in your daily practices. For instance, don't harp all day about playing safe in the execution of your commands, then turn around and do something yourself which is not safe and against the working regulations of the safety director. If you do, you are only destroying that which you should be trying to create, "The Spirit of Cooperation." Mr. Foreman, you are writing a gospel, a chapter a day, by the deeds that you do, by the words that you say. Your men read what you write, whether faithless or true, so what is the gospel according to you?

Make a thorough survey of your working equipment each day at the beginning of the day's work. See that all working implements are in good, safe condition before your men start operations. It may mean that you should be on hand half an hour or so earlier but that will have a striking effect upon the morale of your men. It will show them that you are really sincere in your efforts to safeguard their lives and that you are interested in their welfare. Give them some little thing to do, hold them responsible for the inspection of some machine and it will help to create an interest in this great movement. Remind them that accident prevention means that immediate attention must be given to all injuries no matter how small. They must be treated at the First Aid station by the

attending nurse or doctor. The company has placed it at their disposal and it is your duty as a foreman to see that they take advantage of its services. Continually impress upon their minds the need of being cautious and considerate of others as well as themselves. Show them that the company has proven their sincerity by spending thousands of dollars for safety devices and medical attention in their behalf. Appeal to them for cooperation in using these things to the best advantage. Make yourself the information bureau.

This will give you an organization to meet the needs of the present competitive industrial system that demands economic production.

CHAIRMAN SAIN: I am always interested and pay very close attention when I hear anybody mention spirit. Gentlemen, I wish we had about an hour extra this morning, so we could talk about the spirit of the plant, the thing we need today to make them more agreeable and pleasant places in which to work. Spirit is such a vital subject that I wish every foreman's club, every safety organization, every fraternity, every church or whatnot would take up this subject of spirit in their fall and winter meetings.

I am wondering if you know what spirit is, the spirit of the plant. How particular people are in buying a piece of machinery, how particular they are to get a motor that will carry that machine at the right speed, will carry the load as it should and how important electricity is to run this motor! And spirit to the man is just as necessary. Still, how little we think of that when we go to hire the man.

Dr. Myers told of our program of employment. The first place in creating the right spirit of helpfulness and the atmosphere of agreeableness is right down in your Employment Department. Before a man is ever hired in the Frigidaire Corporation, he gets a talk pertaining to: "Do you know how to work?" Do you know that most people in this country do not know why they should do good work? Create that right atmosphere and they will work, for the good of the company and not with the spirit of trying to get even with that "son-of-a-gun" in the employment office.

I think from what our speaker had to say we should be able to take on some real information, some real points and carry back into our factory with us these things. Unless you do take the things back into your shop and put them to work, your time here has been little more than recreation. You have not even paid six per cent of the expense account that your boss is making up for you.

I realize there are some high-powered men here, men who hold down very responsible jobs. A lot of you drive high-powered machines, too, I suppose, but no matter how high-powered your machine might be you have to stop some time to take on gas. So I don't know of any better place to take on some high-test gas than here at this meeting from the talk we have just had. The storage battery that you brought with you should go back charged to the brim.

Mr. Kettering some time ago was asked by one of the professors of a university to interview a lad recommended to them as the smartest lad ever turned out in the Engineering Department. Mr. Kettering interviewed the lad and turned him down. A few days later he met the professor and the professor said, "What is the matter; wasn't he smart enough?" Mr. Kettering said, "My God, I never met a man who possessed a greater amount of knowledge, but there is a difference between knowledge and intelligence. With all his knowledge, he did not have the least idea of what he was going to do with it. We could go to the book store and buy a set of Encyclopedias that contained as much knowledge as he had for \$75."

So when you go back to your shop with this knowledge box crammed full of ideas, they are not going to amount to a thing unless you can put them to work right down in the plant. I have often said this, that eating without digestion is the same as reading without reflection. Unless you will reflect on all these good

talks you are hearing this week, it will be the same as though you would eat meals and they did not digest.

I would like to ask how many Baptists there are here. (Several hands were raised.) Then you can tell your buddies what I mean when I tell this little story. In Church one Sunday they were having the Baptist immersion services and the Minister was telling how you had to be immersed in order to be saved. Two little youngsters were sitting in the front row. Well, when they got out of Church and started for home, the little girl said to her little brother, "The kittens we have and the Mamma cat have never been baptized; we will have to dip them." So they got a bucket of water and took the little kittens and dipped each one down in and then got the old cat and tried to dip her. But she made such a fuss that they could not immerse her. So the little girl said, "That old cat does not want to be completely immersed." The little boy then said, "Well, just sprinkle her and let her go to hell."

Now, I want to thank the brother very much who just gave us the talk and I am going to call on one of our good old friends. He is a real friend and a real worker in safety, and Mr. Cotcher has a message this morning that I believe we will all appreciate. I want to present Mr. Cotcher.

Safety Through Contests

By E. H. COTCHER

**Supervisor of Safety, The Murray Corporation of America,
Detroit, Mich.**

So much has been written on this subject and it has been discussed so thoroughly that it is difficult to offer anything new for your consideration. However, I shall give a brief outline of my own experience and observation from which you may get some new thoughts. I hope you will pardon the personal touch but we are all better off where we confine our remarks to something of which we know at least a little by our own observation.

The problem of the safety supervisor, whatever his title may be, is very largely one of selling; selling the management on the one hand as to the need for the program, and selling the rank and file on the other hand as to the benefits which they will receive. The safety contest is properly a part of that selling campaign.

Last year we heard Mr. Loney, of the Fisher Body Corporation, tell how they use cash bonuses as an incentive to foremen in accident prevention. We also heard Mr. Williams talk about the attitude of considering safety to be a part of the foreman's job, making it unnecessary to offer any particular reward for a good performance. The one stressed the financial side of the question while the other subordinated the financial consideration to some extent. There is of course, considerable merit in each of these programs as they seem to meet the need in their respective companies.

We are taught in our salesmanship courses that practically all men react to one or the other of two motives or to a combination of the two. The motives are vanity or pride and cupidity or love of money. Let us call these the pride motive and the money motive. If you are to sell an idea to a man or group of men you must appeal to one or both of these motives. Of course with women you cannot go far wrong if you stress the vanity or pride motive, although some of the ladies pride themselves on being hard boiled. The "gold digger" type is interested in the money motive and you must appeal to that motive to win her favor if you consider it worth winning.

If you are dealing with a plant manager or department head you are safe in praising his plant or department before you get around to suggest improvements

which may be needed. If he is cold to this appeal, show him what accidents are costing and how much can be saved by cutting down the loss.

If I seem to have digressed from the subject of contests, there is a reason, as all of these remarks will serve to illustrate my reasons for favoring the type of contest which I shall explain.

All contests appeal to the pride motive in that they appeal to the desire of every man to rank well with his associates; to grade up well in comparison with other managers, other superintendents or other foremen. From my experience it seems possible and desirable to combine the usual appeal to the pride motive with an appeal to the financial motive as well. Let us see how this can be done.

In all contests between departments or plants of different sizes and engaged in different types of work we must apply some handicap or differential as a means of making fair comparisons. This is sometimes done by setting up a "bogie" or allowance, expressed in hours lost or by comparing the present performance with past records of the same department, or by some other means of evening up the start in some way, so that the race will be even and the result will be accepted by the contestants as a fair comparison.

The method which appeals to me as most effective is the bogie or allowance expressed in dollars. By using the manual rates promulgated by the insurance interests as a basis we arrive at a base rate covering the nature of the work for each unit in the contest. Say that the manual rate for sheet metal stamping is \$2.10 per hundred dollars of pay roll covering compensation cost and insurance loading. In my work I should take one sixth of this rate, or thirty-five cents, as the allowance rate as we are only going to use the pure cost to charge against the allowance and we want to make it low enough so that it will be a real accomplishment to keep the costs below the allowance rate. At the end of the first period to be reported we multiply the rate of allowance by the number of hundreds of dollars of actual pay roll to obtain the allowance for that period. Thus if the pay roll amounts to \$25,000 and the rate is 35 cents, 250 times .35 equals \$87.50, the amount of the allowance for the period. Had the payroll been \$87,500 and the rate 10c, the allowance would have been the same. The rate represents the severity of the exposure and the payroll shows the extent or amount of exposure. The allowance, being in dollars and cents, is much more understandable to the average man than any statement of ratios or hours lost. Shop men are accustomed to measuring their departmental efficiencies in terms of cost and such a method fits into the scheme of things.

Against this allowance we charge the cost of compensation and medical treatment, making no charge for minor cases which do not have any costs. Perhaps you question this method. Some would charge every lost time case. My reason for recommending the elimination of the minor cases is so that we may not discourage men reporting to the First Aid as may be done if we include the minor cases. We must avoid this as, if men stay away from the First Aid to avoid charges against the department, we may get some severe infections from that neglect. If we make it clear that the minor cases reported do not penalize the department we avoid this danger.

With such a set-up the contestants are competing against each other and also attempting to keep within their allowance. The unit or contestant carrying the heaviest load, represented by the largest allowance, getting by without any accident cost is the winner. Units are graded in accordance with the percentage of allowance used or percentage saved.

Contests to be of real value must be actively supported by the management. If they are not, they soon lose their appeal and are of little value. As to the rewards to be given those winning and those effecting a saving, opinions vary. Some favor a direct cash award proportional to the savings. Others incline toward prizes such as watches, etc. I shall not attempt to argue in favor of either plan.

I think that those of us who have had experience with properly managed contests will agree that the contest offers the finest kind of medium for selling the safety idea and that they will repay the effort expended.

If you are operating a contest or expect to operate one, I recommend that you study the matter carefully to make sure that you are getting the greatest possible good out of it and if you conclude that you are not, try to sell the management on letting you put the right kind of pep into your contest so that it may go over properly.

As to how to choose the contest and how to arrange the presentation of awards, it is recommended that a dinner be held at the end of the contest period and the awards handed out at that dinner. Some managers may not be sold on this plan but it certainly is a fine way to demonstrate managerial interest if you can put it over. If you are turned down on this plan, you must devise some ceremony such as having a committee from the unit relinquishing the trophy take it to the new winner and deliver it with the proper courtesies and have a few remarks by the heads of the two units.

It is recommended that your study of the question include the reading of Safe Practices Pamphlet No. 67, of the National Safety Council series, for suggestions on publicity, special stunts for scoring and other items coming under the head of maintaining interest in safety.

CHAIRMAN SAIN: If you fellows didn't know anything about safety contests before, you should now. Mr. Cotcher has given me several very good points.

I liked Mr. Cotcher's statement about getting on their wave length. If that is the thing necessary in your plant, I would say, do that thing, have paid contests.

In Frigidaire, we have 450 foremen and group leaders who belong to our Foremen's Club. I am sure that down there, right today, we have 450 safety directors working in the plant. Unless you can have the good will of your men, and have every foreman working for you as a safety director, then you have not done the right job.

How do you present safety to your foreman? How do you enter his department? What do you talk to him about? My experience in learning how to approach a man came from my old instructor and helpmate, Mr. Myers. He called me into his office one day and said, "Sit down." I sat down alongside the old boss. He said to me, "I understand you have a boy over in Columbus at school."

I said, "Yes." When he began to talk about the kiddies—I have two of them in Dayton—then he got right on my wave length, and I pulled the chair right up close to the old boss.

He said, "I understand the boy is getting along very well. I was talking to a friend over in Columbus, and he told me the boy was coming along fine." I felt still better. "I understand that he is in an apartment by himself, that is, with three or four of the Dayton boys."

I said, "Yes, he has a little apartment. It doesn't cost any more. It is a big expense, however, and it ties me down pretty tight."

He said, "Wouldn't it be nice if you could make a little more money to help bear that expense?" Then, I knew there was something coming. He said, "There are a few things going on down in the shop that if you can correct there will be no limit as to where you can go on the job." I felt fine. He certainly got on my wave length.

How do you fellows go out into the shop? I would like to give you a little quotation that I use frequently. What have you in the way of quotations? What have you memorized? Don't any of you tell me that there aren't times in your life when you feel like you are going backward? Isn't that right? You are not always going forward. You sometimes go in reverse. I would suggest that you memorize a few quotations. A little brain athletics sometimes does us a lot of

good. I don't think there are many of us that have memorized anything since "Twinkle, twinkle, little star."

When I go down into the shop to see one of the foremen, I say, "So-and-so has been up to the dispensary three or four times with a minor injury. I suggest that you get the picture over to him in the right way, and let him see what you have in mind, and he will wear the eye protection. Nobody wants to wear them. They all get a headache or hurt their nose. They don't wear the eye protection because we haven't gotten the picture over to them, haven't been a good enough salesman." He threatened to bawl the man out. Then, I gave him this little quotation: "A man who is worthy of being the leader of men will never complain of the stupidity of his helpers. These things are a part of the great game of life. To meet them and not go down before them in discouragement and defeat is the final proof of your power."

I just have one other thing in mind. Out in Seattle a sales manager got his group together. He told them that free labor was the thing that made the difference between the man who succeeds and the man who falls behind in life. The things that men do before and after working hours, the things that they do that they don't get paid for, and the things that they do that they don't have to do are the things that make them get more pay. He said, "A toad has the simplest method of locomotion of anything in the world. He gets up and he sits down. When you go out of here, go out into the field and get up and stay up. Don't be like the toad. That is the only way in the world that you can make a mark for yourself."

Until we can do the thing that we don't have to do with as much energy as we do the thing that we have to do we will never make a mark in life.

I would like to call for some questions or discussion on the first subject, "What is it all about? The foreman and safety."

L. R. SCHUYLER (Lycorning Manufacturing Company, Williamsport, Pa.): I would like to ascertain if they have taken up the foreman's safety discussions in various foremen's meetings along with production. Is it deemed advisable?

MR. BOWEN: I believe, as a foreman of practical experience, that it is the duty of the foreman to picture the production end to his men. The life of every industry is based on production. The existence of that plant, the steadiness of its operation depends on the production record of the plant. It is the cardinal principle of industry.

MR. SCHUYLER: Do you work with this safety program through the foreman? For instance, if you find a man that is grinding without goggles, would you go to the foreman and tell him that one of his men was grinding without goggles, or would you walk up to the man and explain to him why he should wear goggles?

MR. BOWEN: There is a little quotation I left out of my address that every foreman should realize.

You are writing a chapter

By the deeds you do,

By the words you say.

Men read what you write,

Whether faithless or true.

What is the gospel according to you?

I consider the safety director my greatest friend.

In our particular industry, there are rules and regulations governing each department. We know that in the machine shops, in the foundries, that it is not good practice to work at any grindstone of any description without eye protection. When you have instilled into your men the essential need of protecting the eye, the arm, and the limbs, you have no need to tell them about the use of goggles. That is why I impressed the fact that if a man is brought to any foreman from the employment office, it is his duty as a foreman to impart to the new man that

knowledge relative to the use of goggles or any safety devices that are used in that department.

CHAIRMAN SAIN: I think that is a very satisfactory answer.

If you were going down through your departments and you saw a fire starting in one department, you wouldn't hunt the boss and tell him there was a fire. I think a man operating a machine of any kind without the proper protection should be told about it. I think his attention should be called to his disobedience of the rules right then and there.

If you were a workingman grinding on an emery wheel without your goggles on, how would you want the fellow to present the thing to you? Put yourself in the other fellow's place. I say to you, whoever asked that question, it is the very thing that I am preaching and putting more time on than anything else. That man wouldn't be grinding without goggles on if he had a good foreman.

MR. BOWEN: Don't you think that the attitude of the department, where one employee tells another employee to do something, has a tendency to create a spirit of opposition? Don't you think the spirit of a department should be built to that extent, where each member of that organization should have confidence in each other, and should be used in approaching the individual instead of running to the foreman?

CHAIRMAN SAIN: That is the story.

Haven't we seen the executives we admire? We say to ourselves, "It just seems so easy for him." He makes the right approach. He gets the facts and presents them in a way that the men want them.

I might say in that respect that the man working right here should be responsible for the safety of this man next to him, and so on down the line. In our plant, we have that very well organized. We have organized what we call the human safety guard. Every ten men in Frigidaire has a group leader, a safety leader. I can go into a department, most any department, and say to the department head, "Get your safety men together," and he will have them together in a few minutes. I don't want to talk to them particularly, I just want to see if he has his group organized. We make these group leaders members of the National Safety Council. Every fellow wants to do good. Every man in this world wants to do well in life.

L. E. AVERILL (Packard Motor Car Co., Detroit, Mich.): I think one of the most effective things that we have had in protecting our eyes is, as you stated, holding the foreman and the job setters responsible for the safety in their departments. I often find in walking through our departments that the foremen and job setters are mighty busy in the increase in production and changing new models and so forth, and are not giving quite the amount of time they should to the question of safety.

We have had the same experience as every other large manufacturer in losing eyes. Last year, we went ten months without losing an eye. We thought we were going to go through the whole year without having an eye injury. This year so far we haven't lost any. We lost one last year, and five the year before.

In trying to sell this idea, I have tried every conceivable thing that I could imagine. Now, I carry a couple of glass eyes in a little box in my pocket. If I see one of our employees grinding without goggles (I have, by the way, one blue and one brown glass eye) I go up to him and open this box and say, "How do you like the looks of that thing?" He probably will say, "It doesn't look good to me." "How would you like to wear it? We keep it in the office for fellows who grind without goggles. They look pretty good, but you can't see through the darn things."

I will bet money that the next day if I go through the department and if that man is grinding he has his goggles on.

CHAIRMAN SAIN: That is a real example of getting on the wave length.

If there is no further discussion on this particular subject, we will pass over to the subject that Mr. Cotcher talked about, "Safety through contests." I know there is just a lot of things that many of us want to know about safety through contests.

HAROLD MOORE (Wallys-Morrow Co., Elmira, N. Y.): Mr. Cotcher said in his address that they only included major accidents. Do you mean by that lost time accidents, Mr. Cotcher?

MR. COTCHER: In our particular contest, we include only accidents where the time lost exceeds one week. That is a rather arbitrary way of expressing it, but our purpose is to avoid anything which might tend to keep the man out of the first-aid room. I am always afraid if we get too fine, get down to charging these little accidents, that only lose a few hours, there will be a tendency not to report them. You can make that lost time limit anything you please.

J. P. HAIGHT (U. S. Aluminum Co., Edgewater, N. J.): I would like to ask Mr. Cotcher whether he thinks that a certain type of safety contest is effective indefinitely or whether it is necessary to frequently repeat them?

MR. COTCHER: I think that a little variety has to be introduced. It is logical that after you have made the same appeal for several different periods you have to introduce some new ideas. Those new ideas can be introduced in various ways. You can vary your form of award or you can vary your methods of figuring a little, but probably the essential idea will have to remain the same.

MR. AVERILL: I presume Mr. Cotcher was speaking about interplant contests. I am particularly interested in an interdepartmental contest. In our plant, the hazards in the departments vary. In some departments they wouldn't have a compensation case in a year. These departments, therefore, would be winning the contest continually. How would you take care of a contest of that kind? Would you count their minor accidents or slighter injuries?

MR. COTCHER: Sometimes you have departments so small in comparison with others, and the nature of the exposure so slight that you really can't afford to let them enter the contest as single entries. In that case, you have to bunch a few of them together. If you have a productive organization, you have got to balance the size of your contestants somewhat.

Take, for instance, the concern with which I am now employed. We have one plant that employs approximately five thousand men. There are large divisions in that plant, a hundred superintendents. We enter them as though they were separate entrants. We have outlying plants which go down to a total employment as low as one hundred and twenty-five. We have some miscellaneous departments that are more or less unattached. We are compelled to bunch some of those together some times, even though the supervision is not in common. We have several different shipping departments that have independent supervision. We bunch those all together in one general materials handling classification, because, as you say, if we allowed a small department with non-hazardous work they would win the contests indefinitely. The big trouble, I find, is that certain departments will have a tendency to come to the top. We charge any expense, any outside expense that arises. You will find most departments sometime during the six months will have some kind of an accident that will send a man outside of the plant for treatment. If they don't, then I think the answer is to bunch them with some other departments. That is a problem, and it must be met as your circumstances require.

R. E. NEWCOMB (Brewer-Titchener Corp., Cortland, N. Y.): I would like to ask Mr. Cotcher who has the say as to how these small departments will be bunched? Do you take the department head into consideration and counsel with him or do you just arbitrarily bunch him with some other department to equalize that experience?

MR. COTCHER: We figure out what we have to do to make it balance. We then get the approval of the manufacturing head and sell the idea to the department head as to why it had to be done.

It is true in effect that you do have to arbitrarily set them up. Your salesmanship comes in in not letting the fellow know it is done arbitrarily. Lots of times you can put an idea over by going to a man and making a casual remark on any particular thing that you want to sell to him, especially if he is the type that insists on its being his own idea. You can just drop the hint and go away and let him alone.

MR. NEWCOMB: Do you find any reaction on the part of the workmen in the different departments on account of their not getting any reward themselves individually?

MR. COTCHER: Yes, and it is unfortunate that in an organization as large as the one I have in mind, it is impossible to give any great reward. I know of one other organization that was a little more liberal in supporting their contests, and they gave for the winning department a dinner at the expense of the management. Every member of the department was a guest at this dinner. That probably is the ideal way of doing it, if you can get that much support.

MR. NEWCOMB: The Wallys-Morrow Company have a way of doing that. I would like to have Mr. Moore tell how they work it over there.

HAROLD MOORE (Wallys-Morrow Co., Elmira, N. Y.): We started with the idea of making every man or woman in an individual department his brother's keeper. We thought the purpose of departmental contests was to keep that department out of the black list. We divided the plant into two divisions. The first division was actual manufacturing machine work and in that group we also included the maintenance divisions like the millwrights, the electricians and the sheet metal men, the carpenters, because we believed their job, from a hazardous standpoint, was equally that of the man who operated a machine or who worked in a drop forge. The other group consisted of those men in the shipping department, stock chasers, and all departments not actually engaged in machine operation. We made the same division for the night men. There were four groups.

The basis was that in the department that went through in each group with the best record, every member of that department should receive some sort of a token as a memento of the occasion.

In practice, it worked out this way: That there were quite a number of departments in each group that went through without a single lost time accident, and consequently there were in the first edition something like 40 per cent of the men who got prizes. If a department had a single accident, that is, a lost time accident, meaning an accident that meant the loss of more than the shift in which they were actually working, it put that department out of the race for the whole of the four months of the competition.

We chose four months because four months happened to represent what we call the peak of our business.

For the benefit of you fellows who are interested in the eye business, let me tell you any eye case that necessitated the operator going over to have it taken care of by an oculist other than our own first-aid, that department was eliminated from competition. Before the competition started, we let the foremen know what the records were for the previous months. Since we started this competition—we have one every year—we have cut down those overtime cases by 70 per cent. Why? Because every overtime case, every oculist case, arose from nearly one thing, the man wasn't sure whether he had a piece of anything in his eye. He felt something. He thought it was out. He didn't bother any more about it. During the night it troubled him. The next morning he came in and there was the beginning of an ulcer. Our first-aid department, which is not presided over by a doctor but by a registered nurse and a first class superintendent will not handle

cases of that description. The result was that a man would come in to the first-aid room and have his eye taken care of.

Any department that had a lost time accident or an overtime case, lost out in the competition. The first year, we had about 40 per cent of the departments that went through without an accident. The average cost of the individual prizes has been about \$1.50. By going into the wholesale market, we have been able to get something that was nice and something a fellow thinks a lot about. We let the Workmen's Safety Council decide what they will have for their prizes. We always put the prizes in a showcase somewhere in the center of the plant where everybody can see them. When the thing is over, the foreman of the division who is the connecting link always in all this safety work, distributes the prizes. The men have their choice of five things. The presentation of the prizes is made by the manager of the concern, who hands a bunch of the prizes to the foreman and the foreman distributes them to the men in the division.

That is roughly how we handle the safety competition. It does away with one of the points one of the speakers brought up. If it is a bill fold the man has won, he can show it to everybody. It has engraved on it: "Wallys-Morrow Co., Safety Competition, 1928. Winner."

CHAIRMAN SAIN: That is a real plan. The thing that it shows, at least, is that there has been a lot of hard work put back of it. We haven't heard yet from Cyrus Rath of the Reo Company.

CYRUS J. RATH (Reo Motor Car Co., Lansing, Mich.): I don't know whether I have anything to say. A safety contest is an unknown thing in our factory at the present time. We haven't had one in years. We used to have them. I can't add any further information to what has been given.

CHAIRMAN SAIN: Does anybody else have any discussion? I believe Mr. Williams, our Chairman, probably could give us some light on this subject of, How to compensate or how to take care of the departments where the men might probably show a little inclination to be dissatisfied by not being taken into the payment plan.

A. M. WILLIAMS (Chrysler Corp., Detroit, Mich.): The question was asked here a short time back: How do you take care of the department where the hazard is so much greater than possibly in the average department throughout the plant? It has been a hard thing to deal with. In every department, you have two variables. Your one variable is the number of men under the supervision of a given foreman. Your other variable is the degree of hazard on the particular job in that department. One way that has been worked out successfully and carried on for the last three years and has finished twelve consecutive competitions is by taking the insurance rating on each trade. You can go to your insurance company and get the rating on any particular department. For instance, your stores department, receiving and shipping department, you can get from your insurance company the rate on that particular work. Then, you can take your sheet metal stamping, if you wish, and get the pure rate on that. Then, you can take your transformation of bar stock, castings and forgings, all of your machine operations in the transformation of that stock, and use your rate there. You can break it down and get a basis to work from. The experience that you are drawing from, the insurance companies' figures, is so broad that it is pretty nearly as fair a yardstick as can be used.

THOMAS D. LAW (Oneida Community, Ltd., Oneida, N. Y.): I am wondering how many people here really use the preventive accident charts in any contest that you hold? In other words, I have heard quite a lot about not charging the minor accidents. I wonder just how they do it. In a small department where there is less hazard there are minor accidents which should really be charged in

the contest to make it a good contest. A minor accident that is not reported to an emergency room is a preventive charge against that department, and a preventive charge is made such that that foreman is going to be sure that every man that has a minor injury goes to the emergency room. We have tried that for the past two years, and it has worked out 100 per cent. In all our contests, I charge every case reported to the emergency room by the actual cost of the accident or the emergency work. I would like to hear if anyone here uses that system.

CHAIRMAN SAIN: Does anyone here use that system?

I might say that I am very strong with Mr. Cotcher on what he had to say about the minor injuries. It is too easy to break down the employee's willingness to go the medical department. We do like Dr. Myers said yesterday, it is just plain two and two, I look for the facts and I don't fool myself. Don't kid yourself, because there are a lot of foremen right down in the shop that are going to say to a fellow that gets a lot of scratches some pretty hard things, and the next time he is going to say, "Before I will listen to that fellow hawl me out again, I will not go to the medical department." As a result, he is going to get some infection and it is going to terminate in a lost time accident. I agree with you that it is a very good plan to keep a record of all of them, but then it is facing that thing of breaking down that willingness and that wanting to go to the medical department.

L. R. SCHUYLER (Lycoming Manufacturing Co., Williamsport, Pa.): In reply to the gentleman's question on first-aid attendance, we have tried any number of ways to cut down the minor accidents. We know that minor accidents are eventually the cause of a man losing anywhere from two days to possibly a month or more through infection. It is very essential, as we all know, that a man report to the first-aid department for the slightest injury as long as the skin is broken. We have found that antagonizing the men and chasing up the fact that they reported to the first-aid department so many times during the past week or month, that they have that tendency to say, "Well, if they are going to call me down every time I go to the first-aid department, I am not going any more." Consequently, you have a monkey wrench in your gear. He is going to tell the other fellows about it.

We also found if you don't have the person in the first-aid department who uses the proper technique in the approach of a patient, you are spoiling an awful lot of good work. A man came to me one time and said, "I went up to the first-aid department and I thought they were going to bite my head off. I didn't do anything to the attendant."

The way we have been handling it recently, is that we make out a weekly report of the accidents going to the first-aid department. That report is cut down into departments, and every general foreman receives a copy of the list of accidents that happened in his department that necessitated going to the first-aid department for treatment, and also those accidents that required outside medical attention.

When this was first inaugurated, we found some of the general foremen posting these communications on their bulletin boards. I took the matter up with them at once, knowing that it was going to do a whole lot of harm if it continued. I told the foreman that they were not sent that communication for general information, that it was their own individual communication and they should use it to the best advantage. Consequently, we are now receiving a great deal more cooperation from the general foremen.

In the words of one of the foremen, "When I receive your communication on the accidents in my department, I look them over, take the worst accident and then study the individual operation, find out why or how that man could possibly have received that accident. If I find it was the fault of a mechanical part of the machine, I have it rectified. If I find it was lack of knowledge on the part of the operator, I give that operator further instructions." We don't advise the

foreman to bawl a man out because he got hurt. I have gone up to men time and again on emery wheels, new men who hadn't received the message as it was given, and have just shut the power off. He then looks around to find out why the power was shut off on his emery wheel. Then, you give him a little friendly talk and you have the man sold on wearing goggles.

We ask these hard boiled characters, so to speak, to wear the goggles with the strap that go around back of the head. Of course, we tell them. "When you are not using your goggles, you can easily push them up on your forehead out of the way." There is no tendency to have any eye strain and it isn't necessary to wear them all the time.

On the weekly reports, all accidents coming to the first-aid department, we give that over to each individual general foreman and then under it tell him in addition how many dressings his men received in the department during that week.

CHAIRMAN SAIN: As safety directors, we run into people who, when you go down to the department and ask them to do something, will always say, "Who, me?" Did you ever run into that group of fellows that are always saying, "Poor me." They "poor me" themselves to death. Then, did you ever run into that fellow that when you handed him some work to be done says, "Count on me."

There are three types of people—who me, poor me, and count me. What group do you belong to? I would like to go into each one of them in detail.

There are three other things that are going to keep you out, three "in's" that are going to keep you out—indecision, never can decide on a darn thing; intolerance and indifference. There are three "in's" that if you don't get busy on, out you go.

Of the three, there is only one I want to speak of and that is indecision. Write up a plan and then work your plan. That person that hasn't any plan is going to be like the June bug that came out of Mr. Cotcher's pocketbook. Indecision—be sure you know where you are going.

The biggest thing in the world is this: How are we measuring what good we are doing? We don't know how many accidents we prevented last year. We know how many we have had, but we don't know how many we have prevented. The thing I am afraid of is that some of us possess one of those failing characteristics that Dr. Myers spoke of yesterday, laziness, egotism, unconcern. What one there is liable to get us in bad? Due to the fact that we can't tell how many we have prevented, there is no way in the world to measure that. Laziness is the one that may get us in trouble.

My last word to you is, don't be like the toad, get up and stay up.

ADJOURNMENT

October 3, 1928**A. M. WILLIAMS, Chairman****Supervisor of Safety, Chrysler Corporation, Detroit, Mich.**

The second session was called to order at nine-fifty o'clock by the chairman, A. M. Williams.

CHAIRMAN WILLIAMS: Before we go ahead with the regular program, we will have our business session and election of officers. However, that will not take very much time.

The chairman's report will be rather brief. The secretary's report will show what has been accomplished in securing new members and maintaining the interest that has kept together the old members.

In working out our program for this Congress, you will notice that we have given a small portion of it to each of the outstanding things to be considered in a well rounded safety program. Years ago we were pretty mechanical in the safety game, bringing out the educational, and now we are splitting up some of the educational activities.

I have this one illustration that I always carry around in my mind. Back in my boyhood days, we had one outstanding character of the neighborhood, a well read university man, a carpenter, and with him was his only boy. This boy grew up to manhood and always worked with the father. He had just as good a mind, had just as good an intellect, and did just as good work as the father. The father did all the planning and laying out of the work. The boy possibly gave here and there a suggestion. The thing that I want to get across is that the father dominated, the father's mind was the dominating mind. It was his mind that did the planning. When the boy was about forty years old, the father died and left this boy stranded financially and mentally. The boy finally died in the poorhouse. That part of that boy's mind with which he did his thinking and planning had simply atrophied due to the fact that he hadn't worked at it.

The human mind is like the human body, if you exercise by lifting, the muscles with which you lift become strong and you can lift a good big load. If you never exercise those muscles, they waste away. The functions of the mind are the same, only you can't see that atrophy, you can't tell it is there, only by contacting with the mind. In our physical examination rooms we examine a man physically and if we find that one side is atrophied, we say, "Why this man is not using this arm or this shoulder. There is something wrong here someplace." Usually we find some deformity that didn't show up readily. We have the left side in the fellow to compare with the right, and we can tell instantly whether atrophy has taken place. But when it comes to comparing the mental with the physical, unfortunately we haven't two sides to compare. You can't cut your subject off at the collar and tell whether he has exercised what he has above his collar or not.

A man may be well read. We know lots of them. I think all of you can call to mind men who read a great deal, but that is all they ever do with it; they stop right there. The receiving section of their mind is splendid, but when it comes to that section of the mind where they turn that material over and think of it, it is atrophied.

Are we approaching in industry through our safety activities and our other activities, the point where we are letting those things in our employees atrophy, shrivel up through lack of use? Are we pampering them a little bit too much by guarding against this and guarding against that? Don't misunderstand me, I am not driving to the point possibly you think I am, that we shouldn't guard, because we should. However, at the time we guard, the guarding should be in connection with the

development of that part of the employee's mind that we want to develop to keep him alert and on his toes.

In other words, the safety program that we have been driving at this year has been aimed to be a well-balanced program, giving to each its appropriate weight, as we saw it.

The growth of the Automotive Section will be taken care of in the report of the secretary.

The next order of business is the report of the Nominating Committee. The Chairman is Mr. Dunnebacke.

Report of the Nominating Committee

By A. F. DUNNEBACKE

Chairman

The Nominating Committee consisted of Mr. Nelson of the Nash Motor Car Company, Mr. Corbett of the Chandler Motor Car Company and myself.

We rather appreciate the seriousness of a Nominating Committee because the success of this Automotive Section depends upon the selection of your officers and the work that they do. Our deliberations were guided to a certain extent on the activities of the officers this past year. We considered also the precedent that has been established in this section of advancing past officers to higher positions. We have considered also advice from the National Safety Council as to the activities of different members in the National Safety Council and have considered representatives of such companies.

We have considered also the question of geographical location in the working out of the activities of the Section. There is necessarily three or four meetings each year. It sometimes works a hardship to come from distant points to attend the meetings of the officers. If there are not sufficient members present at those meetings, it is difficult to do real constructive work. I say this because you may criticize the committee and some of its members because you might think we are centralizing the officers geographically. If there is that feeling, just remember that that is done solely for the purpose of insuring a complete attendance of all officers at the meetings that are called during the year. We have gone over the matter pretty thoroughly, and I want now to submit to you the slate that has been selected by that Nominating Committee.

Conforming to our precedent of advancing officers, we have suggested the name of Mr. E. H. Cotcher of the Murray Body Corporation as your Chairman. Mr. Cotcher was Vice Chairman last year.

We have selected Mr. H. L. Sain of the Frigidaire Corporation of Dayton as Vice Chairman. Mr. Sain was your Secretary last year.

For Secretary of the Section, we have selected Mr. H. L. Fracher of the Detroit Steel Products Company. Mr. Fracher has done unusual work in connection with the Detroit Industrial Safety Council, and we know from his activities in the Detroit area, that he will make you a very splendid Secretary.

For Chairman of the Poster and Slide Committee, we have selected Mr. M. J. McCarthy, Fisher Body Corporation, Detroit, Mich.

For Chairman of the Publicity Committee, we have selected Mr. C. W. Bishop of the Lycoming Manufacturing Company, Williamsport, Pennsylvania.

For Chairman of the Statistics Committee, we have selected Mr. P. J. Brand of the Pullman Car and Manufacturing Company, Chicago, Illinois.

For Chairman of the Engineering Committee, A. F. Dunnebacke, General Motors Corporation, Detroit, Mich.

For *News Letter* Editor, we have selected Mr. C. M. Dotterer of the Graham Paige Motor Car Corporation, Detroit, Michigan.

There are two Committee Chairmanships we have left vacant pending advice and consultation from the new officers. They are the Chairman of the Program Committee, and the Chairman of the Membership Committee.

The Executive Committee will consist of the officers of the Section, the Past Chairman of the Section and one or two outstanding people that we feel we can call in to the sessions for consultation and advice. Your Executive Committee will be the officers, and Mr. A. M. Williams, the Past Chairman, and Mr. L. E. Averill of the Packard Motor Car Company, Mr. J. S. Burns of the Reo Motor Car Company and myself.

The committee wishes to submit the slate and ask that you accept it.

CHAIRMAN WILLIAMS: Gentlemen, you have heard the report of the committee. What do you wish to do with it? Are there any other nominations?

L. R. SCHUYLER (Lycoming Manufacturing Company, Williamsport, Pa.): I rise, since I hear no other nominations, to move that the report of the Nominating Committee be received, and that the Secretary be instructed to cast the unanimous vote of the Automotive Section for the officers as nominated.

(The motion was seconded and carried.)

CHAIRMAN WILLIAMS: We will now have the report of the secretary on the growth and so forth of the Automotive Section during the year.

SECRETARY SAIN: I think Mr. Dunnebacke was very much justified in his argument there about having the men located in a locality where they can attend the meetings. If you had a record of the meetings we have had in the past year, you would realize it is very important to have them geographically located. There was about as many absent as present at most of the meetings. I don't care to read over each of the meetings in detail.

I think the thing we are most interested in is the membership of this Automotive Section, how many new members we have taken in, how many cancellations there have been, and what we have at the present time. During the year, we have taken in fifty-five new members. I think a lot of credit should go to our Membership Committee. There have been nineteen cancellations, with a total membership at the present time of two hundred and ninety-three.

I think that the field is very rich, there is room for a great harvest. What we need in the coming year is a committee that will call on the different prospective members for the Automotive Section. There is a very short space there to the three hundred mark. With the cancellations we might have in the next year, I don't see any reason why we shouldn't go to three hundred different companies represented in the Automotive Section next year.

CHAIRMAN WILLIAMS: Before turning the chair over to the new chairman, I want to extend to the old committee members, all of them, my sincere thanks for the cooperation they have given me. I want also to extend to the new officers the hope that they will have the same, and give the same as I have experienced in the past year. Mr. Cotcher, will you take the chair?

(Chairman-Elect Cotcher took the chair.)

CHAIRMAN COTCHER: I am very proud to have been elected chairman of a section like this. I noticed, in looking over the reports of the National Safety Council, that we are next to the largest industrial section, and that we got the most new members last year. If the new officers and the new Executive Committee can do as well and make as much progress during the coming year, there is no reason why we can't stand at the top of the list. I feel that we should all be highly complimented in being given the direction of such a very vital and live section.

I am not going to take any more of your time with comments. I conceive the duty of a chairman to be principally to introduce the features of the meeting. We have such a very fine program for today that we don't want to waste any time in oratory.

The first feature of this morning's meeting will be a demonstration of the manu-

facture and application of pyroxylin lacquer. The explanation and demonstration will be given by Mr. E. G. Richardson, Chief Chemist of Berry Brothers of Detroit. Mr. Richardson!

Manufacture and Application of Pyroxylin Lacquers

By E. G. RICHARDSON

Chief Chemist, Berry Brothers, Inc., Detroit, Michigan

In a discussion of the manufacture and application of pyroxylin lacquer, it will be interesting for us to consider first the derivation of the name, and to review briefly the principal lacquers of other civilizations. We can then take up the raw materials entering into modern industrial lacquers; and the methods used in their fabrication. The important methods of application will be dwelt on; and finally a consideration of the hazards involved in the manufacture and the application.

The phenomenal increase in the demand for pyroxylin lacquers is borne out by government statistics which show a production of some thirty million gallons for 1927. This is contrasted with the same report which does not show separate classification of lacquers up to and through 1923. Lacquers may be divided into three classes, which refer to the method of application viz.: spraying, brushing, and dipping. They may also be classified as automobile, furniture, industrial, toy, etc., which refer to the type of coating work they are best fitted to perform. These lacquers are all essentially the same, differing only in some detail of the formulation, or quality of raw material. The term "Lacquer" has simmered down in the last several years so that now it is generally taken to mean a nitrocellulose or pyroxylin base coating material. Formerly, and to a small extent even today, any quick drying coating for protective or decorative purpose could be marketed as a lacquer, if considered desirable from the sales angle.

Ancient history records the use of lacquers. The derivation of the word is the Hindustani "Lakh" which means hundred thousand and refers to the swarms of insects which fasten themselves to host trees in the forests of India, Siam, and Burma, and in the course of their life cycle produce a resinous incrustation. This resin is gathered and after suitable refining becomes the well known shellac of commerce. Shellac varnish was our first lacquer. The earliest written reference of the use of shellac as a coating material is dated 1590; and states that lac was collected for use in making varnishes for the imperial palace.

We frequently hear reference made to Egyptian and Chinese lacquers. The early Egyptian material was a vegetable resin dissolved in any solvent then available, such as oil of cedar. The coating had no outstanding merit and should not be confused with the bitumastic paints used to protect the articles unearthed by present day archeologists. On the other hand, Oriental lacquers are still produced and used today, in much the same fashion as they were centuries ago. These lacquers of China, Burma and Japan consist of evaporated and treated sap from the tree *Rhus Verniciferox*, which is in the same botanical family as our poison ivy. The sap takes on a dark sirupy nature and when spread as a film requires exactly opposite conditions for favorable drying than do our American varnishes. The Chinese lacquer, or Ningpo varnish as it has been dubbed by English speaking residents in China, will dry only under high humidity atmospheric conditions, and, if applied during the dry season, long cloths saturated with water must be hung from the ceiling of the drying room. Many coats are used in building up a finish and each coat rubbed smooth; a process extremely long and tedious, and entirely impractical in any of our American finishing rooms. An unusual peculiarity which would bar the use of Chinese

lacquer in America, if it were practical otherwise, is the fact that wherever it comes in contact with a white man's skin, a rash similar to poison ivy begins, which will often spread and prove serious. This poison property is lost, however, when the lacquer has been allowed to dry sufficiently long. The material is very beautiful and durable and worthy of considerable respect as a finishing scheme, even though impossible in our western civilization.

Origin of Modern Pyroxylin Lacquers

Modern pyroxylin lacquers had their beginning with the issuance of an English patent in 1856 covering a solution of cellulose nitrate in ether-alcohol mixture. Such a lacquer had very limited use and small progress was made until 1881, when a patent was issued covering the use of a solution of cellulose nitrate in amyl acetate. The price of fusel oil, from which amyl acetate was manufactured, increased rapidly and the extensive use of lacquers was thwarted by the high prices for suitable solvents. We might not even today have suitable lacquer solvents at reasonable prices but for the war of 1914-18. Our principal supply in this country today comes from a plant which was originally started for the manufacture of acetone used by the English government in making their cordite. Butyl alcohol or butanol is a by-product from the fermentation process used in the acetone manufacture. Large stocks of the by-product were accumulated and after the war an outlet was sought for this dormant material. Co-incident with this development, the powder people found themselves with large stocks of surplus smokeless powder and processes were developed whereby the nitrogen content could be reduced to the range of 11.8 to 12.5 per cent, which range gives a material soluble in alcohol esters and is not sufficiently high to produce an explosive product. The nitrated cellulose or soluble cotton used in the lacquer industry is not guncotton and cannot be detonated by concussion.

Soluble cotton is used in the lacquer industry, because of the fact that it is soluble in the esters and the alcohol esters, which are suitable vehicles for spray application. If a lacquer were attempted with guncotton, acetone would have to be used as a solvent, and when the lacquer was sprayed, probably most of it would dry before it got to the work, and that which dried on the work would be so white from brushing that it would serve no good purpose at all. Therefore, the high nitrated cotton cannot be used even in lacquer manufacture.

By itself when dry, it will burn with about the rapidity of celluloid. In the lacquer as used, however, other materials are present which retard the fast burning characteristics, and we find that the pigmented lacquer films are no more rapid in combustion than many oil enamel or color varnish films. With the development of processes for conversion of smokeless powder into soluble cotton there was also the interesting development of a process whereby the viscosity of the dissolved material was so reduced that it was possible to get as high as forty ounces of cellulose nitrate into a gallon of solvent and still have a workable lacquer; whereas, with the early nitrocotton not more than six or eight ounces could be dissolved without obtaining a solution so thick that spreading by means of brush or spray was impossible.

This is really the basis of the modern industrial lacquer, because if we had a low solids material, it would take dozens of coats to give a film thick enough to give normal, reasonable durability. Varnish of a high-grade order contains as much as sixty-five ounces of solids in a gallon. So, you see, the present day industrial lacquers do not approach the varnishes from a film thickness per coat aspect. But, they are certainly far improved over the lacquers that were available when the first patent was taken out in 1881.

The lacquers for industrial and domestic use are manufactured today by

processing together in suitable proportions solutions of nitrocellulose, resins, flexibilizers, pigments and solvents. Lacquer nitrocellulose is made by treating purified cotton linters with nitric acid and sulphuric acid. From 5 to 14 per cent of the finished lacquer is soluble cotton. The process is stopped at the proper point and the cotton thoroughly purified by washing. Gun cotton is made by a similar process but the nitration is carried much further. The resins used in most cases are varnish gums such as Ester, Kauri, Congo, etc. They impart adhesion and gloss. The flexibilizers (or plasticizers) are either oils or non-volatile organic chemicals which were previously developed as camphor substitutes in celluloid manufacture. Such materials are tricreylphosphate and dibutylphthalate. As the classification implies, these materials impart flexibility and ductility to the lacquer film. Pigments used are, with few exceptions, the same as employed by the paint and enamel industry in recent years. They include zinc oxide, lithophone, and titanium oxide for whites. Lead chromate and basic lead chromate give yellow and orange colors, respectively: prussian and ultramarine blue produce many shades; pigments called chrome green, consisting of mixtures of prussian blue and lead chromate, give all varieties of green; iron oxides make dull shades of red, and when brilliant red shades are desired it is necessary to resort to dye stuff precipitated on inert white base. The organic colors, while brilliant and beautiful, are fugitive and result in lacquers of poor light fastness.

Solutions of the cotton and gums are made by adding solvents to them, either in agitator tanks or pebble mills. The pigment may be ground directly in the lacquer in pebble mills or may be ground on paint mills in the plasticizer portion of the lacquer, and subsequently stirred into the lacquer. From the manufacturing angle this is the most important phase of lacquer fabrication for a tremendous amount of mechanical work is required to thoroughly wet the pigment with the vehicle and reduce it to "enamel fineness." Tinting operations to secure the exact shade follow and are both tedious and costly. Finally, the lacquer must be cleaned by passing through a centrifugal clarifier which removes all dirt and large pigment particles and makes it possible for the lacquer to produce a smooth, even film when properly applied.

Lacquers Applied by the Spray Method

The bulk of the lacquer manufactured today is applied by the spray method. Spray equipment manufacturers are constantly improving the designs of their apparatus, so that lacquer coatings may be applied quicker and better, with less wastage of material as fume or spray dust. Local and state ordinances require that spray operations be carried out in properly ventilated booths. Booths are of many designs but all are constructed for the same purpose, which is the confinement and removal of fumes and spray dust. Compressed air at pressures of fifty to one hundred pounds per square inch is used to effect atomization of the lacquer in the spray gun. The lacquer supply for the gun is put under five to ten pounds pressure in pressure tanks in one type of equipment while another type depends upon the pressure head developed from an elevated bucket or drum. The first is referred to as pressure feed and second as gravity feed. Almost without exception pigmented lacquer supplied to the consumer is too viscous for application without thinning. The pigment will not settle as hard or cake as readily during the shipping and storage period in heavy bodied lacquer, as it would in thin lacquer. This situation necessitates mixing or thinning tanks in conjunction with the spray equipment.

Dip application of lacquer is only used on small articles and there is no necessity for large quantities of lacquer in the dip tank at any one time. Flacoating with lacquer was thought to have great possibilities a few years ago, but with one or two exceptions it has been given up as impractical at this time. Hand

brush application of lacquer is used industrially on small parts. It is the principal method of application of household lacquers. The hand pump spray which had been advocated for household use has proved tedious and ineffective. The quantity of lacquer sold for household decoration is insignificant when compared with the amount consumed by industries.

The advent of large scale lacquer manufacture and application presented new hazards, but not as was first thought, more serious hazards than had been experienced with varnish and enamel. The quick drying feature of lacquer causes any material not striking the work during spray operation to settle as a loose, fluffy powder. If poor housekeeping is permitted, quantities may accumulate making a very serious fire hazard. The fluffy powder is easily ignited and if a vibration or gust of air suspends it in the air in sufficient quantities, an explosion can result. This is true of any combustible material in powder or dust form, and we occasionally hear of grain, coal and even sugar explosions. Frequent cleaning of booths and stacks removes any possibility of dust explosion.

Explosions Rare in the Spray Booth

A vapor explosion is impossible in a properly operating spray booth as the concentration of thinner vapor is far below the explosive range. A paper published by the author's laboratory in *The Journal of Industrial and Engineering Chemistry*, for February, 1928, reviews the "Explosive Properties of Lacquer—Solvent Vapors." It was found that the vapor concentration in the air of typical industrial spray booths was of the order of one-one-hundredth of the amount necessary for an explosive mixture. Many samples were drawn from exhaust ducts while spray guns were operating a full capacity. These were then transferred to an explosion chamber equipped with a spark gap. In all cases it was found impossible to get an explosion.

Lacquer in mixing or dipping tanks is readily ignited by application of a flame, but, on the other hand easily extinguished by closing the lid or by water, foamite or carbon dioxide. The flash point of lacquer is approximately that of shellac and its burning characteristics are similar to those of oil varnish. Rags saturated with oil, varnish or paint will frequently ignite spontaneously and were often the cause of fires in finishing rooms. Rags saturated with lacquer will not ignite spontaneously and the use of lacquer has given us relief from this very serious hazard.

Lacquer solvents and diluents with the exception of benzol are not toxic. Numerous investigations on this matter have exonerated all except benzol. Alert to the situation, the lacquer manufacturers have eliminated this undesirable constituent from their formulae, except perhaps in a few cases of special purpose lacquers. In such instances, proper precautions should be taken both in manufacture and application to guard the workmen from contact with the fumes.

When the advantages of our modern pyroxylin lacquer became evident, it was truly remarkable how quickly the old established manufacturing and finishing room equipments and procedures were changed over to make way. There is a possibility that some time in the future pyroxylin lacquer will be supplanted with a synthetic resin lacquer possessing similar qualities but with more advantages. But as pyroxylin lacquer is still here, it behooves those of us who are connected with the manufacture or application to continue to learn ways and means of overcoming its faults and shortcomings.

CHAIRMAN COTCHER: To more thoroughly cover the subject of lacquer, the Program Committee has arranged for formal discussions before we invite general discussion. The first phase of that formal discussion will be led by Mr. H. L. Miner, of the E. I. duPont de Nemours Company, Wilmington, Delaware.

Discussion of Mr. Richardson's Paper

By H. L. MINER

Manager of Safety and Fire Protection, E. I. duPont deNemours Company,
Wilmington, Del.

Mr. Richardson certainly covered the subject of the manufacture and application of lacquers in a very comprehensive manner.

Before taking up the different phases of the problem I want to touch upon certain very important characteristics mentioned by Mr. Richardson. Most people have the idea or impression that pyroxylin lacquers or solutions contain large quantities of nitrocellulose or pyroxylin or soluble cotton. Mr. Richardson stated this morning that, generally speaking, the amount of nitrocellulose in these lacquer compounds was from 5 per cent to 15 per cent. I imagine that about 10 to 12 per cent would be the average; just sufficient pyroxylin to act as a binding agent in the finish and prevent oxidation.

A very interesting phase of the problem was raised a year or so ago as to the probable effect of the pigment or color used in lacquer compounds upon flammability or the decomposing tendencies of the residue. One chemist in Philadelphia stated that he felt that certain pigments either due to composition or color might lower the ignition temperature or decomposing temperatures. The Underwriters Laboratories recently tested pigments of five or six different colors, and while there was a few degrees temperature difference in their decomposing or ignition points, the variance was so slight that it was not worthy of note.

Another important phase of the problem, and one not well understood, is the effect that one or two per cent nitrogen has upon the burning characteristics of the nitrocellulose, as was very vividly demonstrated this morning.

During a recent survey in North Carolina, a committee went over the spraying operations in a chair factory. They were spraying ordinary white oil base enamel which did not contain any nitrocellulose. It was a continuous operation. The chairs went into the booth where the spraying was done and were then carried on a trolley system back into the drying room. We found about a quarter of an inch of a milk-like powder on the floor. We took it outside and, when thrown into the air, it ignited, and a blast fire occurred. Any material that is subject to oxidization, if suspended in the air as a dust cloud introduces flash fire or explosion possibilities.

I want to read part of a statement that appears in the 1928 issue of the Fire Prevention Year Book. It is called *The Red Book*. This book is published by Hough and Lawson in Baltimore. They publish several stock fire insurance periodicals. For the past three or four years, they have made it a point to include in their Year Book an article on pyroxylin lacquers. And for the past two years, they have carried the model ordinance suggested by the National Board of Fire Underwriters.

Mr. Lawson came to me several months ago and asked for an article on pyroxylin lacquers. I suggested that either he or some reputable insurance representative make an unbiased survey of the situation and publish the findings in the Year Book. I would like to read their findings, because they are very interesting, and have a bearing on the subject under discussion.

I want you to understand that I am not presenting this with any idea of mitigating the fire hazard or the need of taking proper precautions or anything of that nature; but just to show you that even in the insurance field, where there has been so much hysteria during the past few years, they are gradually gaining knowledge and are readjusting their viewpoint to the more practical common sense basis.

The article starts: "The wide-spread use of pyroxylin lacquer is a result of that quantity production prized by manufacturers for its cost-reducing equation. Pyroxylin lacquer is not a comparatively new product and the compressed air method of spraying dates back to 1890."

"During the World War the use of the spray method extended very rapidly until today it is the accepted method of applying quick-drying lacquers, paints and varnishes. Probably because of the very rapid spread of the spray method there was little time for exhaustive research work on the part of anyone but the manufacturers of pyroxylin and, as a result, the use of pyroxylin lacquer was classed as very hazardous when, as a matter of fact, this lacquer is not more inherently dangerous than other paints and varnishes and less dangerous than the cheaper varnishes and paints. The really important hazard lies in the method of applying it and this is a hazard which can be corrected. The purpose of this article is to clear away misconceptions and to stress to insurance companies, to manufacturers using the spray method, to fire prevention committees, fire chiefs and the public generally the necessity for better housekeeping in manufacturing plants. This bettering of conditions can be advanced if insurance companies would heavily penalize the indifferent and careless users of spray methods and reward, with lower rates, those manufacturers who installed approved spray booths, who kept the booths clean and free from vapors and residue and who provided adequate fire extinguishing systems in their booths and plants."

The article then goes on to say: "There has hardly been any problem in recent years so perplexing to fire prevention bodies and to chiefs of fire departments as that of the widespread use of the spray method of applying quick-drying flammable materials and there has hardly been a commercial product so generally misunderstood as pyroxylin lacquer. Many misleading articles concerning it and the hazard of its use have appeared in the technical and trade press. It is now developing that pyroxylin has been heavily and erroneously penalized."

"The most important development is the general recognition today that pyroxylin lacquer is no more inherently dangerous than is any other paint, lacquer or varnish and not as dangerous as the cheaper varieties."

"The next big development lies in the important fact that the hazard in the spray gun method of applying lacquers, paints and varnishes is largely a matter of house-keeping on the part of the users of the spray method."

"Discussing these questions before the State Firemen's Association of Texas on June 15, this year, Mr. H. E. Newell, engineer of the National Board of Fire Underwriters and an expert on flammable liquids, said this:

"No other subject has evoked so much discussion in the last decade as has the spray application of flammable finishing material on a wide, or quantity production scale. Similarly, no other subject within the scope of fire prevention effort has been so misunderstood and in numerous instances singled out for unwise and unjustified regulation. Reflection for a moment will prove that this is true."

"Neither the use of pyroxylin lacquer nor its application by the spray gun is new. Aside from its use in connection with lacquer, the spray gun is an old invention. As far back as 1893 it was in use and was employed in that year for the exterior painting of the World's Fair buildings in Chicago. If this is true, the question that naturally arises is, why all the agitation and warnings at this late date? The answer is easy to find. The spray application of flammable finishing materials on a wide scale or in connection with modern quantity production is relatively new, being a development of the past few years. During this period, in connection with this process there have occurred several disastrous fires, one of which involved the loss of many lives. In the case of the latter it so happened that the finishing material being used was pyroxylin lacquer, hence the publicity which followed served to emphasize the use of this material and to indicate it as

akin to dynamite and smokeless powder. Indeed it has been referred to as liquid dynamite, the inference being that shock or concussion in its immediate vicinity would cause it to detonate or explode. Of course this is absurd and untrue.

"Now, as everyone knows, the National Board of Fire Underwriters is an organization composed of representatives of virtually all of the largest and soundest stock fire insurance companies. Through its various committees it functions in many ways, not the least of which is its activities in fire prevention work. Its engineers are the best in their respective lines and it is largely through the National Board, its committees and engineers that standards for fire prevention and protection are equitable and sound.

"Another national organization whose activities are entirely devoted to fire prevention is the National Fire Protection Association. It, too, functions through committees and engineers. Its committees, however, are composed of men actively engaged in industry and commerce. They are experts, are business executives of the highest type and recognize, more than does the average layman, that the annual fire waste of the country is one of its very heaviest economic burdens. They labor unceasingly to reduce this burden.

"It is, therefore, most important to know that the National Fire Protection Association has gone on record as having reached the conclusion that the hazard in spray painting lies in the process used rather than in the material.

"On July 20, this year, the editors of the Fire Prevention Year Book wrote to Mr. Robert S. Moulton, technical secretary of the National Fire Protection Association, asking for statistics relative to the number of pyroxylin lacquer fires in the United States as compared with other paint and varnish fires.

"Answering this letter, Mr. Moulton replied:

"The difficulty in attempting to compile any statistics of this character is that the original inspection reports very frequently do not indicate the nature of the material sprayed. We find that the same plant will spray successively ordinary paint, shellac, varnish and pyroxylin lacquer, it sometimes being difficult in an individual fire to state which material was involved in the origin of the fire.

"We have reached the conclusion that the hazard involved resides primarily in the paint spraying process rather than in the particular material sprayed. There is doubtless a difference in hazard between pyroxylin lacquer and the other materials sprayed, but this difference is a comparatively minor one.

"In this connection you may be interested to know that a number of serious fires supposedly due to the use of pyroxylin have been, upon investigation, found to have been due to the spraying of ordinary shellac or varnish. It is also to be noted that substantially the same fire prevention precautions are called for irrespective of the material sprayed."

"Here we have the two national bodies most actively concerned in the question of fire hazard in entire agreement as to the outstanding fact that it is the process and not the material which introduces the hazard in paint spraying.

"In his letter, Mr. Moulton mentions the probability of a difference in hazard between pyroxylin lacquer and other materials sprayed. There is a slight difference. Lacquers involve a dust hazard, removable by good housekeeping. Paints, varnishes, etc., involve an entirely different hazard—that of spontaneous ignition. Mr. Newell, in his talk before the Texas firemen, discussed that particular phase of the question. He said:

"The principal materials used for this purpose (spray painting) include paints, enamels, varnishes, pyroxylin lacquers, oil stains, shellacs and mixtures of these materials.

"Pyroxylin lacquer, ready to apply, contains pigments, resins and flexible oils, thinner or solvent, and nitrocellulose, the latter averaging about 12 per cent of the total content. The solvents, or thinners, are in the alcohol class and vary consid-

erably; they include alcohol, amyl acetate, toluol and various other hydro-carbons too numerous to mention.

"The nitrocellulose used in pyroxylin lacquer, in one stage of its manufacture is pure nitrated cotton and as such would be explosive if allowed to dry; it changes its nature and loses this characteristic just as soon as it is dissolved in a solvent, hence a can of lacquer is no more explosive than a can of paint or any other finishing material. This fact should be recognized and remembered, especially by those liable to be called upon to fight fires in establishments where pyroxylin lacquers are used or stored. There should be no more hesitancy or fear of entering such establishments at times of fire than in the case of buildings containing paints, varnish, etc. It is well to remember also that water is the most effective medium for extinguishing lacquer fires. Pyroxylin lacquers, because of their quick drying properties, involve a dust hazard when applied by the spray method. That portion of the dust which is nitrocellulose may decompose when subjected to moderate heat and give off flammable gases.

"Paints, varnishes, enamels and similar oil type finishing materials contain turpentine as a solvent, but many low grade paints contain naphtha or gasoline. Linseed oil or other oxidizing agents are used to promote drying and this creates the hazard of spontaneous ignition. Some enamels contain quick drying agents, and these, when applied by the spray method, also involve a dust hazard.

"Thus, so far as the general hazard is concerned, there is little difference between paints, varnishes, enamels, shellacs, etc., on the one hand, and pyroxylin lacquers on the others. Lacquers involve a dust hazard; paints, varnishes, etc., as a rule do not. Paints, varnishes, etc., involve the hazard of spontaneous ignition, but lacquers as a rule do not. Lacquer thinners or solvents are generally more volatile than those of paints, varnishes and enamels, but on the other hand, as stated previously, many of the cheaper paints employ gasoline and naphtha for solvent purposes and these are more volatile than many commonly employed lacquer solvents.

"The storage and handling of these materials has caused no serious concern, hence it is apparent that we must search further for the cause of the hazard which we know exists.

"Any of the finishing materials mentioned, be they paints, varnishes, enamels, shellacs or pyroxylin lacquers, when finely atomized in a mist-like form promote vaporization. When discharged from the spray gun this very result is obtained. If thoroughly adequate ventilation is not provided where the spray gun is continuously discharged, the vapor and residue therefrom will spread throughout the room, the latter depositing on ledges, radiators and other places of easy lodgment. If there are open lights or other sources of ignition in the vicinity of the vapor a flash fire occurs.

"Thus it is apparent that it is the method of application and not the material used which is mainly responsible for the hazard. This fact was fully realized by the N. F. P. A. committee which recently completed a brochure on this general subject. To quote the committee:

"While paints, varnishes, enamels and lacquers differ somewhat as to make up and hazard properties, they all represent a similar hazard when applied by the spray method and should be similarly protected."

"The fire record verifies the correctness of this statement. While three large lacquer fires occurred in Detroit, Grand Rapids and Philadelphia, 11 large fires over a period of three years occurred in connection with the spray application of paints, varnishes and enamels in the southern furniture industry. The following are indicated as the principal conditions resulting in fires:

"First, broken electric lamps and other electrical defects.

"Second, result of careless cleaning of booths, fans and motors with highly flammable solvents.

"Third, improperly arranged or designed equipments of booths, fans and motors used for removing vapor laden air.

"The second and third causes might well be grouped and redesignated "poor housekeeping." Failure to maintain clean and orderly conditions in the vicinity of the booth has also facilitated the spread of many of the fires which have occurred. The importance of good housekeeping in connection with the spraying process is urgent and cannot be overstressed.

"Another feature of pronounced importance, indeed one that affects housekeeping to a considerable degree, is the effectiveness in removing vapor and dust laden air from around the article being sprayed. The principal object of the exhaust system is to properly remove the vapors and residue from a designated area. It is in this respect that ventilation is related to housekeeping.

"Thus, assuming direct means of ignition are eliminated, good housekeeping and adequate ventilation stand out as the cardinal features upon which mainly rest the safe operation of the spray method of application. These are by no means the sole precautionary measures necessary. Of equal importance is adequate fire protection supplemented by isolation or separation of the process."

"From the above it will be seen that freedom from the heavy burden imposed on manufacturers using the spray gun method of applying finishing materials lies in improving housekeeping. By 'housekeeping'—a term familiar to virtually all business men—is meant that cleanliness which insures freedom from carelessly caused fires, the installation of improved spray booths and devices which reduce the hazard to a minimum, and the installation of approved automatic, semi-automatic or manual fire extinguishing apparatus to hold, or extinguish such fires that might occur in spite of all precautions.

"That housekeeping was the really important factor, after all, was early recognized by the manufacturers of pyroxylin lacquers, by the members of the American Paint and Varnish Manufacturers' Association and by certain regulatory bodies. But it was not so recognized by the general public, by the layman, nor even by certain scientific men who had made little or no research work. Too many persons had accepted as facts erroneous statements based on an evident lack of knowledge. This was brought out last December in a report printed in *The Journal of the Society of Automotive Engineers* when a member said:

"Few problems in the industrial world in recent years have attracted so much attention as the application of finishing materials by the spray method. No other problem has developed so many diversified opinions, many of them entirely erroneous, largely based on personal conclusions without sufficient knowledge of facts. These statements or conclusions have been responsible for either over-emphasis of the fire and the health hazards involved, or slighting and mitigating the hazards so that proper precautions have not been taken."

"Getting back to the hazard of bad housekeeping, which, after all, makes up the major portion of the hazard of the spray process, the National Fire Protection Association, at its annual meeting in May, this year, at Atlantic City, adopted revised regulations on paint spraying and spray booths which are designed to meet present day needs."

The importance of good housekeeping and the need of adequate ventilation has been touched upon in a number of your meetings. Mr. Richardson mentioned the fact that the solvents and diluents used in lacquers today are non-toxic, benzol having been eliminated. But, should some of the diluents or solvents be toxic to a minor degree, the ventilation necessary for control of the fire hazard or removal of the vapors will adequately take care of any toxicity of the solvents.

The latest pamphlet or brochure covering the spray application of flammable finishes was published by the National Fire Protection Association last spring.

"These regulations are of more importance to the fire insurance companies and to inspection and rating organizations, all of whom are thoroughly familiar with

them. Copies of these regulations may be obtained from the National Fire Protection Association, 40 Central Street, Boston, Massachusetts, or the National Board of Fire Underwriters, 85 John Street, New York City.

"Of utmost importance, however, to fire marshals, fire engineers, fire prevention bureaus, and to fire preventionists in general are certain good practices based upon and in conformance with National Fire Protection Association standard regulations for refinishing shops. These were prepared by a special committee of the National Fire Protection Association after a thorough investigation of the entire subject. This committee was composed of H. E. Newell, engineer of the National Board of Fire Underwriters, and also chairman of several other committees of the National Fire Protection Association; W. D. Milne; H. L. Miner; Benjamin Richards; A. T. Nuckolls, and M. J. Thompson."

The report was unanimously approved by the committee, by the association and published in pamphlet form. It covers the hazard in detail, and outlines the necessary precautions to be taken. It also includes diagrams showing proper installations and installations of spray booths as well as covering the spray room hazard in the refinishing shops where cars are painted or finished in pyroxylin solutions.

CHAIRMAN COTCHER: This discussion wouldn't be complete without someone representing the users, someone who has made a rather thorough study of the subject, and your Program Committee has arranged to have this side presented by R. E. Abbott, Director of Fire Prevention of the Fisher Body Corporation.

MR. ABBOTT: I was informed by the council that they would prefer to have no prepared talk made for this morning, but rather an extemporaneous discussion. I assume that the formal discussion is supposed to continue by comments or criticism on what the former speakers have stated.

I think the subject has been very thoroughly covered by Mr. Richardson and Mr. Miner. Not very long ago, one of our prominent university professors was asked how it was he talked upon so many different subjects and was very conversant with the facts concerning the various subjects. The gentleman said to him, "You talk to doctors and you seem to be thoroughly familiar with medicine and medical terms, and you talk to lawyers and you are very familiar with legal terms and facts. How is it that you do that so ably?"

He replied, "Well, that is very easy. When I talk to doctors I talk upon law and when I talk to lawyers I talk upon medicine."

I think in a great many of our meetings along this line, that has been about the case. We hear technical papers read and discussed which it is hard for a safety man in the plant to discuss later and apply in his work in the plant. I think this morning we should be particularly grateful to Mr. Richardson for bringing us a very happy combination of the technical along with the practical knowledge of the subject under discussion.

There are one or two points I made a note of which I think are worthy of a little further attention. I was very glad to see Mr. Richardson make the demonstration here concerning the nitrated cotton and its relation to the solvents. I think a number of us will agree with me that in the early introductions of lacquer, there was a great deal said upon the subject of guncotton, and the demonstration which Mr. Richardson has given us was very fine on that point.

Sometime ago I addressed a meeting of the fire department in one of our southern cities. In the course of my talk, I had a sample of lacquer and I poured some of it out on the table, set fire to it and extinguished it with a glass of water that was on the table. After the meeting was over, the chief of the fire department came up to me and said, "That is the finest thing that ever happened before these men."

I said, "Why?"

He said, "There isn't a man in this room but what would have thought if he dropped some lacquer on the floor it would blow up the building."

That is the mistaken idea concerning guncotton which a great many people have. The demonstration which Mr. Richardson gave us of the difference between guncotton and its explosive qualities and the cotton which he used as it is used in pyroxylin finishes was worthy of your note. In other words, when it is in combination with the solvents, it is not as explosive as dry nitrated cotton. I think there has been a great deal of misunderstanding on that point.

Another important point is the danger from the explosive qualities of the vapors. There has been a great deal of misunderstanding on that point. It seems to be the idea in the minds of a great many people that the vapors were just somehow bound to explode. Experience in the field has taught us, as Mr. Richardson told us, that there is little danger if there is anywhere near adequate ventilation.

Also on the point of spontaneous ignition, which Mr. Miner touched on, there has been a great deal of misunderstanding. I think I am correct in stating that unless the residues of these materials are combined with other materials such as in your spray booths or other places of application, where they are mixed with oils or the residue from other products, that there is little possibility of spontaneous ignition from the dry residue.

Mr. Miner also mentioned or touched upon the point of the hysteria that existed probably up to a year or two years ago concerning this subject. It is true that a great many articles have been written, and a great deal has been said that was not authentic on this subject. I recall very distinctly that after the Briggs fire in Detroit, a report went to one of the municipalities from the officer who investigated the fire that the material being sprayed was 90 per cent guncotton and 10 per cent toluol. That report went into print and received wide publicity. I don't know that I could blame some of the engineers of the insurance companies after reading such an article if they did get hysterical. The demonstration this morning has clearly shown you where the misunderstanding has crept into the subject concerning guncotton.

L. R. SCHUYLER (Lycoming Manufacturing Company, Williamsport, Pa.): I would like to know the best method of housekeeping in lacquer booths to remove the residue from the booth.

MR. ABBOTT: That subject is dependent somewhat upon the extent of the operation. It is true that there are some spraying operations which are involved in small booths or small articles being sprayed, where a washdown system is not essential. If the installation is properly installed, and you have the proper equipment, they can be very well taken care of by a dry cleaning method.

In our plants at the Fisher Body Corporation, we employ almost exclusively now what is known as the washdown system. The booths, the ducts are equipped with open sprinkler heads, and the water is turned on at the close of the day, and the ducts and the booths are thoroughly washed down, assisted by hose streams, if necessary. Our experience with lacquer since this system was installed has been very favorable. We have had less fires over the same period of time from pyroxylin finish operations with this method than we ever had with paint and varnishes.

It is true that the floor space required and the time required to produce an article to a finish under pyroxylin has been reduced by about two-thirds. Take, for illustration, an automobile body. Under the old method of paints and varnishes, it required about twenty-one days for a final finish, whereas with pyroxylin it is finished in seven days. That reduces floor space and makes it possible to maintain good housekeeping conditions, because of the nature of the dry residue of the pyroxylin finish, whereas with paints and varnishes we had a sticky, adhesive residue, and it was almost impossible to maintain good housekeeping.

There is just one other point that comes to my mind along the lines of your question. I think it is folly to install equipment in a plant in which good house-

keeping is impossible, and then go down and tell the man in the plant that he must maintain good housekeeping conditions. If new ducts and booths have been installed, we tell the men down in the plant that they must be kept clean, that they must remove this residue and so forth at the close of each day's operations. We have gone into that phase of the subject and have gone over our equipment and seen that the equipment was so arranged that good housekeeping was possible. That may be an angle that will interest some of you people here.

We have had some minor fires and one or two of some proportions in the country that was caused by the cleaning operation. We analyzed the country over and this was the result, that all the fires that had occurred up to that time were due to one of two causes, either the lack of proper cleaning or improper methods of cleaning.

MR. SCHUYLER: Do you use soap on the walls?

MR. ABBOTT: We are using some of the various soap solutions that are on the market for the interior of the booths. In the ducts, we put no coating at all. In the booths, the soap solution seems to facilitate the cleaning and makes it a little more rapid. There is a little labor saving item there to be considered.

DEWITT RAPALJE (Fire Prevention Engineer, Railroad Insurance Association): Mr. Richardson's paper was certainly most interesting and instructive. It is just part of the educational campaign that has to be carried on to acquaint the public and the users of pyroxylin finishes with their nature and with their proper handling.

I do, however, want to speak on this subject as an engineer of a fire insurance organization, because some reference has been made here in the discussion to hysteria on the part of fire insurance engineers on the lacquer spraying problem.

I think we are just as much in danger of letting the pendulum swing the other way and telling the public in general, or giving them the impression that there are no new fire hazards, that there are no new installation problems, that lacquer is just the same as paint and varnishes—"all you have to do is to always be careful." I rather fear that some of the comments that have been made at this meeting might lead the unobservant to draw that conclusion.

In the particular end of the fire insurance industry which I am connected with, fire prevention on steam railroads, we have not felt any hysteria over the nature of pyroxylin finishes. We have not gotten excited over the fire hazard of the material, but we have recognized the fact that we have a large educational problem on our hands, to educate the users of pyroxylin finishes on steam railroads to a proper handling and proper installation when lacquers are sprayed.

I will say right now the job is nowhere near over, because the railroads have been very lax in taking up modern processes. They are, I should say, three or four years behind the automotive industry in painting practices. Right now, they are at the stage that the automotive industry was three or four years ago. The absolute ignorance that is evidenced by some railroad paint foremen and car shop superintendents on the modern finishing processes is astounding.

It is not only a question of housekeeping. Mr. Richardson referred in his paper to the fact that it was remarkable how quickly finishing rooms were altered to accommodate the new processes. That may be true; I think it has been true in the automotive industry. They were eager to install the proper equipment. The problem was a serious one of production. I am confident that it is not true at the present time on steam railroads. There are cases of large railroad systems using pyroxylin finishes without any study or provision for ventilating systems.

It isn't only a question of housekeeping, it is a question of equipment, different equipment necessary for pyroxylin lacquer spraying than that used for hand-painting. The educational work is still before the underwriters and it is still before the manufacturing end of the industry, to show the user show the process should be installed and how it should be used.

Mr. Miner has given probably as much attention to this whole subject as any man in the country. He has been working on it for a good many years, both through the industry and through the National Fire Protection Association. He has called your attention to the recent brochure of the National Fire Protection Association on spray painting. If every user of pyroxylin finishes would follow out the instructions that are contained in that product of the National Fire Protection Association there would be no further fire hazard problem. The result would be just as Mr. Abbott pointed out in his own plants, that the fire hazards of painting and finishing would be reduced, because the safe practices, if adopted, will make lacquer finishing work a far safer process than the old paint room was.

The trouble is it takes years and constant and continuous work to educate the users of any process up to modern methods. I want to make these few remarks because I don't believe that any so-called hysteria has been on the part of the intelligent officials of the stock fire insurance companies, and I know it has not been on the part of the mutual fire insurance companies. The work that the insurance companies are doing and the publicity which they are giving to this subject is entirely educational, to get for the users the proper installations when spray finishing is adopted.

On the steam railroads this is a very live topic. The American Railway Association had its convention a couple of weeks ago in Montreal, its Section on Equipment Painting. There were all kinds of committee reports introduced at that three-day meeting. Everyone of them before they got to the end of the report got into a discussion of the lacquer finishes. That was the live topic before those men. A great deal of educational, helpful work was brought out in that meeting.

Next week, the Railway Fire Protection Association, a younger brother of the National Fire Protection Association, holds its annual convention in Cincinnati, and the same topic is coming up there, because when the railroads take up lacquer finishes—and I personally am convinced it is just a matter of time when every railroad in the country will be using pyroxylin finishes on all its rolling stock—as they are beginning to now, they are going to be one of the largest users of pyroxylin finishes in any industry.

CHAIRMAN COTCHER: I don't think any speaker this morning desires to create the impression that there are no dangers in the application. I think we are all in agreement that there can be very serious dangers if the proper precautions are not taken.

MR. MINER: From Mr. Rapalje's attitude, I feel that perhaps some of you may have gained the wrong impression. You will recall that before I mentioned that two of the insurance company representatives were there, I stated that I in no way wished to mitigate the hazard introduced through the spraying process. There were hazards there that should have been protected.

I do challenge Mr. Rapalje on the question of hysteria. I have been through it for the past five years, and I know just what it means. If it were possible for me to divulge certain confidential information that I have received in the past six months, I could very readily disprove his statement. Some of the conditions under which these so-called serious fires took place were frightful. It wasn't a case of there not being information available covering these hazards, it was a case of the process suddenly creeping in on the manufacturing interests; and I think I can safely say that even the insurance interests themselves didn't appreciate the conditions that existed, neither did they in a number of instances that I am thoroughly familiar with, take up the question of the carrying out of their own regulations.

I can safely make this statement: That had the regulations existing at the time of these serious fires been complied with, in essential details, the serious fires would never have occurred.

I do want to make the plea, as I have in the past, to all manufacturers, whether

they are stock or mutuals, that they take the regulations or suggestions of their insurance carriers, analyze them and carry them out in full. The spraying brochure which I mentioned is in line with both stock and mutual insurance practices. If you will follow that brochure you can bring about safe conditions.

A. M. WILLIAMS (Chrysler Corporation, Detroit, Mich.): There is this, of course, that when we change from one kind of paint to another, we find our hazards and the things to be watched for changed. Am I right, Mr. Miner and Mr. Abbott, in saying that the dry residue we accumulate in large quantities around steam pipes and other places where the temperature may be raised to around two hundred degrees that spontaneous combustion can take place?

MR. MINER: I wouldn't call it spontaneous combustion. It is not considered good practice to have even wooden floors in contact with heating pipes. As an old insurance inspector, I have been making the same recommendations for the past twenty-five years. When you go into a factory and see clothing on the steam pipes, you always ask that the pipes be cleared and kept free from combustible materials. The residue of pyroxylin finishes has certain decomposition tendencies and should not be allowed to collect or remain upon steam pipes or other heating devices.

MR. WILLIAMS: We can then in our safety inspection of our plants emphasize the one point of housekeeping, especially with temperature.

MR. MINER: Regardless of what is being used.

MR. WILLIAMS: In the burning of a dry residue is there danger from the smoke?

MR. MINER: Not if it is burning.

MR. WILLIAMS: During the time it is burning?

MR. MINER: No.

L. R. SCHUYLER (Lycoming Manufacturing Company, Williamsport, Pa.): Are you having much trouble with lacquers poisoning a man?

MR. MINER: That is outside of my line. I can say this, however, that some lacquers are super-sensitive to certain solvents. For example, in the paint industry, you will find some workers that are seriously effected by turpentine. Generally speaking, the diluents and solvents are not of an irritating nature.

J. T. HAINES (Wagner Electric Corp., St. Louis, Mo.): I would like to know whether the friction from chipping the residue will cause an explosion or a fire?

MR. MINER: If you strike a spark, it will ignite.

CHAIRMAN COTCHER: We will proceed to the question of housekeeping. Your committee has divided the subject of housekeeping into three general heads. They have arranged with Mr. R. G. Knutson, Commissioner of the Industrial Commission of the State of Wisconsin at Madison, Wisconsin, to discuss the general topic of housekeeping. But as Mr. Knutson seems to have gone A. W. O. L., the next division of the subject is that of "Production Stores." That subject has been assigned to Mr. J. L. Juhl, Superintendent of Planning of the Chrysler Corporation of Detroit.

Competitive Housekeeping As a Means of Reducing to a Minimum Lost Time Accidents

By J. L. JUHL

Superintendent of Planning, Chrysler Corporation, Detroit, Mich.

Building automobiles is the business of our company. Our engineers are responsible for what we build, our sales department is responsible for how many we build, and our manufacturing department is responsible for not only how we build, but how safely we build. The handling of material is so closely linked with

some manufacturing activities that it is very difficult in some cases to discern where material handling leaves off and manufacturing begins.

The department I represent in our corporation is what is known as the "Planning Department." The responsibility of having sufficient parts available and the proper handling of material is the function of our department.

It is my purpose to cover certain phases of safety in material handling, but before I do this, it is best that you are given a brief outline of how the planning department functions.

In our general offices, we have what is known as the "Central Planning Division." Each plant within the corporation has its own planning department. The central planning division acts as a managerial clearing house on all engineering and sales information that is to be passed on through to the manufacturing division. It is through this medium that the individual plant planning departments are kept advised how to outline and control their activities. The plant planning department is directly responsible to the factory manager.

The respective plant planning department in every case is responsible for the following:

- (A) Material engineering specification records. Through means of the particular group controlling these records, all interested departments in the manufacturing division are kept advised on schedule and engineering changes.
- (B) The requisitioning of material requirements against the purchasing department.
- (C) The releasing and scheduling of materials against supplying vendors purchase order.
- (D) The scheduling of finished parts to be machined or stamped within our own plant from raw material, such as castings, forgings, bar stock and sheet metal.
- (E) The proper receiving of material, as well as correct disbursing and handling is a part of the planning function. We are responsible for both productive and non-productive materials from the time the requisition is issued until the material is actually consumed.

Various methods have been adopted in the cause of safety in material handling. At our plant, we have adopted a means of reducing accidents and lost hours, by getting our foremen and men directly interested in a monthly competitive inspection. Honorable competition in every line of endeavor stimulates and brings out the best. Competition coupled with necessity makes possible the highly developed industrial organizations that are known to the world today. From the time that history gives us any record of civilization, up to the present gigantic industrial development, competition has played a most important role in the affairs of men throughout the world. Through competition, better peoples, better governments and better communities have developed. By the same token, industries have improved, and with improved industries, better and safer methods of manufacturing and material handling have come to the front.

Until approximately fifteen months ago, material handling at our plant had come in for more than its share of criticism. In our department, we held safety meetings, read papers on the subject of safety, had talks given regarding safety, and all persons present at these meetings left with the avowed determination that accidents would cease; but regardless of the excellent intentions, accidents still prevailed in great numbers. Accidents and lost hours had been increasing at an alarming rate. We all knew that some other means had to be adopted to make material handling safe, but what course to pursue was questionable.

A committee was appointed to investigate the situation thoroughly. This committee consisted of four planning department executives. Various methods were

discussed, and finally after considerable deliberation we decided to attempt an end to unnecessary accidents and lost hours through a competitive scheme. We all knew that competition had existed in the safety movements between plants within our corporation and had shown excellent results, so we decided that competition within the departments controlling the material handling would accomplish the desired results. Immediately following our decision to enter into a competitive scheme we set out to draft up a necessary set of instructions governing such a campaign.

In the first place, we procured from the plant engineering division several sets of blue prints showing the plant layout. These layouts were divided into given areas. To each area a material foreman was assigned. He was to be held strictly accountable, not only for seeing to it that material was at the proper place at the proper time, but seeing to it that the material was handled safely at all times. The general appearance of this given area was chargeable to the material foreman. It was expected that he would work with production supervisors and foremen within that area to maintain shop appearance that the corporation might well be proud of. In other words, every material foreman was to train himself to look at his area through safety glasses as well as production glasses.

Our next step was to get the responsible material foremen together with the committee, and lay out before them our proposed means of cutting down compensation money and inefficient methods. All questionable points were brought up for discussion and before the meeting was dismissed we had every foreman giving us his enthusiastic and whole hearted support.

The day following this meeting we got each material foreman responsible for a given area together with his men, to see what the reaction was to be with the men. They were more than willing to give us their best efforts and support. We explained to them in no uncertain terms what would be necessary if we were to successfully combat the evil of lost hours resulting through poor housekeeping.

We stressed the following points:

- (1) The necessity of a clean shop.
- (2) Why material should be piled carefully, whether on floors, skids, racks, or what not.
- (3) Why certain commodities should be piled a given height.
- (4) Why aisles should be kept clear with all material inside the white lines.
- (5) Why electric truck and tractor drivers should reduce their speed.
- (6) Why the receiving department should remove all nails from opened boxes and kegs.
- (7) The absolute necessity of keeping skids properly lined up in order to conserve the greatest amount of floor space.

We further explained to them that any known hazard within their area, whether directly a material responsibility or the responsibility of some other division, was to be brought to the attention of the department head, who in turn could take up the proposition of eliminating the hazard with the safety division.

When it was made known to them that the plant had been divided into given areas and that a competitive inspection was to be given, they accepted the proposition much the same as a game. We all know that any real sportsman in any kind of a game, plays to win, and so we found this proposal of competitive housekeeping and safety ready to be adopted with but one point not yet cleared away, it had not been covered with our plant safety organization, but I need not say anything else other than it was enthusiastically accepted by them.

An inspection committee was appointed. It was decided that there would be one inspection held monthly. This inspection to be held sometime within the first ten days of each month, the foremen and men not to know the definite time for this inspection. The inspection committee was made up from executives within the

plant but outside the planning organization. This committee consisted of three men, one from the safety department, one from the manufacturing division, and one from the time study and efficiency department. When this inspection was made, the planning superintendent, material supervisor and his assistant accompanied the committee. The respective material foreman responsible for his area in the shop accompanied the committee while making the round of his particular territory. It was the responsibility of this foreman to bring to the attention of the committee any hazards in his division, regardless of where the responsibility lay.

After one or two monthly inspections, the production men became very enthusiastic and took steps to keep their part of the shop in ship-shape form, so that an inspection could be had at any time. In other words, both material and production foremen instructed their men to be ready for the inspection any day.

It was possible through the inspection for a given division to get a report rating them 100 per cent. The table for computing percentages was based as follows:

Safety	30 per cent
General appearance	20 per cent
Cleanliness	20 per cent
Efficiency	20 per cent
Accomplishments	10 per cent

The 30 per cent or safety element was based on lost hours.

Cleanliness and general appearance are closely allied, and are each rated as a 20 per cent inspection factor. These have to do with the actual stock lineup and appearance generally.

Efficiency, we listed as a 20 per cent item. This has to do with the time allowance against group bonus, production hold-ups because of stock shortages, etc.

Accomplishments we rated at 10 per cent. This has to do with progress made in the way of correcting known hazards that existed at the last general inspection.

The foreman responsible for the area receiving the highest monthly percentage was to be presented with an American Flag and also a banner, which read—"Material Honor Banner—General Efficiency."

It was to be possible for one department to keep the flag and banner an indefinite period of time, provided the percentage figure over the other divisions could be maintained.

This campaign started in June, 1927, and has been working successfully ever since. We discovered many interesting things as a result of these inspections.

These monthly inspections not only proved to be of decided benefit to life and limb, but also worked out very advantageously from a material standpoint. Below, we list certain conditions that results:

- (A) Aisles were kept open.
- (B) Material was properly piled.
- (C) Damaged equipment, such as racks and skids went to the repair department without delay.
- (D) Rusty material practically eliminated because material turnover was being carefully watched.
- (E) Salvage and obsolete material cleared the departments automatically.
- (F) Sheet steel piled the proper height.
- (G) Elimination of overloaded skids.
- (H) Installation of "Stop" and "Go" lights at main aisle intersections thus eliminating one of the worst hazards in our plant.
- (I) Floor space, which continuously has been at a premium in our plant, owing to increasing the scope of our activities, was used to the maximum capacity because material was properly piled and skids and containers properly lined up.

Numerous additional improvements could be mentioned, but time does not permit.

After two monthly inspections, certain of the foremen were asking that Vendors be instructed to send in containers that were safe for handling. A campaign was then instituted whereby materials were sent into the plant in containers that could be readily piled and handled. This was accomplished after considerable effort, but we now find our vendors very ready to cooperate with us. For an example, items such as bearings were being shipped in to us in containers weighing anywhere from five hundred to one thousand pounds. These we found impractical and unsafe for handling, both the size and the weights were reduced so that bearings could be handled easily. What is true of the bearings is true of some thirty other commodities giving similar trouble.

By getting vendors to cooperate with us in reducing the size and weight of certain containers that proved hazardous, we eliminated one of the greatest sources of lost hours. By the greatest source, according to our records, I refer to accidents to the leg and foot. Overhead hoists have now been installed to handle practically all of the remaining heavy containers and commodities, thus eliminating excessive back strains and the hazards of falling material while being handled.

Our monthly inspections gave us a physical insight into our stock conditions. We discovered many items on which our inventory was excessive. These became so numerous that we set out to revise our entire bank on both purchased finished and items fabricated within our own plant, and, as a result, to make a long story short, we showed a material turn-over at our plant that we believe ranks with any manufacturer in the country. And material turnover after all has considerable to do with safety. Excessive banks mean more handling—more handling means that there is just that much greater possibility for accidents. It is our purpose to place nothing in stock rooms save sheet steel and few of the large commodities, such as axles, radiators, fenders, etc. We for the most part handle from the freight car or truck to the point of consumption or primary operation. We eliminated all production material stock rooms better than a year ago.

I wish to give you a few figures that show better than anything else what has been accomplished through our safety efforts. In 1926 we had the following statistics:

	Hours Allowed	Hours Used	Hours Saved
1st Quarter	1,210	585	625
2nd Quarter	1,755	990	765
3rd Quarter	1,759	18,787	—17,028
4th Quarter	1,221	3,124	—1,903
Total year, 1926	5,945	23,486	—17,541

So in 1926, against 5,945 hours allowed in the various departments of the Planning Division, we utilized 23,486 or approximately four times as many as we should have consumed. This certainly was anything but a good record. In the third quarter, during the month of August, 1926, we had a death chalked up against us, an electric truck driver subjected himself to the hazards of a wet incline, he lost control, nothing more need be said other than when he arrived at the hospital he was found to be dead. Electric trucks, or jitneys as they are commonly called, have caused numerous accidents in our plants. As mentioned before, our safety department now has this very well under control, having "Stop" and "Go" lights at all the main intersections throughout the plant. All inclines are now equipped with tread plates, which no longer permit drivers losing control. To assure ourselves that we were procuring capable men, we instituted the practice of giving all jitney drivers a thorough examination prior to accepting them for the position for which they were intended. Each man hired to do this particular work is given a very thorough examination. Since starting this practice, jitney accidents have been

reduced to a minimum, and it is with the greatest feeling of pride that we state that not a single lost hour has resulted since starting this examination, through carelessness of an electric truck or jitney driver. Mr. Williams, our safety supervisor, brought with him to this safety Congress, a quantity of booklets covering questions asked when giving the jitney drivers their examination. In addition to the set of questions, he also has a complete set of rules and regulations for all operators handling trucks, tractors and jitneys on company property. He will be glad to furnish these to anyone desiring them.

When the year 1927 was ushered in, every man in our division was determined this was to be a year without excessive lost hours, and as few accidents as possible. Just the mere desire to prevent accidents was not sufficient. Before the year was half gone, we had another death to our credit, this time because a truck had not been made securely fast at our loading dock. In pushing a heavily loaded rack of fenders on the truck from the dock, the rack caught on the floor of the truck, and instead of pushing the rack on to the truck, the truck was being moved forward. The man pushing was not looking up, and therefore did not realize that the truck was being moved forward. As a result the fender rack fell to the ground, and in so doing, a man was caught and crushed between the dock and the rack. In addition to this, we had numerous accidents of various descriptions, chiefly confined to the foot and leg.

Our records for the first half of 1927 are as follows:

	Hours Allowed	Hours Used	Hours Saved
1st Quarter	714	1,134	—420
2nd Quarter	1,607	17,163	—15,556
Total first half, 1927	2,321	18,297	—15,976

Our 1927 start was certainly no improvement over the year of 1926.

It was in May, 1927, that the death at the loading dock occurred. In June, 1927, we started our competitive clean-up. The records for the balance of 1927 are as follows:

	Hours Allowed	Hours Used	Hours Saved
3rd Quarter	1,701	261	1,440
4th Quarter	808	0	808
Total last half, 1927	2,509	261	2,248

A foot accident on the 13th day of September caused us a loss of 261 hours. This was the only lost time accident from June 20, 1927, until March 5, 1928, or 261 lost hours in a department with an average enrollment of 550 men over a period of eight and one-half months. From September 13, 1927, to March 5, 1928, gave us 172 consecutive days in which we experienced no lost hours. Prior to our campaign we had experienced lost hour accidents every few days.

In 1928 from January 1st to September 1st we reported the following:

	Hours Allowed	Hours Used	Hours Saved
1st Quarter	1,446	1,620	—174
2nd Quarter	2,629	108	2,521
7/1 to 9/1/28	1,820	360	1,420
Total 1/1/28 to 9/1/28	5,895	2,088	3,807

The 1,620 hours reported in March, is the result of the loss of a finger on the steel roller leveller. In June, after having gone 96 more days, we had another accident in our sheet metal plant, where a man was cut by a piece of salvaged steel. This loss resulted in 108 hours. During the month of August, we had minor foot accidents that resulted in 360 lost hours.

During the year 1926 the Planning Department did not experience a single month without a lost time accident. The same is true in 1927 up until our competitive safety campaign started. So far in 1928, we have the following months with no lost time accidents: January, February, April, May, July.

The loss of the finger is the only accident of any real consequence so far this year. We realize, however, that any accident, no matter how unimportant at the outset may prove extremely costly and serious.

It will also be of interest to you to know that during the first eight months of 1928 we handled as much material as we did during the entire year of 1927. During the first eight months of this year we handled 33 1/3 per cent more than during the year 1926. During the year 1926 our records show that we unloaded approximately 6,500 freight carloads of material. In 1927 we unloaded 7,300. During the first eight months of 1928 we have unloaded more freight cars than we did during 1926, and within 500 of the entire 1927 figure.

The results obtained from this competitive safety campaign have proven conclusively to us that the method adopted for eliminating lost hours is well worth while, and if it works in the Chrysler Corporation, there is no reason in this world why it will not work in other automobile plants as well as any industrial plants where material handling is so important a problem to the safety of all concerned.

CHAIRMAN COTCHER: We will go on to the next subdivision of the discussion of material handling, that covering "Manufacturing Departments," which is to be discussed by Mr. J. B. Gibson, Safety and Health Division of the Western Electric Company, Chicago.

Good Housekeeping in the Manufacturing Department

By J. B. GIBSON

Safety and Health Division, Western Electric Company, Chicago

A few years ago, a president of an eastern university invited a prominent New York minister to speak at chapel on Sunday morning, and the visiting clergyman naturally inquired how long he should preach. The president being somewhat of a diplomat did not wish to give a definite answer. But when the question was again asked the university president said that he did not know how long he should speak, but there was a tradition at the university that no souls were saved after the first twenty minutes. I am not planning to break any traditions today. In fact, I will try to conclude my few remarks before the noon whistle blows.

I have attended the last seven Congresses of the National Safety Council and do not recall that in any one of these conventions the question of housekeeping has been left off the program, either at a sectional or at a general session. This in itself is evidence that housekeeping is a factor that must continually be kept in mind in any successful accident prevention program.

Undoubtedly you will agree that we like to see good housekeeping in our home and that we enjoy our meals at a table where clean linen, clean silver and food well served are the rule rather than the exception. I do not see how we can expect in our factories to have a workman turn out a high quality product if the environment in which he works is not up to the highest possible standard.

Assuming for the moment that a workman is careless, untidy and shiftless in his home surroundings, isn't it within the realm of probability that if we can give him a neat, clean shop, with adequate aisle space, clean machines, and scrap picked up from floors as quickly as possible, we may develop that workman to the point where he may rise to the level of being a neat and orderly individual? In the same way, if we have a promising type of workman coming into a dirty factory,

where the chips fall as they may or where his hands may be brushing against iron filings on the bed of the machine, no matter how he may try to battle against it, his morale is going to break down before very long and he is going to go along with the crowd.

Housekeeping goes back to the old principle that there is a place for everything and everything in its place.

In our Monday luncheon where Dr. Harry Myers of the Frigidaire Corporation spoke, he emphasized again and again that in his company, and I believe in the other divisions of the General Motors Corporation, one of the most important rules is that the workman shall be neat and orderly.

The particular phase of the subject that I was asked to discuss, that of the manufacturing departments, involves the handling of materials from department to department, from machine to machine, and sometimes from workman to workman. Let us assume that the stock has been drawn from the stores and is in the departments about to be processed. Of course, if your plant is modern, recently built, and equipped with an up-to-date layout, your problem of housekeeping is relatively simple. But there are in the United States any number of companies with buildings that were built in years gone by. However, they still make a satisfactory return on the investment and we have been obliged to live with the old conditions in the present day when efficiency and elimination of waste are the watchwords.

The closer we can come to running a job through the shop in an orderly manner, that is from department to department and machine to machine without any slack or overlapping, the nearer we get to the goal of efficiency. Frequently we have to put up with conditions as we find them, remembering, however, that good housekeeping depends to a large extent upon the individual workman, the supervisor, and the support you get from the management.

Dr. Myers remarked that he did not think the answer to good housekeeping rested on an ability to hire more janitors. With such sentiments I heartily agree, because, as you know, hiring one more janitor or hiring ten more janitors increases your direct expense by the total salaries of those ten janitors. That item is thrown against your budget, it enters into the cost of your product, and puts you at a disadvantage with your competitor in a field where competition is keen.

It seems to me that we can achieve more substantial results by adopting a policy of hammering at the subject day after day, interesting the workman, selling your supervisory force and getting them to expect just as much from the workman as he may expect from the supervisor.

In transporting material from department to department, it has been the experience of the company with which I am associated, that electrical trucks are doing a great deal of valuable work. I was interested in the last speaker's remarks that although electric jitney trucks a few years ago caused trouble, at the present time as a result of their thorough study and analysis of the causes, accidents have been reduced. We have had a somewhat similar experience. Fortunately, we have had no serious accidents. We had some minor accidents with the electric trucks in the early days. But they have since been developed to the point where they are safe to operate and function quietly, efficiently and at a reasonable cost. The electric truck eliminates that irritating noise you get from dragging metal containers along the floor with hooks. Moreover, you do not have from electric trucks the hernia possibilities that you get from pulling trucks.

If any of you men are foremen, and I imagine several of you are, don't you agree with me that we have had on too frequent occasions considerable difficulty in getting adequate space in our departments to store materials after they have come from the stores and are waiting for machines. I don't know how your departments are lined up but I have seen in any number of places spare parts piled up in aisle space. You talk to a supervisor about it and he says, "I know, I just put them there; in five minutes we are going to run them through." However,

those five minutes are being repeated all through the day and the parts are a real hazard since they interfere with the passageway through your aisles.

Until within the past few years planning engineers have generally paid more attention to a layout, getting the machines lined up, getting ready for production, than they have to helping the foreman to take care in his department of his surplus stock.

We also have to face the problem nowadays of setting machines pretty close together, especially in the small shops, where increased production and limited space present problems all their own. Perhaps you first set up a battery of machines close together. Then you move or take out one machine. Such a rearrangement changes the entire safety picture. In removing one machine you may expose parts of the next machine which are hazardous to the workman or the passerby and which opens up an entirely new guarding problem to be solved without delay.

The last speaker brought up the question of containers, especially metal containers which you need to inspect frequently. Watch out for the burrs on metal containers where the top part is bent over and roughened. Containers can be overloaded. In fact, they frequently are. Of course it is hard to determine just when a container is overloaded. But with overloaded containers you have all the probabilities of serious accidents, damaged or defective material, and all such items that do not help when you are striving to get out your product at a low cost.

We have adopted a method whereby electric trucks carrying material in metal containers pile these containers one on top of the other, four tiers high. Each container is so designed that it fits on top of the one beneath. The automobile factories have used this method for some time. We are finding it very successful and have had no trouble with tipping or loss of material.

Another point we should be interested in is that of the disposal of scrap. Until recently we have been so interested in getting the parts in process through the shop that we have not paid much attention to this item. As a result, scrap piled up around the machines results in cuts, scratches and possible infections unless prompt medical treatment is given. Where your scrap is in long strips we have solved a large part of the problem by using take-up reels.

We have also found that where stock is run through machines in lengths and the machine that is working the particular stock is on the aisle, the end of stock may project into the aisle. One of our employees developed a so-called semaphore, which can be attached to the iron pipe guard rail and is marked with black and white squares. I think an illustration of it appeared in the last issue of the *National Safety News*. Such a device gives ample warning to any person coming along the aisle.

I recently visited the plant of the American Can Company at Maywood, Illinois, and found there a most interesting mechanical conveyor system which took the scrap away from the machines, down along the side of the building, out through an opening and into freight cars without any human hands touching the scrap itself. This is certainly one of the most up-to-date developments so far as I know in the handling of scrap material.

Now, the condition of floors is important, especially where trucks are used. Electric trucks, of course, can handle a heavier load than the truck manually operated. If an operator of such a truck hits a floor with a depression in it, or if you have a concrete floor with broken patches, you still have the possibility of your truck tipping material all over the aisle and into nearby machines.

I was interested in the last speaker's remarks about the stop and go signs at the intersection of aisles in his plant. We have worked out the plan of one way traffic on certain aisles in order to speed up the transfer of material from department to department.

Machines located along the main aisles should be guarded, usually by pipe guard

rails. Sometime ago, I was in a factory and saw a battery of machines along the aisle with the back of the machines facing the aisle. The machines themselves were adequately guarded so far as the operator was concerned, but along the aisle the working parts in the rear of the machines were exposed. There were gears, there was everything there to encourage a serious injury.

Another point in which we are interested and which affects housekeeping is good lighting conditions. A foreman might well argue that it is very difficult for him to get any better lighting conditions because the plant maintenance department is responsible. However, the wheel that squeaks gets the most grease, and if the foreman finds he has a poorly illuminated location, he can usually get the proper kind of cooperation to take care of his complaint.

I came here today not only to talk but to learn. In conclusion I would like to ask this group two questions, the answers to which I am still seeking. First, what is the answer to slippery floors in a screw machine department. There is oil on the floor, and therefore the floor is slippery. We have tried everything possible, but we have not got as yet a one hundred per cent satisfactory answer.

The second point and one which always starts a discussion, is, What do you do to prevent spitting on the floors?

With those two questions, I rest my case.

CHAIRMAN COTCHER: I am mighty sorry that our program run along to the point where we had to squeeze both Mr. Juhl and Mr. Gibson, because they had both of them very pertinent topics.

Mr. Gibson left us two questions, the first of which was about the slippery floors.

A. F. DUNNEBACKE (General Motors Corp., Detroit, Mich.): I walked through the Brown, Lipe Chapin plant some three years ago with a wad of chewing tobacco in my mouth. I was afraid to spit, because every time I came to an entrance there was a little sign, about six by fourteen, saying, "Spot the spitter." I was in that plant three hours. I really carried it around three hours because I was afraid to spit. That is an idea for you.

MR. GIBSON: That was an accident hazard you had.

We have painted the corners on the stairways white, but we find, after going through in four or five days, that they are no longer white. I was wondering whether anybody had that experience. I know that education is the final answer, but I am looking for a stop-gap.

L. R. SCHUYLER (Lycoming Manufacturing Company, Williamsport, Pa.): In reference to these questions, we have had all kinds of experiences in trying to eliminate the spitting hazard. We have painted the corners white. We also went to great expense to paint the whole shop white for better illumination. We haven't yet found the answer to the "spitter" problem.

We have in the assembly department of our plant taken up the matter of slippery floors. After having tried numerous preparations including sawdust and cinders to take up the oil, we have put to work anywhere from four to six janitors or laborers who go about with scalding hot water and a certain percentage of Oakite. All they do day in and day out is scrub the floor of our assembly department. They keep that floor thoroughly clean. In that way, we have eliminated the slippery hazard. We have found that it also has a tendency to limit the spitting bug. A man who sees a clean floor does not want to besmirch it by spitting on it. That has been our experience.

J. T. HAINES (Wagner Electric Corp., St. Louis, Mo.): We did practically the same thing as Mr. Schuyler. We charged the foreman with that extra expense.

S. N. SMITH (Singer Manufacturing Company, Bridgeport, Conn.): We have, we think, eliminated the spitting hazard about as well as any factory you can go in to. I think I supplied the National Safety Council with our system some five or six years ago. We furnish cuspidors. We made a study as to where they were

used the most. If a man uses the cuspidor, he has a new one to use every day. It is a metal cuspidor. We have racks that hold six cuspidors. They never touch the cuspidors with their hands.

CHAIRMAN COTCHER: I am told that one of the plants in Detroit furnishes cardboard containers with sawdust or wood waste in them and sells them at about one cent apiece and then they collect them and burn them and say the b.t.u. value of them pays the cost of handling them.

ADJOURNMENT

October 4, 1928

E. H. COTCHER, Chairman
Supervisor of Safety, The Murray Corporation of America, Detroit, Mich.

The third session was called to order at nine forty-five o'clock by the chairman, E. H. Cotcher.

CHAIRMAN COTCHER: As I said yesterday, I conceive it the chairman's duty to do the introducing and not the talking. I am going now to introduce the first feature of our program this morning, which is going to be staged by Mr. A. F. Dunnebacke, of the General Motors Corporation.

Introduction of the New Employee

By A. F. DUNNEBACKE
Safety Director, General Motors Corporation, Detroit, Mich.

At a recent meeting of General Motors officials in the city of Flint, Mr. Sloan, President of the General Motors Corporation, used these words:

"The value of General Motors as measured in the market today is approximately \$3,500,000,000, whereas the value of the corporation's assets is \$850,000,000, the difference, or \$2,650,000,000 is the value established by the public for the corporation's goodwill."

It is a little strange, isn't it, that the president of the largest organization in the world values goodwill at over \$2,500,000.

What is goodwill, in the sense that Mr. Sloan used the term? When he used that term goodwill, he simply meant the kindly feeling and the attitude of the public toward the General Motors Corporation; its products and the conduct of its business. When he used the term goodwill, he meant the enthusiasm, he meant the loyalty and he meant the friendly feeling of the employees toward the corporation. When he used the term goodwill, he meant the pleasure on the part of employees in general who work for the corporation in being a part of it. That is what Mr. Sloan meant by goodwill, and he values that at \$2,500,000.

I claim that participation in a company safety program, an employee's desire to take part in that program in a plant is goodwill.

Who is responsible for setting up in the mind of the employee this spirit of goodwill that is so valuable? It is every man who has contact with a man from the time he asks for a job at the employment office until that new employee is put to work. It is the employment manager, it is the medical examiner, it is the clerk who takes the man down to the job, and it is the foreman. Those are the men who are responsible for setting up in the mind of the new employee this asset of goodwill.

There are a number of subjects that are called to the attention of a new employee when he is hired. There is the question of the insurance plan, there is the question of savings and investments, and there is the question of safety. This is a safety meeting. I am going to emphasize the question of safety as a part of this goodwill.

I could tell you in so many words how it is being done in some plants, and I could tell you in other words how it is being done in other plants, to show you what I think is the wrong and the right way of conducting the new employee from the employment office to his job. I think we will get a better conception of it if we put it on in the way of a little act.

I am going to put on two little acts. They will not take long. In those acts, I am going to try to show you one of the wrong ways of handling a new employee and what is the proper way. I am going to be assisted in this act by Mr. Ted Meisner, of the American Can Company, who is going to take the part of the new employee, and Mr. M. Kroger of the Chevrolet Forge Company, who is going to take the part of an employment clerk. Personally, I am going to take the part of the employment man and of the foreman.

In putting on these two little acts, we are going to leave a lot to your imagination. You will have to imagine an employment office here. You will have to imagine a clerk in the employment office at a desk over here. You will have to imagine that you are down in the production department, and you will have to imagine a drill press or some other machine here.

We will now show you what we think is the wrong way of handling a new employee.

The new employee has gone through his medical examination. He has been accepted for employment and he is being written up in the employment office. The play will start from the time he is written up until he gets down on the job.

In the Employment Office

EMPLOYMENT MANAGER—Well, I'll send you down to the boss now and don't forget there are dozens of men here every day looking for your job. *(The employment manager then calls to a clerk who is slouching in a chair, feet up on the desk, smoking a cigarette and reading a newspaper.)* Hey, Smitty, come here.

SMITTY—Yah, just a minute.

EMPLOYMENT MANAGER—Take this man down to Jackson.

SMITTY—Alright, come on.

(Smitty starts away to Jackson's department followed by the new employee. Smitty pays no attention to him but talks with the employees on the way, kids several female flapper employees, and approaches Jackson's desk.)

SMITTY—Hey, Jackson, here's a new man.

(Smitty then turns to the new employee.)

SMITTY—There's your foreman.

FOREMAN JACKSON—So you're the man they hired for me, are you? Whatcha done and what d'ya know? Never mind, I'll find out what you know. Come over to this drill press. I want you to run this machine. Here is the stock. Here are your tools, and here is your blue print. Now, let's see if you can cut the buck.

NEW EMPLOYEE—Gee, that fellow sure hates himself. This is some joint. Treated like a dog in the employment office, brought up here by a rough clerk and meet about the toughest type of a foreman I ever heard of. I think I will get out of here while I am all together.

MR. DUNNEBACKE: Now, gentlemen, we feel that that is a fairly accurate way in which the employment is still being handled in some plants. Maybe we have overdone it.

I think one of the greatest weaknesses in American industry today is the failure of the management, from general manager to foreman or straw boss, to properly appreciate the value of the first hour of contact between a new employee and the company for whom he is starting to work.

The greatest opportunity for establishing goodwill is in this first hour. There is no time when the new employee's mind is so impressionable as in this first hour. There is no time when it is so easy to set up in his mind a confident, kindly and friendly disposition towards the company, as in this first hour. There is no time

when he is more susceptible to instructions, when he will take more kindly to your advice and instructions. I feel that that is one of the greatest weaknesses in American industry today, the fact that the management of our plants, our personnel directors and our employment men do not fully appreciate the value of that first hour, that a man is with a company.

Who is the man who has the opportunity and who is responsible for setting up this spirit of goodwill? It is every man who has contact with the new employee from the time he asks for a job until he is at work on the machine.

It is reported that one company finds it good business to pay an intelligent middle-aged man a salary of \$5,000 per year to instill goodwill into the new employee's mind by properly conducting him from the employment office to the foreman.

We will try to put on a sketch showing what we think is the proper way of handling a man. Bear in mind that the man has been written up and is being conducted to his job.

Another Kind of Employment Session

EMPLOYMENT MANAGER—Now, Mr. Thompson, before I can sign you up, you will have to read over this book of instructions. This is our book of safety rules, general shop and factory rules, and we want you to read that over, before we send you down into the factory.

NEW EMPLOYEE (*Handing the book back*)—I think I understand what it is all about.

EMPLOYMENT MANAGER—You have to keep this. You will notice here on the back is a little receipt. Will you please sign that so that we will know that you have read it over and have received a copy?

Now, Mr. Thompson, I am going to send you down to Mr. Jackson. Mr. Jackson is the foreman of the department in which you are going to work. I think you will like him very much. He has been with us eight or ten years, and we feel Mr. Jackson is one of the best foremen we have. I am sure you will enjoy working for him. Mr. Smith!

MR. SMITH—Yes, sir.

EMPLOYMENT MANAGER—Mr. Smith, this is Mr. Thompson.

MR. SMITH—I am very glad to know you, Mr. Thompson.

EMPLOYMENT MANAGER—Mr. Thompson has been hired for Mr. Jackson's department, and I wish you would take him down and introduce him to Mr. Jackson.

MR. SMITH—With pleasure.

EMPLOYMENT MANAGER—Just a minute, Mr. Thompson. I wish you would come back and see me in a couple of days. I want you to realize that this office is always open. I would like to know how you are getting along. I would like to have you keep in touch with me. Come up any time and talk things over.

NEW EMPLOYEE—I will. Thank you, very much.

At the first aid room.

MR. SMITH—This is our first aid department. You will recall the safety rule book stated to come up here for every injury, regardless of how slight. You will notice it is well equipped and is in charge of a competent registered nurse.

NEW EMPLOYEE—I hope I will not have to use this place, but I am glad to know where it is in case I do.

At the company store.

MR. SMITH—This is one of our three stores, Mr. Thompson, where employees can purchase tobaccos, candy, soap, gloves, safety shoes. All the revenue of

these stores goes into our welfare fund. They are open fifteen minutes before starting time and during the noon hour.

At the foundry department.

NEW EMPLOYEE—Mr. Smith, what is that department over there?

MR. SMITH—That department on the far end is our foundry department. Every man in there has a pair of goggles on. It may not occur to you, but one of our shop rules is that every man in that department that is doing any grinding or chipping or any kind of work where he may injure his eyes, the company demands that he must put on goggles for protection. You won't find any man in there working without goggles.

At the safety banner award.

MR. SMITH—Do you see that banner up there, Mr. Thompson? We have a committee in this factory which makes a monthly inspection of this whole plant and awards that banner to the department that has the cleanest, most orderly, and safest department. This department has won it twice so far this year. I am telling you, they are proud of it. It is worth having.

NEW EMPLOYEE—That's a fine idea. That accounts for this department looking so nice and clean.

At the drill press department.

MR. SMITH—Mr. Jackson, this is Mr. Thompson, who has been hired for your department. Good-bye, Mr. Thompson.

NEW EMPLOYEE—Thank you very much, Mr. Smith.

MR. JACKSON—Come up, Mr. Thompson, and take a chair. Are you living here in the city?

NEW EMPLOYEE—Yes, sir.

MR. JACKSON—Are you married?

NEW EMPLOYEE—Yes, sir.

MR. JACKSON—Any children?

NEW EMPLOYEE—I have two children.

MR. JACKSON—How old are they? Are they in school?

NEW EMPLOYEE—One is eight and the other is eleven. Yes, they are going to school.

MR. JACKSON—Do you own your own home?

NEW EMPLOYEE—Yes, sir. I am buying one on a contract and have it about half paid for.

MR. JACKSON—Have you ever worked in any other plant here in the city?

NEW EMPLOYEE—I worked for the Central Machine Parts Company.

MR. JACKSON—How long?

NEW EMPLOYEE—Seven years.

MR. JACKSON—That is a pretty good record. What line of machinery are you most familiar with?

NEW EMPLOYEE—I have specialized mostly in drill press work.

MR. JACKSON—Are you used to working to pretty close limits?

NEW EMPLOYEE—Yes, sir.

MR. JACKSON—Familiar with blue prints?

NEW EMPLOYEE—Yes, sir.

MR. JACKSON—Micrometers, test gauges and so on?

NEW EMPLOYEE—Yes, sir.

MR. JACKSON—I suppose you have been over our safety rule book?

NEW EMPLOYEE—Yes, I have read it over. I am not altogether familiar with it as yet.

MR. JACKSON—I want you to get very familiar with it. You will have a little time during the day, and I wish you would read it over until you get quite familiar

with it. This company is doing a lot of work along safety lines. We are having a contest in our shop, and my department has a good record so far. I should hate very much to have you get hurt and spoil our record.

NEW EMPLOYEE—I will do all I can to help you win that flag I saw on my way down to this department.

MR. JACKSON—That is fine.

Let us go over to this machine. I want to show you the job you have been hired for. I want you to run this drill press, Mr. Thompson. This part which you will machine is a clutch hub. You will notice the first operation is simply a rough boring operation. The second is the drilling operation, and the final operation is the reaming. Your stock from here will go down to the next machine on the conveyor. I am going to run through a few pieces for you and then I am going to have you run a few. (*Demonstrating.*) I wish you would run a few of those, Mr. Thompson.

Mr. Thompson puts on a pair of gloves.

MR. JACKSON—Wait a minute. Wasn't there something in the safety rules about wearing gloves on machines?

NEW EMPLOYEE—I believe I did see something about not using gloves on machines. I think I had better roll up my sleeves, too, before I start.

Mr. Thompson then runs a few pieces through the machine.

NEW EMPLOYEE—How does that look?

MR. JACKSON—I think you will get along on the job alright, Mr. Thompson. I will leave you now. If you do have some trouble, don't hesitate to come up and see me. (*Turning to Jones, a fellow employee.*)

Just a minute, Mr. Thompson. I want you to meet Mr. Jones. Mr. Jones has been in our department about six or seven years. Mr. Thompson is a new man coming into the department. I wish you would kind of take an interest in him for a few days and see that he gets along alright. Mr. Jones has been with us for six years. He knows all the ropes in the department. He will be glad to help you out anytime.

MR. DUNNEBACKE—Now, gentlemen, that is, just in a sketch, our opinion of what is the right way. I hope it met with your approval.

If you gentlemen will now kindly imagine yourselves a group of new employees, hired during the day, and who have reported to the safety director's office at five-thirty, I would like to speak to you as I used to talk to the new employees of a company for whom I formerly worked.

At this plant the management set up a rule that all new employees must report to the safety director at five-thirty, immediately after whistle time, on the first day they were hired and went to work. The company paid all men attending this talk one-half hour's time. Absences were reported next morning to the factory manager, and foremen soon were asked by him why their new employees were not at the safety meeting the night before.

The Safety Director Talks to the New Employees

"No doubt you men know why you are here tonight. You are here to have a little safety talk. This company wants you to come through that entrance gate in the morning happy and healthy. It wants you to have a pleasant day's work and it wants you to go out of that gate every night back to your homes and your families safe and sound. It would much rather have this than to have you get hurt, call an ambulance, take you to the hospital and then have some one from our welfare department get a car, go up to your home and tell your wife or mother that you were hurt and are over at the hospital. Yet, that is what is happening quite often. The ambulance driver knows that gate pretty well.

"We feel that we have one of the safest plants in the city. We compare our accident records with other plants and we know we have as good a record, if not better, than any other plant. The state factory inspector made a thorough inspection of this plant last month and only issued two minor orders. This company spends thousands of dollars every year to make this plant safer; it guards and protects every hazard. It has a safety engineer, medical department, first aid rooms. Our manager told me only last week that he would rather pay a hundred dollars any day to keep a man from getting hurt, than fifty dollars for compensation after he gets hurt. Now, that is the kind of a company you are working for and the kind of a plant you are working in. And yet, we killed men last year, we lost some eyes last year, some of our men lost fingers, and, as I said before, the ambulance still calls here. We will probably kill some this year and some will lose their sight and fingers. Who is it going to be? You? No person in this crowd can say definitely that he will leave that gate at night safe and sound. But, I can definitely say that according to the law of averages that we are going to have a certain number of accidents this year.

"What are we going to do about it? I said the company was paying thousands of dollars a year to stop accidents, and I know it would pay any amount I recommended if it knew the accidents would cease. But, fellows, the company cannot stop the accidents we are having these days. They could fill this factory full of all kinds of guards and we couldn't prevent ten per cent of the accidents. The accidents we are having nowadays can only be prevented by yourselves. They result from inattention, acts of carelessness, chances that men take. There is only one guard can prevent these and this guard is under your hat. The guard is to use your head and do a little thinking.

"Here are a few accidents. A carpenter took hold of a wire hanging down, gave it a yank, expecting to pull it loose from its fastening overhead. But, it didn't pull down. It pulled out of his hand, swung back and hit him in the eye. He has lost the sight of his eye. Could any guard have prevented that? Yet, he had a hammer in his other hand. If he had wrapped the wire around his hammer handle a few turns and then yanked, all would have been well.

"A few months ago a man stepped from the dock into an open freight car. As he stepped over, his foot slipped and he fell between the dock and the car, fracturing several ribs. Could any guard have prevented that? The trouble was that when he stepped over, he did not put his foot sufficiently into the car to get enough bearing under it to carry the weight of his body.

"Over in the motor plant a while ago, one man goosed another man. He jumped, struck his thigh against the corner of a work bench. An abscess set in and he was in the hospital two weeks, just because some damn fool thought he would be smart. Is there any kind of a guard to prevent such accidents? Horse play. Fool stunts.

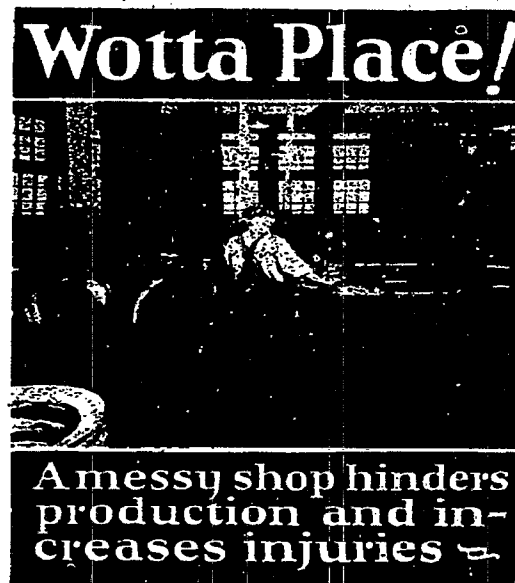
"Now, those are just samples of some of the accidents that are happening. I am telling you that we can't stop them any more. The only way we can stop them is through your help and cooperation. That is the purpose of this safety talk.

"Did each of you get one of these safety rule books this morning? Everybody did. And do you all know what is in this book? Put up your hands all who do. Oh, fine, everybody. Now, be careful, fellows, before you put up your hand. I would only have to ask a few questions to show you you don't know what is in this book yet. I know you have read it, because the employment man wouldn't sign you up until you had. Would he? And, I know you have a fair idea of what is in it. But, you don't know every word that is in this book yet the way I want you to know it.

"There is only one reason I have for wanting you to know these rules and that is to keep you safe, not me. I don't care if you get hurt, it is only one more accident in the record, a few more dollars in compensation. That sounds rather hard-boiled, but that is not the way I mean it. What I mean is this; That if you get

hurt, you and your family are the only ones who suffer. Isn't that true? So, it is you who we are trying to protect. That is why I want you all to know the rules in this book, because if you know the rules and follow them you will be much safer than if you don't. I analyze every accident that happens here, to find out just what caused it, and here is my experience: That ninety per cent of the accidents that happen in this plant, happen because some one failed to follow the rules in this book. So, keep this book with you. Read it over once a day for a week and then once a week for a month. If each of you will faithfully do this, then you will know the rules, and if you follow them you will be safe.

"I am not going to take up each of these rules, but I am going to spend a few minutes on a few of them. First, this rule about going to the first aid room for every minor bruise or injury. You know, a lot of fellows think it is kind of sissy



Wotta Place!
**A messy shop hinders
 production and in-
 creases injuries**

to go to a first aid room, and when they get a little bruise or cut they brush the blood off on their overalls and say, "Oh, hell, that don't amount to anything," and go on with their work. Well, before night a few little bugs get in the bruise; over night they increase to millions and about the second or third day there is a nice case of infection that requires a doctor's care.

"Last year we had sixty-six cases of infection, and in some cases the doctor had to work pretty hard to save the finger or arm. Why? Because they thought it was not necessary to go to the first aid room. So, I don't care what you are doing, or where you are, the minute you have a break in the skin, go at once to the first aid room. If you don't, look out for your foreman. If he sees you he will make you go.

"Second, the question of clothing. We have nearly all of our dangerous belts and gears guarded, and do not have many accidents from getting caught in machinery. However, we have occasional accidents from the use of gloves. The rule is, that absolutely no gloves are to be worn around machines with revolving parts such as drill presses, lathes, milling machinery, grinders, etc.

"Here is a glove that was worn by a young man on a hand miller. It got caught in the milling cutter and he lost two fingers on his left hand. This young man, by the way, was intending to study dentistry. He hasn't any chance now, has he?"

"There are some jobs in this shop where we furnish gloves to men to prevent accidents. Men who are handling sheet steel and rough castings must wear gloves, but their use is absolutely forbidden on any machine unless your foreman and the safety director have studied the job and given permission to use them. Keep your sleeves rolled up to the elbow. Keep the flowing ends of your tie tucked in. Keep your overalls buttoned up tight around you, keep rings off your fingers, and wear safety shoes. We can sell you a pair of safety shoes at our stores that have more honest shoe value, more comfort than you can buy at a shoe shop, for more money; and in addition, they have safety for your toes. If you wear sloppy, thin, dangerous shoes, don't be surprised to have your foreman tell you to go to the store and get a pair of safety shoes.

"Hand tools: I am especially concerned about these mushroom headed tools. Here is a sample. You can see how that head is all burred over. Every time I hit that chisel, steel flies off and it may lodge in somebody's eye. It is not you that is getting hurt, but it is the fellow next to you. Watch your hand tools.

"On the question of goggles, I hardly know what to say. It is very, very serious. Sight is one of the most valuable of our five senses. Ninety per cent of the pleasures and happiness that come to us in life, and yes, some of the tragedies, come through the sense of sight. It is not hearing, nor feeling, nor tasting, nor smelling, but sight, which is the greatest gift. And yet, how little we seem to appreciate it and what awful chances some men take with their eyes.

"I shall always remember my grandfather who was blind in later life. Mother would take us to his home during vacation when we were kiddies. He would take us on his knee and pass the tips of his fingers over our face, our little bodies and say, 'This is Joe,' or 'This is Frank.' Many of you are fathers. Can you imagine anything more beautiful in life for parents than to watch their little kiddies grow up from babyhood through childhood into beautiful men and women in whom they see their immortality? Do you want to do this as my grandfather did with your finger tips? Vision is wonderful, it is precious, and yet, how quickly we can lose it. A flying nail, a flying particle from a machine tool, a bit from an emery wheel, a splash of acid or hot metal and the beauties of this life turn to the tragedies of darkness.

"We have set up in this factory the list of operations in which you must wear goggles; so, when your foreman tells you to wear goggles just realize that he is trying to save your eyesight.

"Here are a few samples of goggles that were worn by our employees and which saved their eyes. This pair was worn by a man who was cutting a nut from a bolt with a cold chisel. The last blow severed the nut. It flew, struck a panel, and bounded back in his eye. It broke the lens but saved his sight. This pair was worn by a man making babbitt hammers. Some of the molten metal splashed up and struck the lens.

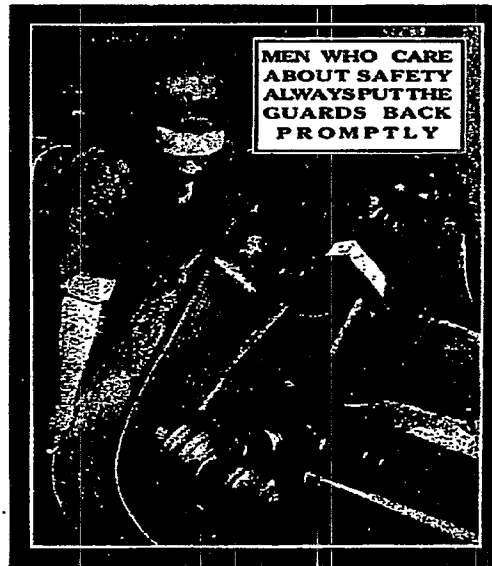
"We have all kinds of collections. Here are some more. All of these were worn by fellows in regular work.

"If any of you are going to work in the press room, just remember there is only one safe way to feed a press, and that is to keep your fingers out from under the dies. We haven't got a job in the shop that can't be run safe and no man will be laid off in this shop for refusing to run a dangerous machine. Just talk each job over with your foreman and he will show you the safe way to run the job.

"I will not spend any more time on the rules. Your foreman will discuss these with you in detail. I have simply touched on some of the more important ones. Possibly I have scared some of you and made you think this is a dangerous place

to work. I do not want you to think so, for, as I said in the beginning, you are working in one of the safest plants in the city. Last year, under our group insurance policy, the insurance company paid claims on sixty-five violent deaths in the Corporation and out of these only sixteen were in our factories, the rest were in the homes and streets. So, you see, you are four times as safe working in our shop as you are away from the job.

"Here is last year's report of the National Safety Council, of all accidents in this country, and here is our company pretty close to the top of its section. I want you to feel that you are in a safe plant, that you are working for a company that is anxious to keep you safe, but at the same time I want you to know we are still having a few accidents and we can only prevent these with your help.



"In closing, let me say a word or two on cooperation. I get out a monthly report in this plant showing just how every department stands on safety, and every foreman is anxious to have his department at the top of the list. You can help your foreman. The only accidents we count are what we call lost time accidents. A lost time accident is one which keeps a man off on the next shift at which he was hurt. Today is one shift, tomorrow is the next. You could be hurt any time today, the nurse might bandage up your finger and send you home, but if you are back tomorrow you are back on the next shift. It is not a lost time accident and does not go into the record. I mention this, because so often men like to take a day or two off and they use a slight accident as an excuse for being away.

"Then, too, I want you to cooperate with me. Any time that anyone of you see anything that you think is dangerous or may cause an accident, just call me over, when you see me in the shop, or call your foreman and say, 'What do you think about this? Don't you think we ought to have a guard on this?' We do not do everything that the men suggest, because we have to use good judgment and commonsense, and we only install guards when our experience shows there is no:

only a possibility of an accident but also a probability. But when you call our attention to these things, it shows us that you are back of us in our safety program, and that is what we want. We want every man in this shop to take an active, personal interest in his own safety and in the safety of his fellow-man.

"Safety is just a habit. When you drive your car, you never stop to think to use your clutch or brake pedal, you just do it automatically. So it is with safety. If every day you give a few thoughts to safety, if when you are piling your stock you say, 'No, I guess I will pile it the other way, it will be safer,' or if when you go to jump over the conveyor you say, 'No, I guess I will go down to the gate,' or if when you see an upturned nail you step on it and bend it down, you will soon do these things unconsciously; you will have acquired the safety habit.

"We have made a wonderful record in this plant since we have been doing safety work. We have cut the number of accidents nearly seventy per cent. We feel that we are pretty safe, but, as I said in the beginning, we are not satisfied; we are still having too many, and we can only hope to make further improvement through the cooperation of every man in this plant, with the management to make this a one hundred per cent plant."

CHAIRMAN COTCHER: I feel sure that after you get the Congress transactions and read over and analyze this talk, you will appreciate even more than you have now the fundamental psychology behind it.

Does anybody want to ask any questions of Mr. Dunnebacke before we proceed?

JAMES F. HENNESSEY (State Insurance Fund, New York City): I would like to ask Mr. Dunnebacke to what extent they get the cooperation of the men to wear the goggles?

MR. DUNNEBACKE: We attempted at first to do it through kindness and reasoning with them. We had fair success. In my experience, the use of goggles is something that you can't play with. The more I see of it, the more I realize that we have got to get down to a hard-boiled discipline. It is a case of saying that you *have* to wear goggles, and if you don't you don't care to work for us. My experience in safety work is beginning to teach me that that is the only thing we can do on goggles.

JAMES S. HENNESSEY (State Insurance Fund, New York City): Do they have any trouble with the foreign speaking help relative to having them obey the rules?

MR. DUNNEBACKE: The question of language is present in all our plants. All of our people are English-speaking people. However, this program can be varied to suit the different nationalities of a plant.

MR. HENNESSEY: The reason I ask those questions is this: Of course, in our work here in New York, we have a great many small shops, and one of our hardest propositions is to get the cooperation of the men to wear goggles. We go in and sell the employer the idea of providing the goggles. I have gone into plants where they have had serious eye injuries, and notwithstanding that fact they complained of a certain type of goggle. I persuaded the employer to buy a goggle that would suit their needs. On many occasions thereafter when I went into that plant, I went right into the chipping room because it was near the gate and there I would see the men wearing the goggles under their hat. That has happened time and again. I have pleaded with the foreman, I have pleaded with the employer to enforce those rules.

I imagine from Mr. Dunnebacke's statement here that it all depends upon the employer, how far he is willing to go to enforce the rule. The employers claim in these small shops in New York that their greatest trouble is getting the cooperation of the non-English-speaking people. I don't know why it should be when there are so many accidents and so many serious ones which affect the eyes. I

would like to know what other people are doing, and how far they go to enforce the rule of wearing goggles.

L. R. SCHUYLER (Lycoming Manufacturing Company, Williamsport, Pa.) Relative to the use of goggles, I might say that we don't have all our men wearing goggles yet that we want. The last speaker said we try to get the goggles through the milk of human kindness and in some departments where we have straight grinding, that is, grinding directly in front of the emery wheel, we ask the men to try the lightweight large goggle without the side protection at first. But, of course, in the event that the man is doing snagging and work of that kind,



I have gone so far as to try four and five different types of goggles on. I have even sent to San Francisco for goggles to try and get anything that might possibly be able to convince the man that it is all right. After a man has had three or four different kinds of goggles fitted on him, he rather gets ashamed of himself; he can't find any more excuses to make for not wearing them. That is one of the ways that we get around him.

I would like to ask the last speaker, the relation of the employment department to the old employee. What becomes of the old employee when he can no longer safely carry on his regular occupation?

MR. DUNNEBACKE: In the General Motors Corporation, the executives of the corporation are realizing that that is one of the most serious problems that is facing them today. They are making an intensive study of the question. It is a personnel problem and it is a managerial problem that I don't think I am capable of giving you a good answer to. Some of the industrials are not in favor of pension systems. I think the proper idea is that in a man's lifetime as an industrial worker, management should give him every opportunity to lay up and to provide an income for his later age. There are a certain small majority of men we can take care of. It is one of the biggest problems that is facing American industry today. I am not in a position to answer that.

A. L. THOMPSON (Du Pont Company, Gibbstown, N. J.): Speaking about goggles, did it ever occur to you gentlemen that they have to be adjusted to the particular individual? You must remember that you buy goggles in wholesale lots, and you give them to a man and they are uncomfortable. Very seldom does the man take the trouble to adjust that goggle to his face. If you will take time to adjust the goggle, you will find it easy to get the man to wear them. I think that has been one of the drawbacks in getting the men to wear the goggles.

MR. BIRD (Fisher Body Corp., Pontiac, Mich.): On that question of goggles, I instruct all the new men coming in that if they have any difficulty with the goggles to stop me on my way through the shop. Almost every day I am stopped by at least one man who is having difficulty. I get him straightened up right then. If necessary, we try a half dozen different kinds of goggles on him. Just the day before I came up here, one of the men said he was having trouble with his goggles. I looked at them, and saw they were bent. I straightened them out for him.

CHAIRMAN COTCHER: We will pass on to the next topic. We are going to have some short discussions, and the first one is on the subject of "Rehabilitation."

Mr. Owen T. Flynn of the Fisher Body Corporation will discuss this topic.

MR. OWEN T. FLYNN: Mr. Chairman and Gentlemen: In accepting the invitation to address you on such an important subject, I am going to make use of my status as an invitee and also due to time limitation, will read from prepared data in order to insure accuracy.

Rehabilitation

By OWEN T. FLYNN

Department of Industrial Relations, Fisher Body Corporation, Detroit, Mich.

In introducing a subject of such far-reaching importance, I will first introduce myself and my connections. Anything contained herein is my personal opinion, and on that basis I will proceed.

I am in charge of the department of industrial relations of the Fisher Body Corporation, Division of General Motors, at Detroit, Michigan. My duties deal with labor trouble, welfare; and our medical department, employment, compensation and safety departments have their respective heads which do not come in range of my activities.

After many years dealing and associating with industrial workers while actively participating as a unionist, the writer decided that he could render a greater service by changing his course, but not his destination.

Dealing directly with the workers, the writer believes that to a great degree he has re-established that lost personal contact which was lost when industry went through transition and entered the machine age.

The word "welfare" is in the constitution of the United States of America, and no one associates it with charity or dole systems. Recognition of the equities of all partners in the big game of mass production, and render service accordingly, is my conception of welfare.

Rehabilitation is a word very little understood, due largely to its infrequency in every-day use.

The problem, as I see it today, especially in the United States, is not one of production alone, but of more units of production per man-day. If I am correct, the problem is divided into two parts; one dealing with the installation of modern machinery to reduce costs, or the material side; and the other dealing

with individual efficiency and reward, or the human side. I will deal with the human side, because I believe it is most important.

It is so, because no matter how scientifically equipped, wonderfully located, or beautiful the plant may be, it is quite valueless without men. Recognizing this side of the industrial picture, one of the largest, if not the largest motor manufacturing concerns in the world, claims it is just as much interested in the employees' welfare as it is making money; and to prove same, it gives the employees an insurance protection in case of accident, sickness or death, with liberal provisions for permanent disability, and encourages its employees to avail



themselves of a co-operative savings and investment plan which will, if accepted, provide amply in days when old age prevents them from working.

It goes further in recognizing the equities of its employees and at great cost has made their plants a safe place to work. The safety department contributes these benefits, and gives some other people something to brag about. It also provides first class surgical and medical care in all industrial injuries, but not withstanding these wonderful achievements, has recognized itself as a part of our great commonwealth, and has come to realize that restoring injured employees to a working, self-sustaining basis and prevent them from becoming state charges, is also full appreciation of equity.

During the war, the topic or subject of rehabilitation was very much in evidence, and to prove that it is worthy of its name the United States Government, through its Congress, passed the Rehabilitation Act, it was signed by our president on June 2, 1920, and thereby told the world that she recognized equity, and that maimed and injured people had to have vocational rehabilitation. However, this act does not provide for the direct organization or administration of vocational rehabilitation by the Federal Government, but does provide for financial assistance to each state in proportion to which its population bears to the population of the United States. Provision for each state is at least

\$5,000.00; providing, however, that each federal dollar is matched by a state dollar. The appropriation for 1920-1921 was in the amount of \$750,000.00 and I believe \$1,000,000.00 each year since.

Opportunities of returning disabled men to industry is difficult, especially during depressions, and according to state men, the depressions are due to labor-saving machinery and gradual moving of country folks into the cities.

There are some 41 states operating under the Federal Act, and we in industry can reasonably expect the state to rehabilitate cases of major nature. Now it behooves us to take care of those less seriously injured by setting up a method of our own. The Fisher Body Corporation has set up such a department on the following tentative basis:

It is a department divorced from other departments and managed by a production man, who pays attention to an employee's disability; and a psychiatric nurse, who sees to it that the medical director's directions are carried out to the letter. Only candidates whom the medical director and industrial director pass on go there for employment.

The doctor will use his own judgment on all entrants, with the possible exception of the few who carry on production when there are no medical cases.

Small operations have been set aside for production in this department.

It is strictly against our set-up to allow same to be an old men's home.

I will now attempt to show you where rehabilitation comes into our own industrial picture.

How States May Secure Federal Aid

1. It must accept provisions of the Federal Act.
2. State should empower and direct the state board for vocational education to cooperate with the Federal Board for vocational education in administering this act.
3. Provide for a plan of cooperation between the state board for vocational education and the state board, department or commission administering the State Workmen's Compensation Act, if state has such an act.
4. Provide for supervision and support of the work.
5. Appoint the state treasurer as custodian of all such allotments.

Time prevents me from going very much further, but I must at least call your attention to the following: Under our compensation laws, some states provide for the purchase of artificial appliances, and are as follows:

Massachusetts	Utah	Arizona
California	Minnesota	Washington
Nevada	Wisconsin	Illinois
Maryland	Oregon	

In conclusion, I must point out that the industrial surgeon, when amputating, should make such an amputation with a view in mind of an artificial appliance being desired by the patient and fitted to the stump. Makers of artificial appliances complain of their inability, to properly fit an appliance to a stump that is too long, and often a re-amputation is necessary if the patient is ever to be satisfied.

Time is long since up, and if the chairman so permits, I will try to answer questions, but will refuse to discuss cases, only on the basis of viewpoint.

Anyone interested in this topic can secure more information by writing to me at Detroit, and I will close, thanking you for your attentiveness.

JAMES F. HENNESSEY (State Insurance Fund, New York City): New York also provides for the purchase of artificial appliances.

MR. FLYNN: When was that added to your laws?

MR. HENNESSEY: I don't know when it was added to our laws. I know in the various cases where I have had a compensation and medical fee, it has also included a surgical or artificial appliance. I do not know that the State Fund pays for it.

MR. FLYNN: They can do it if they want to, but it is not a law.

MR. STEEL (Singer Manufacturing Company, Elizabeth, New Jersey): The New York State law was changed and went into effect July 1st of this year.

MR. FLYNN: The last publication I have here written by the government is Bulletin Number 126. If you gentlemen want a copy of this, you can get it by sending twenty-five cents to the Bureau of Documents, Washington, D. C.

I have just returned from the convention of the National Rehabilitation Association at Milwaukee. Nobody attended that meeting except Government and State officials. I happened to be the only industrialist. I was invited by the Federal Board. It was the most interesting four-day meeting I have ever attended. There are a lot of people as close as I am to industrial matters. I didn't know the Government was doing the work they are doing.

MR. BIRD: What measures, if any, have been taken to instruct industrial physicians in regard to where amputations should be made, having in mind appliances?

MR. FLYNN: There was very little done in that direction. However, in a trip yesterday through this Institute for the Crippled and Disabled, the director in charge told me that student doctors and student surgeons are making weekly trips through there with that very thing in mind.

The average man, after he is injured and loses a member of his hand or foot, wants an artificial appliance long before the stump is ready to receive it. There are plenty of ambulance chasers around to sell him one. If you have an injured man in your plant who wants to buy an appliance, buy it through the State Department of Rehabilitation. They have a contract with these appliance makers, and they guarantee to make it serviceable. The State will live a whole lot longer than either you or I will.

MR. BIRD: I have in mind a major case where a man had both hands cut off and faced reamputation with all the tragedy that had already occurred in that man's family; that was a terrific shock to that family, facing possible death, of course, again unnecessarily through physicians not being informed when the time is right and appropriate. I certainly think that this organization should go on record as proposing through any possible or feasible means that instruction where amputation should be made should be included in the university curriculums of our medical schools of the United States.

Double Duty Guards—How to Get the Most Out of Them

By H. E. MILLER

Safety Engineer, Chevrolet Motor Company, Detroit, Mich.

It has been my privilege occasionally to talk to groups of men on topics of interest. I know that this topic is one which carries a lot of interest to all who are enrolled on the roster of those who serve their God and fellow-man in this great humanitarian movement of safety. I hope I shall be able to do justice to the subject, and be able to leave with you a few thoughts which will be of value when you leave this Congress and take up your endeavors in your several localities.

As a prelude to this discussion, will you permit me to diverge just a little and make a comparison of present day methods with those of a decade or so ago?

Several times in the past three or four years I have heard the remark passed that the human element is being more and more forgotten in industry. I do not agree with this statement, and an analysis of present day working conditions will prove conclusively that this is untrue, and that more actual study is now given to the betterment of man's working conditions than has ever been the fact before. This is emphasized by the fact that nearly every employer has one or more persons to whom are delegated the sole duty of looking after the safety of these employees, and those who for economic reasons are not able to go that far, with very few exceptions have made safety part of the duties of some responsible party in the organization.

Compare this condition, if you please, with the conditions in all industries some 20 or more years ago. Some of the old timers in this audience, will, I believe, verify the statement that in those days man was not valued as highly as a good mule. Man was only thought of as a necessary evil that could be replaced by stepping to the gate and whistling or crooking a finger. A mule, however, was on the par with a little tin God. He had to be brought a long distance and trained carefully to do the job assigned to him, and then he was guarded religiously to see that he did not get hurt, and that he was not taken sick; for if either of these things took place, he would be out of the service for a time, and that would result in a terrible loss; therefore nothing was overlooked to guard him and keep him on the job. Nothing, except in very rare instances, was done to protect the man-power in the plant from either sickness or accident.

I remember an incident in a Pittsburgh steel mill, which, as I recall it, happened about 18 years ago. At that time this particular mill had a narrow gauge railroad track running from the pig yard in to the furnaces, and the cars were hauled by a single mule, there being about two ton of pig in each car load. On this particular day I saw the mule skinner misjudge his distance, and back a car load of pig off the end of the track at the turn table, and when it dropped it pulled the driver and mule down into the pit on top of it. The car was badly damaged and both the driver and the mule were hurt. The pig gang got the driver out, laid him out on the ground and then spent about 25 minutes getting the mule out. They found the mule had to go to the veterinary but they forgot all about the man who was still lying on the ground. I was finally able to get the gang boss to send a couple of men to help get the man to a doctor. The mule was found to have several minor injuries to his hide and not much else, so he was able to be back on the job almost immediately, but the man, when examined, was found to have a broken collar bone, a dislocated shoulder, a broken wrist, three broken ribs and severe contusions all over his body, and he was laid up in the hospital for 19 weeks. The best part of this however is yet to come, and that is that when the subject of protecting this dangerous condition was brought up, the pig yard boss' reply was that he thought something should be done as it was too hard to get good mules.

Now doesn't that make a great picture? No worry as to the condition of the man but worried to death for fear they would lose a mule.

Today, thank God! this condition has changed, and man has been raised to his proper place, and now is considered far more valuable than the most expensive piece of machinery or equipment. It has only been a very few years since industry began to figure the value of the human being and how best to protect him from injury and death, but in those few years, thanks to men of the caliber of Judge Gary, such rapid strides have been made that almost the first thought of the executive, when buying new equipment, is "What guards are provided and what will we need to make this machine safe for use?" I know of plants, lots of them, where a new piece of equipment cannot be ordered until the general manager, the assistant manager, plant superintendent, master mechanic and safety engineer sit in conference and actually specify what the manufacturer shall provide in the line of guards for dangerous points, so the machinery will be received fully guarded and

no delay will be occasioned through waiting till guards are built. In other plants I know of, they will not let the power be turned on till every dangerous point is fully guarded.

Now, let me ask you this—How is it with you? Do you get this cooperation in your plant?

If you do not, there is something wrong with you or your executives, and you should bend your every effort toward getting it. Without it you cannot hope to gain the confidence of your employees, for they will gain the impression that you have not the whole-hearted support of your management, and further that the management is only interested in putting guards where they are compelled to. You will never gain the necessary confidence of the men with this idea prevalent.

This brings me to the main part of my topic, which refers to, "Getting the most out of mechanical guards."

This subject could have been worded a little differently to express the real import of the matter. That wording I believe should have been, "Selling the Employee on His Own Safety and Protection Through Design, Construction, Application and Use of Mechanical Guards."

There are many angles to this important subject, and a lot of them I will be unable to touch on in the space of time allotted to me, so I have selected the four most important, and will discuss them in this order: Design, Construction, Application and Use.

Care in the design of guards is vital, for, if improperly designed, they may be clumsy both to handle and look at and that nearly always, if on production machinery, results in handicapping the operator or workman. Such handicapping, you all know, will be disastrous, especially in shops where so many men work on a bonus, or piece-work, basis, for it will directly react on the pay check, and when that happens you can rest assured they will exert every influence toward removing the handicap. This is logical and has been proven in many different types of factories.

In designing, therefore, there are many things to be considered, chief of which are: (1) cover the dangerous point; (2) make the guard as small as you can and eliminate protrudance into aisles or runways and tie in as much as possible to the contour of the machine; (3) exclude as far as possible any encroachment on point of actual operations; and (4) consult the operator and job foreman for their suggestion as to design.

The first three are very important but the last is, to my mind, the most important. To a lot of you this may sound like bunk, but listen—the point is that unless you get your suggestion from the man who is running the machine you are not putting up the kind of guards that will get the cooperation of the workman himself. In other words, unless you do go to the workman when a guard is contemplated, and get his ideas you will be erecting something which, from your view-point, will probably do the work, but practically it will be causing inconvenience to the operator, and when you cause this you will find your guard doing duty as a floor covering or helping to hold up a post in the middle of the plant most of the time. When you seek the reason for this you will get no explanation from anyone except the answer, "I guess the night turn took it off, for it was off when I came to work this morning." But if, when you plan to build a guard, you ask the operator for his ideas, he will nearly always make a good suggestion or two and if you follow his suggestions, even partially, you are forging a chain which will compel him to leave the guard in place. That way lies protection.

Let me illustrate: A couple of years after I started in safety work, I had formed the opinion that my experience qualified me to design a guard just about as well as anyone, and consequently when an occasion arose one day to lay out a guard for a machine I proceeded to do so. I had it made up according to my own ideas, and had it installed and said to myself that it was a darn good piece of work.

I noticed, however, that the operator was not very enthusiastic about it. But, in my egotistic way, I gave him no thought, as I could not see that there was a thing the matter with my guard. A few days later I found my beautiful piece of guarding a total loss, for someone had "accidentally" removed it for some purpose, and while it was lying beside the machine, something heavy had, again "accidentally," fallen on it and it was ruined. Again I did not use good judgment but had another guard made up along the same lines, only to have it meet the same fate. Then I began to realize that all this was happening because someone did not like the thing. Then I went to the foreman and the operator and asked them what was the matter; and the three of us checked this job and the operator showed me more in a few minutes about guarding that job than I could have found out alone in a week. I followed his ideas on the next one, and when it was installed it stayed put; and by the way, I happen to know that that guard is still in use after several years duty.

After that experience I have carefully followed the lead I got then, and when I find a place where a new type of guard is necessary I first study the job myself, then I get the foreman to suggest his ideas, and then I go to the operator and ask him for any suggestions he may have that will help in designing a guard for his machine. I often find that his suggestions follow the ideas already incorporated but more often I get a different slant on the job than I have been able to get from my own study. Following this, the total of the ideas of the workman, foreman and myself are consolidated into a design, and we then proceed to have the guard made up. It is a fact that, by following this procedure, whether the operator is able to give any new ideas or not, I am having the contact with him which has the psychological effect of selling him the safety thought, and from this on he is constantly watching not only his own job but various others in the immediate neighborhood and his suggestions are very often extremely valuable.

Some of you may not think I gain much by such a procedure and that I may even forfeit the respect of the employee by it, but I am here to say that I have never found a case where I have lost a bit of the man's respect. And here's another angle, after I have asked their aid in designing a guard I cannot recall a time or a case where any of these enlisted safety men have had to be cautioned a second time on any matter pertaining to their personal safety, nor do I have a record of any of them having been injured from the enlistment date on. So I claim that very often we can all sacrifice our so-called dignity and get hand in hand with the mechanic, the production man, and the laborer and profit from it to an unlimited extent.

As to the construction of guards, let me say that there are very few hard and fast rules or ideas to follow, as this is a good bit like building a house, for you have to judge your construction from many angles. Let me explain this in a few words: if the guard to be built is to cover a remote place where there is little, if any, traffic passing and is on a machine where there is very little chance for frequent repairs and where the operator is only required to go at infrequent intervals, then let your guard be of very light material, preferably metal, bent to shape and set in place. But if your guard is in the direct opposite location, that is, where there is lots of traffic, both foot and motorized, and is subject to bumps and jams, or is liable to be removed due to frequent machine repairs, then, for goodness sake, build it of heavy gauge metal-rivet, or weld the seams, reinforce the sides with steel ribs and fasten it in place with heavy machine bolts or cap screws and you will find that you will not need to replace it for a long time as it will stand a lot of abuse.

Never, except in very rare cases where nothing else will do, should you use cast metals for guard construction, for that type does not stand up. The lightest taps or blows will frequently break them, and that necessitates replacement or a

welding job, which always increases your operating costs, and in the latter case usually results in a very unsightly appearance.

Then, to tie in construction to double duty guards, let me say that a guard lightly built will not stand up and in a short time becomes misshapen and ragged, and one that has been welded looks terrible; all of which detracts from the general appearance of your factory and has a great bearing on the safety of your employees, for a man who works in a slovenly looking shop rapidly loses all pride in himself and his work and as he becomes careless in his appearance, he also becomes so in his actions and accidents and personal injuries result.

Therefore my whole discussion on construction can be expressed this way; build your guards of rugged material, build them along the lines that conform to the contours of the machine without encroachment on production, and build them ruggedly.

In discussing the application and use of guards let me cite an experience of a few months ago in Detroit, when, on invitation, I went to pay a visit to a large plant. The Safety Engineer of that plant is well known to you and we made quite a trip of it and I enjoyed it greatly. There was, however, one incident that reacted unfavorably on me and I haven't been able to forget it. On entering one department, and while standing beside a machine, I noticed a set of spiral gears uncovered and running at high speed within 18 inches of the operator's hands. On looking around I saw the guard or gear cover lying on the floor near the operator, and it was filled with sawdust and you can guess its use. My friend noticed it, too, and began to ask questions and learned that the guard had been off for several weeks, that the operator had asked that the gears be guarded but the foreman had made no attempt to have it replaced. This safety engineer then proceeded to give the operator a call down for using the guard for a cuspidor, but did not say a word to the foreman about the guard being off. I learned that the operator had been on that job for about three months and as we left him I overheard him say to his neighbor: "Who is that anyway?" The reply was, "Why that's the safety man." And the first operator remarked, "Well, I never saw him before."

Do you get the picture as I do? Do you see the thing as I do? Was this safety engineer handling his plant properly, when a man could be working there three months without knowing him? Was the foreman sold on safety when he would knowingly leave so flagrant a violation of all safe practices in existence? How could the safety engineer accomplish anything by criticising the operator and letting the foreman go without censure? Wouldn't it have been better to have called the foreman right then and insisted that the guard be cleaned out and replaced at once, and that this condition be overcome and never again allowed to exist? And lastly, wouldn't the engineer have strengthened his position a lot with the operators, by showing them that he was only interested in their welfare and would put up a fight for their protection? You can answer these questions for yourselves, but I'll wager your answers will coincide with mine, and that you will agree that this man went at things wrong end to; for it is a fact that the operator can only get done what the foremen will do for him, as far as the mechanical side of things is concerned, but that they will do a lot for you if you will only take the time to show them that you are working for their interests.

This incident illustrates the necessity not only of proper installation but of proper and continuous inspection to see that they are being properly used and brings out the point that when you have designed and ordered a guard of any description everyone in the immediate neighborhood is aware of the fact and it is therefore imperative that you leave no stone unturned in obtaining prompt construction and immediate installation. I have seen cases in plants where the guard was built and taken to the machine but due to high production schedules it was felt that the machine could not be shut down long enough to install the guard with the result

that the guard lay on the floor for several days before it was put in place and I have heard the operators ask why in blazes it wasn't put on. It is a fact that the majority of operators are intelligent men and they cannot reconcile our statements that we are working for their protection and safety and yet will allow a guard to be left uninstalled after it is ready to be put on. Therefore, let me emphasize that when a guard is ready it should either be placed on the machine at once or kept clear out of sight until the time arrives for installation, otherwise you will get adverse sentiment which will react unfavorably.

As to the use of a guard, you can only determine whether it is being properly used by constant inspection. I have gone into plants of many kinds for various reasons and through these have discovered there are only two classes of safety engineers; the ones who are constantly in the plant and are known to everyone, and the kind who are seldom in the plant and are known to only a limited number of employees. If you will permit, I am going to theorize at this point in this way: I feel that the theory of safety engineering is tied up with the constant and careful analysis of each unit of your plant. You can go around the outside of the department following the aisles and see very little of what is going on but if you will get into the middle of your department for only a few minutes you will find more actual hazards existing that should be guarded than you can find in a week by walking around the outside and you will find that if you do enter and travel through the departments everyday, you will have any number of employees stopping you and pointing out what they consider dangerous conditions and will be able to get more actual results than in any other manner.

In this same theorizing I want to ask you a question and that is: How many of you actually consider yourselves as useful mechanical guards against accidents in your plants? This may sound like a queer question, but let me say that through your constant inspection efforts and analysis of hazards you are making of yourself a useful practical and mechanical guard, and you are building a mental chain around each and every employee. He will take pride in seeing that there is never a guard missing from his particular piece of equipment, and will be constantly mentally alert not only to the guarding of hazards of a mechanical nature but to the guarding of his own mental hazards.

This all leads to this thought: that in the real analysis we can only get safety among the employees, by selling the idea of self protection, but when they have bought the idea they will bring you added suggestions of ways and means for betterment of conditions; and, while many of these will be useless, there will be plenty that can be used, and those you can use will just be added means of securing more and more safety amongst the men.

I had the privilege some time ago of looking over the minutes of a general safety committee meeting of a large automobile manufacturing plant which gave me some very good corroborative evidence on this subject. In this meeting they were comparing the accident record of Plant "A" (which was being completely guarded) with that of Plant "X" (which, except for extremely dangerous points, was being practically left out of the guarding program) and I believe this was being done with a very definite idea in mind. Some one from Plant X could not see why they were being discriminated against, and asked for reasons. The gist of the safety director's reply was that Plant A was only having about five per cent as many accidents as Plant X, but the reason for this was that the foreman and workmen in Plant A had embraced safety as part of their duties, and were so interested in it that they were continually requesting guards for dangerous places, and that the management was giving them these guards as their contribution to the general safety and well being of the men, thus helping to keep up the interest of all employees. In Plant X, however, the foremen or men had not become imbued with the safety idea and were not making any pretense of trying to protect themselves and they were not ready for the inauguration of an intensive

guarding campaign. He enlarged upon this by saying that his inspectors were simply devoting their time in Plant X trying to increase the employees' interest in their own safety and trying to get them in a frame of mind where they would begin to see the light and start asking for some protection, and when that day arrived the company would be ready and anxious to get their guarding program under way.

The safety director further stated, in answer to a question as to why the safety inspectors did not ask for guards, that the inspector's job was purely that of arousing interest in safety, and acting as a friendly advisor and aide to the plant supervision, and that it was the duty of supervision itself to ask for guard protection. In other words, he stated that putting the guards in to arouse interest was just putting the cart before the horse. I am heartily in accord with this idea and I believe his stand on the subject is a direct support to what ideas I have been trying to pass on to you.

Now let me summarize just a little and I am through. Consider this, that safety is a means of increasing efficiency, and an efficient man is nearly always a safe man; or you can put it this way: safety and efficiency are the true direction of man's mind to his work. This being true, guarding then must be a part of efficiency as well as safety.

Therefore, as I see it, to get the most duty out of mechanical guards, let the workman in on your studies, take well into consideration all that he may offer, combine it with your own knowledge of proper methods of construction, build your guards of materials that will stand up under long usage, make your installations accessible but permanent. And last, but greatest of all, use your guarding activities as a means of impressing safety so indelibly on the employee's mind that he will unconsciously become safety conscious and will himself, mentally, guard by his actions those points where mechanical guards cannot be applied, or that if applied would be absolutely worthless. All of these things will help you to sell to the man the idea that all you and he are doing will react to his benefit through saving him injury and pain and you will not only enlist his aid in keeping the guard in place and in good condition, but you will make of him a true disciple of the gospel of safety, which he will preach throughout the shop and it will be the means of eliminating accidents and their causes, and accomplishing this is, to my mind, the only way of securing double duty from your guards.

CHAIRMAN COTCHER: I am sorry, but shortness of time makes it undesirable to stop here for any discussion.

We will now take up the next topic, which is "Mechanical Safeguarding." This is to be discussed by Mr. George Thompson of Detroit.

Mechanical Safeguarding

By GEORGE THOMPSON

Detroit Insurance Agency, Detroit, Mich.

What is meant by mechanical safeguarding? I would say it is protecting machinery so that the operator will not be injured. In other words, it is providing a protection by some mechanical construction that will substitute for the skill and judgment we expect the operator to possess. That is really a fact.

In Lansing, Michigan, I gave a talk on mechanical guards and constructed a plant on paper, so why not construct a plant here and put in it some of our machinery?

I am not going to dwell on building requirements as that is confined to location, various locations having certain requirements that they feel necessary in buildings. For convenience sake, we will use the square type. It will be one story,

basement, with a gallery, virtually a two-story structure, which is similar to most of the plants which you work in.

We, of course, will have a fireproof building, with cement reinforced floors in the basement, the main floor, and self-supported gallery with ventilated slab roof. That again is just about what we use.

We must have a separating wall, a fire wall, if you please, separating the office from the factory, and the exits in the wall are to be equipped with approved fire doors. The building is also equipped with sprinklers and hose, also hand extinguishers, some soda and some chloride.

The building is to house one hundred men, so we must provide exits for these men, and will provide fireproof exits and stairways of the approved type. We must have at least two, one on each side of the building. We must be sure that these exits are kept clear at all times. We must see that they are not only clear in the plant but also clear to the public street.

We must also keep the stairways lighted, and the source of power for these lights must come from a source other than our own, so that these lights will always be illuminated. This is important. This was proven beyond a doubt at a recent fire, both as to the fire stairway and lights. The lights were burning three days after the fire was out and the debris had been removed. The stairways were serviceable even after all of the debris had been removed. In fact, they had to be torn down. It proves conclusively that fireproof stairways, well lighted, are the proper thing to have connected to your building.

The doors must open outward and all exits must be marked so that in case of extreme movement our men will know how to get to safety. This is also important. Why do we say a fireproof door? These tin doors are just wood-like inside of them. Why do we want a door of that kind? Why not put up steel? Let me tell you something. A blast of flame of enormous intensity and four of these doors exposed to that flame constantly, and even though the interior of the door was completely disintegrated, and within twenty feet of that doorway was textile material that a slight amount of heat would have ignited, the material was saved. Don't discourage the use of a tin door just because it is tin, because when the Board of Fire Underwriters set up that standard for the fire door, they did it for a purpose. The fire door is no good, you know, if someone puts a brick in the corner of the doorway and keeps the door open. It isn't any good at all if it is blocked open. A door is meant to do two things, open and close. A fire door is meant to do two things, open and close, and stay closed when it is subjected to fire. So, let's provide our buildings with fire doors.

Stairways: This is very important. Equip all stairs with slip-proof treads and hand rails, with landings. These landings must not be more than twelve feet apart. I would suggest six feet as preferable, as this will give us an angle of rise of about thirty degrees. This is a pleasant non-tiring rise, for as you know we must conserve the energy of our men.

I don't know whether you realize the importance of a stairway in a plant, but if you have to walk up and down five stories in a building, two or three times a day, even you yourself will find it rather tiring. But if that stairway has the proper slant, you will do it all day long without any particular effort.

The nosing should also be given attention, and should not over-hang the riser more than one or one-and-a-half inches. Why? Did you ever hear of a person falling up a stair, or falling down when they are walking up the stairs? I have. I find it was caused by the toe catching under the nosing. You experience the same feeling that you do when you reach for the top step when you come home late at night from a lodge meeting or something of that kind, and you reach for the step and it isn't there. I dare say there is not a man in this room that can tell me how many steps there are in the stairway of his home, yet you are using them every day. It is just that unconscious fact of the stairway being there, the

familiarity of going up and down that makes it a safe stairway for use. We don't stop to count the steps, and neither does the workman stop to count the steps. Therefore, if you will give him a stair that is as near foolproof as possible, you won't have the accident of falling downstairs; and falling accidents, by the way, are the greatest cause of injury in the United States today. Falling is one of the big things that contribute to our accident frequency in the United States.

The hand rails on the stairs should be made of not less than one and one-half inch pipe and should measure thirty-six inches from the center of the tread to the top of the rail with another rail eighteen inches from center of tread, measured at right angles to the tread.

We must not forget the gallery. This must also have a rail and should be forty-two inches high with an intermediate rail midway between the floor and the top rail, with a riser every six or eight feet. We must also have a toe board. I have found that a four or six-inch board is sufficient. I don't believe in making the toe rail rigid. I have found, by taking the toe board and putting a pipe champ on it to fit the riser on your rail, that then if it is necessary to move it for cleanliness or for some other purpose, you can merely slide the champ, clean out from under it, taking out the waste material that may accumulate around the ledge, and the moment it falls back in its place it is done. It is not rigidly fastened.

We will have an elevator. We will have one of the approved types. We will have the top hinge of the elevator or top section of the elevator hinged, so that if anything protrudes into the car and the car moves it will open and drop closed, when the obstruction is passed; also if it should be dislodged it will fall on top of the car instead of on the operator. That in many of our plants is disregarded. They are usually made across the shaft to open up and come down, and usually they don't come down. If this section across the front at the doorway entrance to the elevator is made so that it hinges and can stay up, if anything projects it will turn up and drop down underneath it. If it has dislodged that part, then that part will come down and land on the elevator.

Let me speak about the boilers in your plant. They get the least amount of attention of anything you have in the plant. Boilers sometimes explode. Very little thought is given to protecting the men from burning, or scalding.

The boilers will have safety valves properly set and exhaust outside of the building. We will have gauge glasses protected and instant reading devices installed so that our fireman can readily tell his water level. We will also have double blow-off valves that can be locked, also that we won't injure anyone inside the boiler when cleaning and inspection is necessary. Our boiler doors will also have latches so that in case of leaking flues or water getting into our fire box the steam will pass out into the chimney instead of blowing the fire doors open and scalding or injuring our fireman.

The turbine will have a governor and the generator will have breakers and rubber matting will be used on the floor in front of our control board. This will also be railed off.

We will now install our machinery. As we are going to use some machine shop equipment, we will have transmission.

We will locate our motor overhead and drive to the transmission line from here, and we can go to our countershafts and down to the drills and grinders.

The drive belt on our motor may break and fall, so we will enclose the drive belt with a hanging rack strongly built, so that if the belt fails it will drop into the hanger and do no harm. We will also put a belt catcher at the end of the motor pulley so that if the belt slips off the pulley the hook will catch it. The rack under the belt should not have a wood or metal bottom in it. I would suggest cross rods spaced twelve inches apart. Why? Because a wood or metal bottom accumulates lint and dust and presents a fire or explosion hazard, so why create one when the open construction is safer and cheaper?

We will enclose our down belts at least six feet from the floor, one side we will have removable. We will use set screws but they must be the socket head or safety set screws, and while the old millwright does not like them, we know that they are the best because they are safe.

We are going to have some ladders. We will equip our ladders with safety feet. We will have the rungs not less than one and one-half inches thick. They will be spaced not more than twelve inches apart. On our step ladders, we will have rungs on one side and steps on the other, or perhaps rungs on both sides, as occasion may demand. We will equip our straight ladders with hooks. I have found the best place to put these hooks is about one and one-half feet from the top, the extreme end of the ladder.

You may say, why do that, why not put it on so you hook it on the shaft? In many of our plants today the old type of transmission is still in effect, and the man goes up to put a belt on. He climbs up the ladder and throws it on the pulley. Possibly the pulley is making 1,300 to 1,500 revolutions per minute. The belt is anywhere from three to five inches. A man may have loose clothes and get caught. I say a foot and a half advisedly for this reason: Your hangers are very rarely over thirty-six inches on the extreme; there are more of them twelve to eighteen inches; so that you will have plenty of head room between the shaft and the ceiling. Put the hook a foot and a half down and when you hook it up, the man has an opportunity to take the rest of that ladder to act as a guide, a brace for him to hold himself in throwing that belt on.

On our drill presses we will enclose the gears and drive belts and rail off the rear guards, and we will instruct our operator that he must not wear loose clothing or finger rings.

Milling machines: Our milling machines will have their moving parts enclosed, and we will instruct our operator to use a brush to remove the chips, and he must also be instructed regarding loose clothing, gloves and rings.

Shapers: Our shaper has its drives enclosed and a rear pan long enough to cover the extreme travel of the ram, and we will instruct our operator to wear eye shields to keep the hot chips from his eyes.

Our lathes must be of the quick change type, so that the gears will be enclosed. We must also enclose our latch pins. I don't know whether you boys have come in contact with that very much. The latch pin is that little latch that you pull out when you want to throw out the back gears. Many a man thoughtlessly puts his hand on the bearing and throws the belt on and the pin comes around and a finger is gone. It is usually either torn off or it is mutilated in such a condition that it has to be removed. It costs about fifty cents to enclose this pin to a lathe.

On our planer, we will see that the apron is enclosed and filled-in, so that no one will reach for tools when the bed is moving and possibly break their arm. That has been done many times.

We will have a grinder or emery stand, so we will use grip tight washers and enclose the wheels so that not more than one-third of the wheels are exposed. We will adjust the tool rests as close as possible to the wheels, and we will equip the stand with glass shields, that are adjustable, as we do not want emery in our workmen's eyes. We will also have a tool grinder, and we will warn our operators that they must wear goggles when using this tool. These tools will also be equipped with an exhaust system.

Why do I bring up the matter of tool rests? Well, you have heard the old story that a burnt child is afraid of the fire. I have been burnt. I was just about as hard-boiled a tool maker as ever came down the pike. If twenty years ago someone had come to be and talked safety, I would have said: "That is some more of that stuff; spread it on the lawn; I don't need it." I had to hang

around and work in plants, supervise and all that sort of thing for a considerable length of time before I realized that we were not making mechanics like the old type mechanic. Production wouldn't permit it. Specialization was a rule of the day.

Some years ago, I was doing missionary work or emergency work, and did something that I had no business to do. It took a quarter of an inch of that finger off. I started to grind a washer on a grinding machine, and the rest was too far back and the washer went in and so did my finger and it ground off enough so I could pull it out. It served me right. I had no business to do it; I knew better than do it. It made a safety man out of me. If I am fool enough to take that finger and lose a quarter of an inch of it to do such a fool thing as that, what can I expect of other men who maybe haven't quite as much intelligence as I have. It is up to me, it is part of my job to tell that man what he may expect and then to mechanically safeguard that machine to the best of my ability. I haven't done my job, and you haven't done yours unless you have done the same thing. That is the reason I talk mechanical safeguards up to a certain point.

Let us go out into the production department, and as we propose to use both wood and metal in our product, we must keep our metal division separate from our wood division. In our metal division we will have a row of drills, some turret lathes, a miller or two and a square shear, power type, as we have described the guard for drills and lathes and know what they are. We must now provide protection for our shearmen. As we drive our shear with an individual motor, we must next enclose the fly wheel, which is rarely done on shears. I would do it, however. This should be entirely enclosed with solid or one-half inch mesh and have one side removable. The treadle should have a board protecting it, so that falling objects will not release the clutch and cause an injury. Also, we will fill in the arches on the hold down with a metal shield loosely held in place and having a vertical action of about one-half inch, so that if an operator gets too close to the cutting edges it will at least warn him of his danger before he meets with an accident. We will also warn him to use a metal pushing tool when he is cutting close to the line. We are called upon to have all of the wrinkles out of our metal parts, so we must have a spring hammer or bumper, and so we will enclose the spring action, then if the spring should break it will fall to the floor and not injure our men.

Punch presses: I am not going to start anything on punch presses this morning, because we could talk all next week on that little thing. But, you can bet we will enclose our fly wheels and operate them with two-handed devices. (A lot of you won't agree with me on that.) We will also feed all of our dies with tongs or spuds, as we will not allow our operators to place their hands between the dies. Of course, we will enclose our blanking dies and use slides whenever we can, and if we must use the treadle we will put a shield over it so that falling objects will not trip the press and injure anyone.

We have a nail keg full of those tongs about every two or three weeks. They cost us thirty-five cents, and we can buy a whole tub full of new ones for one finger. It doesn't do the die any particular harm.

We will also use a board hammer and we must have a pulley catcher and enclose our boards, put on a treadle guard, shield out back action and use baffles for scale and chips. Our men will wear goggles. On our furnace, we will use a water curtain, and the counter poise on our furnace doors will have limit chains and pins.

In our wood department, we will have several machines. One of them will be a mitre saw. It is driven with an enclosed motor. As we will use it for ripping as well as cutting gains, we must use several types of protection. When ripping, we will use a splitter, a shield, and a dog for kick back. When we are

fitted with a Dado head for cutting gains, we will put an over-hang on our cross rail so that the cutter head will not be exposed when the work has passed over the head. On the cross cutting, we will also use the over-hang. If we are cutting blocks, we will open the throat plate and allow the blocks to fall through the table into a box.

Yes, we will need a shaper, so we will make our protection in the form and fit the form with handles. Our clamps will be provided with latches so that they will lock in place. We will also use heavy steel shields and adjust them so that the form will pass freely under them. We will instruct our men to wear goggles when operating these machines.

Our saw tenonner we must enclose and use baffles so that the piece removed will not be thrown out in the aisles.

We will equip our boring machine with a stripper or holding form, and we will instruct our operator that he must not reach in under this protection at any time. Our jointer has a cylinder head, and it is shielded with a fan or slat shield. On our planer, we will have a kick back so adjusted that it will always keep the block or board in the rolls.

Our band saws will have the wheels enclosed, and we will provide a deep slot for the return side of the saw. We will also attach a head guard to the guide roll bracket, so that when cutting close to the line, our operator will not injure his head.

We will have a horizontal or bull shaper. Our men will wear leather aprons to protect them from splinters. We will have a dust proof room where we will spray our paints, so we will equip our booths with an exhaust of the impulse or injector type. The motor will be located outside the booth. The booths will be fitted with temperature release valves, and our men will wear respirators and wash down the booths every day. When necessary, we will scrape the side walls with brass or copper scrapers. We will warn our men to keep everything clean.

As our product is now finished, we will pack and ship it and send it on its way.

Now It Is "Up to the Management"

Now, gentlemen, our next step in the control of this plant is up to the management. What are we going to do about safety? I would suggest in our plant that we have a safety committee of four men, one to be our manager, one to be the factory superintendent, the assistant superintendent and the foreman and our maintenance man, he to be our inspector. We will expect him to check the following items:

Fire hazards and fire equipment; floors, openings, walls; elevated runways and platforms; pressure apparatus; electric equipment; railings, toe boards, ladders; elevators and hoisting equipment and gates transmission equipment; machine hazard, guards, belt; general conditions; first aid; lighting; goggles, respirators; material storage, toilet facilities, hand tools; and we will expect general suggestions.

We will hold a safety meeting once a month. We will review this report and outline what our activities for the next month are to be. That is a very important thing to do. If you put a ship on the ocean and just start it sailing, it will, of course, eventually get somewhere, but that isn't the destination. But, if you will outline and chart a course that you are going to pursue for the next month, you have something to hit at and you have something to endeavor to obtain. That is the reason I put that thought in there.

Men, there is nothing in this talk I have given you, so far, that you cannot do; there is nothing unreasonable. If you have not started, start now.

CHAIRMAN COTCHER: The next discussion is of Safety Committees by H. L. Fracher.

Safety Committees

By HOYT L. FRACHER

Personnel Manager, Detroit Steel Products Company, Detroit, Mich.

The many years of successful operation of "Safety Committees" in the industries of the country is sufficient evidence of their importance in the development of industrial accident prevention programs. The general benefits to be derived from the operations of a successful safety committee are too well known and appreciated to warrant our spending time in the discussion of them.

Our problem, assuming that we accept the premise that safety committees are desirable, is to develop that type of safety committee which meets the requirements of our specific problems.

Safety committees generally may be classified under three broad operating methods: First, the "Employee's Safety Committee" whose personnel includes only workmen. This type of organization is usually found in the larger industries where it forms but one group in a series of committees. Secondly, there is the "Management Safety Committee," comprised of only three persons holding supervisory positions; and lastly, the "Combination Safety Committee," which includes both workers and representatives of management.

The fact that all the types of committees and combinations of committees have staunch advocates is testimony to the fact that no one particular organization plan is all-inclusive. A careful analysis of the purposes to be accomplished by the organization of a safety committee is necessary to the establishment of a proper type of committee.

While safety committees are a great help to plants employing a safety engineer or safety director, I believe that the greatest work can be accomplished by safety committees in plants which are not large enough to employ a safety engineer. I want, therefore, to confine my remarks to the operation of a safety committee which is functioning in a plant of about 900 employees not employing a safety engineer.

The personnel of this committee includes the plant engineer, who is chairman of the committee, chief electrician, chief tool designer, employment manager, one superintendent, two assistant superintendents and the personnel manager. You can readily see the spread of experience that is gathered in this group. This committee has no sub-committees or employees' committees, but invites four foremen and four employees to meet with them at each of their meetings, asking the employees and foremen for their suggestions. These men are also invited to the next meeting to allow them to see what has been done with the suggestions that they made at the previous meeting. In this way we feel that we are creating an interest and making safety missionaries out of each one of the men who attend the meetings. By this method in a comparatively short time a considerable number of key foremen and key employees are brought in contact with this committee and in increasing numbers form the basis of contact for the promotion of our safety program.

If I should attempt to point out the greatest single factor in the success of our committee it would be this: That the committee has final authority on the matters it considers and due to the makeup of the committee recommendations are put into immediate effect. The management had given this committee authority to make improvements for safety up to \$2,500 without referring it to the management for their O. K. This situation brings about two conditions which, to my mind, are the backbone of the successful operation of a safety committee. First, the authority to order desirable recommendations to be carried out; and second, the means to put these recommendations into effect immediately.

Suggestions submitted to the safety committee by foremen or workmen are acted upon promptly and if, in the opinion of the committee the recommendation is not a practical one, the person who made it is advised why his plan could not be accepted. We believe this procedure, combined with the prompt carrying out of accepted recommendations, is very necessary if we are to secure the cooperation and interest of the entire organization in our program. The man who conscientiously and sincerely makes a safety recommendation is entitled to a proper explanation of why the suggestion is not practical, if such is the decision of the Safety Committee.

In conclusion, I just want to restate the two points which I believe to be of greatest importance:

First—Careful analysis to secure the proper type of safety committee organization for the work to be accomplished.

Secondly—Sufficient authority for the safety committee to enable them to properly and promptly execute desirable recommendations.

CHAIRMAN COTCHER: I know you are all here to hear Dr. Myers. I am not going to wait any longer. I now introduce Dr. Harry Myers of the Frigidaire Corporation who will talk to us on, "What Are You Going to Do About It?"

What Are You Going to Do About It?

By DR. HARRY MYERS

Superintendent of Personnel, Frigidaire Corporation, Dayton, O.

Some time ago at a foremen's meeting in a certain city, the program was very, very long. They had a lot of entertainment, gymnasts of one kind or another and lots of humorous things. Finally, I was supposed to talk. I said then to the chairman, "Let's declare an intermission of five minutes and get a rest."

The chairman said, "Aren't you afraid most of the men will leave?"

I said, "If they do, it is because they would rather leave than hear me talk. In that case I would rather they would leave for they are not interested in what I am going to say."

Just let me throw out this hint while I am on that subject. If you are having foremen's meetings of any kind in your city or shop, and you are having somebody come to talk, do not have a lot of miscellaneous entertainment before you have the main address. Do not fill up your program with a lot of vaudeville. Today, it seems to me, a lot of men who are managing meetings imagine they have got to have a lot of vaudeville of some kind to attract people. If they do, then I pray you, let that vaudeville come after the principal address. Maybe that will hold the crowd all the better. Do not ask a speaker to approach a very tired audience. Remember this, the average foreman gets up early, and is tired and ready to go to bed by nine or nine-thirty. If he is too tired, he can't possibly follow the speaker and he can't possibly get any good out of what he says.

My subject is "What Are You Going to Do About It?" When the program committee gave me this subject, I thought it a rather queer one. But if I do say anything which reminds people that things must be put into action, then I am very glad, for unless you act on any idea, will you not agree with me that it amounts to nothing? Will you not agree with me that this whole convention, so far, will not amount to anything unless you take certain things out of here and go home and do them? If you do not take some things out of here and go home and do them you will have been just a bill of expense to your company. Certain it is, if you will take what has been talked over here this morning or any particular part of it, starting with the splendid subject "The introduction of the new employee,"

which was so cleverly presented by Mr. Dunnebacke, it will repay any organization to pay for your time and expense here. And this is only one small part of this great Congress. Many other splendid meetings have been held, so I am just wondering what are you going to take out of all this, and what are you really going to put to work in your plant?

Well, there are a lot of things you are not going to do, because you have a closed mind, and you really didn't get the picture of what was being discussed. There have been a lot of things talked over here in this Congress to which you have said, "Hell, I know better than that; that isn't so." It is the same thing that you encounter in many other meetings. You read or hear many things that you automatically can never do anything about because you keep the idea out of your head with a closed mind.

I wonder what type of an individual you are? I wonder if you are one that people can approach and feel that they are getting their idea over to you, or if you are a man with a closed mind. You have been up against those people, haven't you? Perhaps you have oftentimes gone up against your boss when you have felt just like a rubber ball going up against the side of a big building. You know absolutely when you went there that you wouldn't make any impression because you couldn't even get your idea inside of his skull.

Oh, if we will only recognize this fact, that no idea can possibly do anything for us until it gets into our mind. It all starts from up here in the brain. Mr. Sloan, President of General Motors, is constantly stressing the importance of an open mind if we are going to progress and Mr. John Patterson's favorite slogan was, "We progress through change." Yet this change seems difficult for most people to make and there are two distinct things down in our bone marrow and down deep in the marrow of the race that tend to close the mind. I wonder if anybody can tell me what they are? These two things will guarantee that you won't carry anything in particular out of this convention. Yes, these two things will guarantee that you won't handle a bigger job. They block the progress of the race and thereby block your own progress. They are the tendency to resist the new and the tendency to resent criticism.

Resisting the New and Resenting Criticism

There are a lot of things that have been discussed in this Congress, that you are not going to do anything about for you resisted the idea because it was new. This is a trait of the human race. That's why we say so many times, "Oh, it can't be done." Do you agree with me?

If you want to read an interesting book, read Henry Ford's "Today and Tomorrow." If you do read the book, read that particular chapter, "It Can't Be Done," and see the number of things that were proposed in that organization that people said couldn't be done. One of the most interesting that he cites is that somebody said plate glass couldn't be made in a continuous stream. I want you to follow me carefully. I am going to quote the book almost verbatim. He said: We felt plate glass should be made in a continuous stream. We consulted the glass experts of the world and they told us that it could not be done. Then, we put a group of men to work at it that never had been in a glass plant, and they did it.

What a lesson, ladies and gentlemen! I ask you, is it not a peculiar circumstance, to have somebody come along who has never really been in our line of work and show us how to do something that we said "couldn't be done." I think it is due to this fact, that as we go along, we accumulate knowledge or information of two kinds, that which is true and that which is not. Every once in a while you accumulate more knowledge on the subject that is not true than is and you are

then on dead center; worse than that, you are in reverse. Then, somebody coming along who knows nothing about it can tell you how to do it. But he will have an awful time getting it into your head.

The Outside Opinion

I am just wondering now if you, as safety experts (I don't care what division of safety you are in) are wise enough to get that outside opinion. I was so glad to hear Mr. Miller's paper where he said he goes to the men on the job and gets their ideas. I am just wondering if you do that thing or if you are one of those experts that know it all. I heard the definition of an expert the other day. He is an ordinary man away from home. Some say he is a worn-out fountain ex-purt. That is pretty deep; you have to think that over.

Anyhow, if you are an expert, you don't know it all. One of the wisest things that John Patterson, that great man who did so much for the industry of America, ever said was: "I go to school to every one I meet." I wonder if you do. I wonder if you want the outside viewpoint, I know this: A man from the outside can many times show us things that we are stumbling over. We are too close to them. In fact, it is easy to get so close to a thing you cannot see it.

Just the other day I had my coat off, and Harry Sain, a good friend of mine, said to me, "I think your collar button is too long." I felt for it, and found that it was pushing my collar out, and I had never noticed it, and just think how close I was to it.

The other day my brother Al came to visit me. As I was shaving, he said, "Just leave your brush out as I may want to use it." A little later he yelled out, "What kind of a brush have you got?" I looked to see what was the matter. I will tell you honestly, until that moment I didn't notice that that shaving brush which was once long had been worn down to a stub. I had been too close to it—twice a day.

Isn't that peculiar? It is indeed easy to get so close to a thing that you don't see it and then anybody who is on the outside can come in and tell you about it.

We say to all visitors who come down our way, "Don't tell us just how fine things are; we think those things ourselves. We want especially to know about the things we can improve." This then, always gives us the outside view point.

There are going to be a lot of things mentioned in this convention that are not going to be registered in your plant, unless you have an open mind.

The Open Mind

How, then, can we develop an open mind? This is of greatest importance to all of us.

I wonder if you realize that everything starts from up here, and possibly because you are not doing a good job along this line is due to the fact that this isn't acting right for you.

Glenn Frank, President of the University of Wisconsin, mentions these four points of a fine acting mind: first, humility; second, curiosity; third, courage; and fourth, responsibility. Note how he has them lined up.

Humility, really makes for open-mindedness.

Curiosity, means you actually want to know; the very fact that you are sitting at a meeting this morning, have come to New York, indicates that you want to know something; you are showing that.

Third, courage means you will follow a new idea, even if it upsets all the old ones you had; courage when somebody down in the plant whom you thought never had an idea comes to you with a good idea that you adopt—that takes more courage than to lick your weight in wild cats. If there is anything that closes our

minds, it is when somebody comes to us whom we thought never had an idea in his head, and now has a good one. How we hate to acknowledge that that fellow has a good idea! That takes courage.

Now, responsibility, the fourth thing, the thing that, after you get the idea, after you have courage enough to see that it is right, makes you put it to work. The responsibility that is going to rest upon you to leave this meeting and do something about these things back in your plant.

I don't think I ever heard four points lined up finer than that. If you have an open mind you are going to get a lot out of this meeting. If your mind is closed, there will be a lot you won't get out of it. I am afraid there is going to be a lot lost unless you review some of the things you have heard.

Taking Notes

There is going to be a lot of things that you are not going to do in your plant simply because you are going to forget what was said in this convention. I am pleased to say that at the various meetings I have been in, I have seen more note-taking than any other convention I have ever attended. That is a marvelous sign, people taking notes so that they won't forget.

There is another fine thing you can do, and that is, you can order a copy of the transactions of this congress. I am just wondering how many of you are going to put to work what these fine people who are sitting here are taking down. Some day I am going to ask them how they do that stuff. Did it ever strike you how marvelous that is? I don't know if I will be able to learn it; I may be too dumb. It is one of the most interesting things I have ever seen. Now, I just wonder if you will order a copy of the transactions, study them, and do the things you read. This, by the way, will enable you to benefit by the sessions you were unable to attend.

Do you see what we have discussed so far? We have analyzed a group of things that you haven't done because of the closed mind or perhaps because you are going to forget it. And now let us say that you haven't got a closed mind, that you have it in your notes, or you are going to read it in the proceedings. What are you going to do about those things which you do remember and of which you say, "Yes, that was fine; that will make my shop a better shop,"—what are you going to do about these things?

Well, what have you done about the things to date which you have admitted would make you a better safety director, foreman or manager? What have you done about those things? Here is a question I am very fond of asking of large numbers of people. I have asked it of thousands of people. The answer I get is fairly accurate. What per cent of things you hear or read and admit will make you better and more of a success in life, what per cent do you do? It would be interesting to take that census right here this morning. After taking it with tens of thousands of people, the per cent is just about as good as poor beer. And mark you, I mean Dayton beer and not Detroit or New York beer. There is a difference I am honest about it. The per cent runs from one-half to one per cent. You think that over quietly when you get back home. Ask your wife about it—she may have some pretty good notions on it—and see how you stack up. Then, remember this statement: *That my value is governed entirely by the amount of supervision I require.* Do you get the force of that?

That is why you don't do more than you do, because there is nobody to go along and make you do it. If somebody gets a hold of you and makes you do a thing, that is supervision, and this is what costs money. That ties in exactly with Elbert Hubbard's idea of initiative, "The world bestows its big prizes both in money and honors for but one thing, and that is initiative." What is initiative? I'll tell you it is doing the right thing without being told. But next to doing the

thing without being told is to do it when you are told once. In other words, with the least possible supervision. Hubbard thereby divided the world into three classes, those can do things without being told, those who have to be told once and those who have to be told more than once. The successes of life lie in the first two classes, and the failures of life lie in the third class. Examine your own life and examine the men who work with you, and you will see that this statement is true.

The men who can do things without being told always have good jobs. They are also the last men to be laid off. The men who fail or the men who have poor jobs, are the men who have proved themselves undependable or those who have to be told more than once. You make the application, and see if it isn't true. Every time you have to be told more than once you have joined the failure class on that particular thing. If there are enough of those instances, you do belong in the failure class and you fail and you lose your job.

My value is governed entirely by the amount of supervision I require. If you can take the things out of this meeting and put them to work, it means that you are doing it with a very little bit of supervision and great will be your reward; you will be a success.

Now, let us go a little farther, let us go to the plant. Let us say you are home. Can't you feel yourself walking into the plant? I wonder how many ideas you will still have with you. When you get there and you still have a lot of good ideas, look out. I wonder whom you are going to see first. Of course, they are going to ask you about the Safety Congress. They probably think you had a good time and didn't bring back any new ideas. Maybe you never brought back any information before. Fool them this time. Make the old G. M. smile.

You are back home, you still have some good ideas. You are going to start talking to somebody. Suppose that fellow frowns, for he hasn't the inspiration of this convention. Can't you see him, can't you feel him? That is a tough moment, and that is going to be the deciding thing. There isn't anything that so decides your status as just that proposition. Can you go up against opposition and handle it? Or do you wilt and wither?

I am not pausing particularly for emphasis or because I have run out of talk, but I am pausing because I want you to think about that feeling you are going to have. A lot of you are going to be up against it. Maybe your management is not sympathetic with this thing. How long can you carry this atmosphere and this inspiration that you have got out of this convention? The man who goes up against any type of opposition and gets the thing done, is a live wire. Let me say this: Unless you can go up against whatever opposition you are going to meet, once again this convention is going to fail for your plant. Great is the responsibility of anybody who is the point of contact between an idea and putting that idea to work.

I want you to think about the obligation that is on you, on anything that you are doing when you are the point of contact between the idea and getting it done.

The men in the plant are going to miss a lot of this thing if you fail for any reason, any that I have named or any that we are talking about right now.

Good Teachers

Let us say you have a wonderful plant, and that the folks are waiting for you to come home. You are going to give your various reports to the different committees. Now what? Are you going to be able to present this thing in such a way that that crowd wants to do it? A lot of my good friends sitting in this meeting who have heard me before know exactly what I am going to say next. It brings in this biggest and hardest job that every one of us is up against, and that is the job of teaching others. This is the hardest job you have.

I wish we had two hours to talk on the art of teaching. I am wondering if back in your plant there is an atmosphere of teaching. A visitor came to our plant the other day and paid us a very high compliment. He said, "Of all the plants I have been in, there is more of an atmosphere of teaching around here, more of the atmosphere of college, than any place I have been in my life."

That is the highest compliment that man could have paid our institution. Yes, we try to have an atmosphere of teaching throughout the place. If any of you are interested in this particular phase of our work down there, we will be glad to send you some literature describing it, namely a book, "You and Your Work," which might possibly help you.

How few good teachers there are in the world. If you don't believe it, look over your own life. Some time ago I addressed the State Teachers Association. I guess I was pretty rough. I said to them, "In the last ten years I have talked to a good many groups of people but I have never talked to a group of teachers, and yet I am perfectly at home with you, because your problem is mine and mine is yours. I am just wondering now how many of you are good teachers and how many of you are punk." They all looked at me expectantly. I said, "On the law of averages, most of you are punk." (Are there any teachers here?) I said, "If you don't believe it, look back over your own life and see how few good teachers you ever had." Isn't that so? What does it mean? It simply means, ladies and gentlemen, that the principles of teaching bring to the surface certain elements that are very difficult to find in people.

I wonder what your idea of a teacher is. My idea of a teacher is somebody who can stimulate and direct others. A teacher should provide the inspiration and the enthusiasm. I was interested this morning in hearing the number of times the various speakers say, "You must tell them; you *must* do this." I am wondering if you can say "must" and still be interesting. I want to tell you right here that I have found very few people who can ever say "must" or make a demand that are ever interesting. There is just something about everyone of us the minute we have got to do a thing, somehow or other we don't like to do it. Let me say in all sincerity, that if you are going to go home with any of these ideas and are going to put them over by virtue of your authority, look out! That again will decide your status and the spirit of your organization more than you will ever know. Yes, that will decide your status in life, it will decide the type of man that you are.

In Ingersoll's Tribute to Lincoln there is this tribute to him: "Nothing discloses real character like the use of power. It is easy for the weak to be gentle. Most people can bear adversity. But if you wish to know what a man really is, give him power. *This is the supreme test.* It is to the glory of Lincoln that having almost absolute power, he never abused it except on the side of mercy." Did you ever hear anything more beautiful? Now don't say "must" too hard. Try to be interesting. Don't use your authority too quickly, anyone can do that and no one likes to have it used on him. Somehow or other we don't like to have people make demands on us. Let us try to make this whole program interesting. If finally you fail in that and you have got to say "must," say it, but at the same time admit that you have failed to be interesting, the greatest indictment that can be given against you as a supervisor of any type. Do you think that sounds right?

I wonder how you stack up back home. I wonder if you are interesting. How many interesting people do you know? I wonder if anybody but your wife thinks you are interesting. I say that in all sincerity too. Do you make work interesting to others so that they really want to do it?

There are three thoughts I learned from Mr. Kettering one time on the subject of teaching. I can never go past this point in teaching without laying down these three points. I remember my first work in Frigidaire. My boss told me that Mr. Kettering was going to come in to a class I was conducting, for he is inter-

ested in all sides of development, material or human. Right in the middle of the class one day in he walked. He didn't know what I was talking about. He listened to me for a little while. I happened to be talking about instructions. He jumped to his feet and said, "Do you mind if I talk a bit?" In the next half-hour he told me more about teaching than I ever knew before. I want to pass this along to you and I want you to review it frequently.

The plea I am making is, don't use your authority first; use it last if you have got to. Andrew Carnegie gave us eight words that if he gotten the race to see would have done more for the race than all of his libraries. They are contained in his autobiography, and if you haven't read it, and most of you haven't because I find very few people who have, you should; on page seventy-four, you will find a description of the time that Andrew first had authority. He was put in as a superintendent for two weeks. He abused his authority terribly. Later on, Andrew Carnegie, the great man, the philanthropist, as he looked back over it, saw where he was wrong and comes out and tells us where he was wrong and ends up with these eight words: "Only experience teaches the supreme force of gentleness." "Isn't that wonderful?"

Most people seem so afraid of having an agreeable and pleasant shop. Unless there is an atmosphere of agreeableness and a spirit of helpfulness in your organization, the two biggest factors in production are killed off.

Square that all up now with Mr. Kettering's idea on instruction.

Mr. Kettering's Points on Teaching

Mr. Kettering says you are apt to be poor teachers because instructions tend to degenerate, they do not propagate. You can't tell a man a thing just once and then think it is going to be done. You have got to check up. Instructions themselves tend to degenerate, and the individual, of course, being an ordinary human being forgets and gets lazy and many other characteristics enter that stop the thing.

Second, you are poor instructors because you are apt to teach the last thing you learned and not the first. And that poor fellow is learning it from the other end like you did years ago, I honestly believe this: That in all the things you have got to instruct, if you will go back in your own mind and see what was hard in that thing to you and put special emphasis on that, do special checking on that particular thing, you will clear up many things to the fellow you are trying to instruct.

It is only natural that as you go along and teach ideas on any type of thing, that you are apt to teach the last thing you learned. We are poor instructors because we can't remember how dumb we once were. Nature is very kind to us. It is a very protective thing. If we only could remember that, I am sure we wouldn't be so egotistic.

Mr. Kettering's third point is, "You are poor instructors because you are poor actors." You don't like to do your stuff over and over again in an interesting and entertaining way. He said, "Last night, I went to see Ed Wynn, and he is doing the same darn fool stuff he did three years ago, and yet I sat there and laughed my head off. I thought, What has that cost Ed Wynn to be doing that thing in such an interesting way for three years?" Can you do it three times in the plant and still be interesting? Isn't that a great point? Maybe that is the difference between yours and Ed Wynn's salary. Because he can do the same things again and again and again and still be entertaining.

Can you do whatever you have got to do in that interesting way again and again and again? Or, do you fall back immediately on your authority that you have got and say, with the face of a dill pickle, "Do it this way!"

If you have an open mind, if you receive ideas, if you won't resist the new,

if you won't resent criticism, and if you will carry these ideas back to your plant, and if you can then meet whatever opposition you encounter and go straight along with it and make these subjects interesting and entertaining, I know the greatest possible success can come to you and to yours. And that is the wish I am making for you, and I hope you are making it for me.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Aircraft Sessions

First National Aeronautical Safety Conference

Under Joint Auspices of

*The Daniel Guggenheim Fund for the
Promotion of Aeronautics and the
National Safety Council*

October 4 and 5, 1928

PROFESSOR ALEXANDER KLEMIN, Chairman
The Daniel Guggenheim School of Aeronautics
New York University, New York City

The first session of the Aircraft Division at the Seventeenth Annual Safety Congress, devoted to a consideration of "Structures and Materials in Relation to Aviation Safety," was called to order at ten o'clock by the chairman, Professor Alexander Klemin, of the Daniel Guggenheim School of Aeronautics, New York University, New York City, who introduced the speakers, as follows:

Structural Analysis and Design in Relation to Commercial Aviation Safety

By T. P. WRIGHT

Chief Engineer, Airplane Division, Curtiss Aeroplane & Motor Co., Inc.

In order that aviation may continue to expand and may more rapidly attain the position in our modern civilization which all of us who are actively engaged in its development feel confident it will eventually reach, it is necessary that the public in general become actively interested in its use. This interest must be concentrated on the possibilities of the airplane as an every day carrier of men and goods, and not as means of providing an afternoon of thrills. I believe the most important single feature connected with airplane transportation which can so convince the public, is assurance of safety comparable with that which exists in other means of transportation. Although statistics are frequently cited by the aviation enthusiast, dealing with thousands of miles traveled per fatality and like figures, up to the present time the average man has not been convinced, and probably rightly so, that it is safe to travel by air. Rather than attempt to prove a doubtful case, it is, I believe far better to buckle down to the task of considering all phases of the safety problem, with view to eliminating sources of danger which exist in air

transportation as rapidly and as completely as possible. The urgency of such action emphasizes the importance of the present National Congress on Safety in Aviation.

Safety, by definition, is freedom from danger; any state which is non-hazardous. We cannot expect to witness a truly air minded country until its people are convinced that when traveling by air relatively great freedom from danger exists. Plenty of uses for the airplane will spring up, once its safety is proved. Every indication is that potentially aviation is an economic necessity.

Types of Danger Which at Present Exist in Aviation

The following list classifies the types of danger which now exist in air transportation. The list has been drawn up after studying reports in which the causes of airplane accidents in this and foreign countries have been carefully analyzed. A per cent is given to each item, as obtained by averaging the results appearing in these reports.

(a) Forced landings away from a suitable airdrome or emergency landing field, caused by engine failure. Twenty per cent of all accidents are brought about by this cause. This classification includes engine failures caused by breakage or non-functioning of the engine proper, or of the systems connected with its operation, such as the fuel, ignition, cooling, lubricating, distribution or carburetion. Approximately the same percentage of failures occur in each of the above sub items. The remedy for this source of danger is in providing more dependable power plants; in using multi engined airplanes, capable of flying with one or more disabled power units; and in providing more landing fields throughout the country.

(b) Errors of judgment of the pilot.

Fifty-three per cent of the accidents are marked against this cause. It should however be realized that it is frequently extremely difficult to decide just to which one of a number of contributing factors a given accident should be credited. The pilot may be credited with an accident brought about by design deficiency. Such faulty design may consist of the presence of instability, deficient control or excessive landing speed. It can however, be argued that the pilot realizing these qualities in his airplane, should so fly his ship that accident would be averted. In any event, the remedy for this potent source of danger appears to be better training for pilots and the production of more easily flown airplanes.

(c) Acts of God and miscellaneous causes.

These include chiefly accidents caused by the elements, such as severe storms, lightning, fog, ice formation, etc. Nineteen per cent of the accidents recorded are listed under this heading. The remedy would appear to lie in the establishment of more meteorological stations accompanied by facilities for disseminating the information there collected. Radio will undoubtedly play an important part in accomplishing this end.

(d) Structural failures.

Under this heading are included all accidents brought about by structural failures of the airplane proper, including wings, fuselage, landing gear, tail controls or propeller. Strangely enough, only 8 per cent of the accidents are brought about by this cause. Additional importance should however be attached to this 8 per cent, when it is realized that the percentage of fatal accidents herein is high. The adverse effect on morale of a structural failure is tremendous. It is the type of failure, more than others, which tends to create fear in the mind of the average person witnessing or reading about such an accident, thereby deferring the time when that particular person will

become air minded. One comes in contact in other walks of life with fatalities by lightning, by storm, by errors of judgment in personnel or by other causes which can be associated with items of the preceding classifications. It is however, distinctly novel and unpleasant to say the least, to think of being a mile up in an airplane when the wing drops off.

Having described briefly the general problem of commercial aviation safety and the types of danger which are present, I will now discuss in more detail the last item listed, namely, structural failure, including within the discussion a description of the stress analysis made in developing a design. The object of a stress analysis is to assure the existence of an adequate factor of safety, thus insofar as possible eliminating the source of danger: structural failure.

General Theory of Factor of Safety in Airplane Design and Description of Stress Analysis Methods

The necessity for economy of weight in the airplane structure has an importance in aviation which is unrepresented in the older engineering arts, such as in the construction of buildings, bridges or machinery. As a consequence of the greater stringency of the requirements, it is necessary in preparing a stress analysis for an airplane structure, to make common application of theorems and formulae of comparatively rare usage in the other branches of engineering. The two ever present and essential considerations which it is necessary for the structural engineer to keep before him when designing the airplane structure, are therefore weight economy and structural safety. Realization of the former assures the production of a design which will permit of carrying a relatively large pay load; without the presence in the design of the latter quality however, few if any of the planes so produced will find a market. Any aeronautical engineer has to constantly compromise in developing his design. This necessity for weight economy means first of all, the selection of a low factor of safety, lower, for example, than employed in the designing of bridges and buildings. Greater attention must therefore be paid to the loads to which the internal structure is subjected.

No other vehicle of transportation is subjected to such a variety of changes of motion, as the airplane. Consider, for example, the evolutions gone through in performing a loop or roll. The basis of all rules for stress analysis work in airplane design, is the load factor. This term is peculiar to aviation, and consists of the increase of loading on the airplane wings, when performing a given maneuver, over the normal unit loading which maintains in unaccelerated horizontal flight. For a given type of airplane, it is therefore first necessary to consider what maneuvers it is reasonable to suppose will be executed in it when completed. The next step is to ascertain what load factors can be present during these maneuvers. This last load factor is then increased so as to provide what is known as a real factor of safety.

The distinction between load factor and real factor of safety is extremely important and must be constantly borne in mind. In the older branches of engineering, the largest load which is likely to occur on a given structure is determined and a factor of safety obtained by using this load as a basis for the design analysis and then reducing the strength of the materials employed by the amount of the factor of safety. Ultimate stresses in the material divided by the working stresses in design gives the factor of safety. For bridges, buildings and the like the factor of safety is about four to five. In airplane design it rarely exceeds two and is frequently used at one and one half. This factor must take care of possible defects in material and workmanship; of design inaccuracies; of errors in assumptions and of depreciation. The justification for the use of such a low-factor of safety in a structure such

as the airplane, where freedom from danger is so important, is the extreme care used in selecting load factors; the refinements used in preparing stress analyses; and the care used in selecting and inspecting and testing the materials. It is unfortunately true however, that all the painstaking care of the designer and engineer in improving performance through low weight obtainable in part by use of low-basic load factors, can be nullified, and the whole art in a measure set back, by unthinking pilots who persist in violently stunting airplanes not designed for the purpose; and no commercial airplane based on standard Department of Commerce requirements, is so designed.

Let us next consider the magnitude of the loadfactors which maintain during several maneuvers, remembering that the load factor is the increase in loading over the amount present in straight horizontal flight.

In the following maneuvers, which are used in military airplanes, and which are not usually, if ever, essential to the operation of commercial planes, the accelerations or load factors are approximately as follows:

Dive	3½
Roll	4
Loop	4
Spin	3½
Sharp, pull out from dive	5½

These values were obtained on military airplanes tested with an accelerometer mounted in the plane when maneuvered at Langley Field by test pilots of the National Advisory Committee for Aeronautics. The high speed of these particular planes was approximately one hundred twenty-five miles per hour. It is theoretically possible to obtain higher load factors than the above, the limitations being the power of controls present in the design, the amount of balancing of controls, and the strength and endurance of the pilot. Remember the pilot has the same forces acting on his internal organs that are acting on the wings of the airplane. The point at which a man loses consciousness varies for individuals, from about four or five load factors to as high as seven or eight. The following load factors are present when maneuvering a commercial airplane:

Sharp vertical bank	3½
Bumps (rough air)	2½

It is therefore apparent that in setting the designating load factor for an airplane, considerations of future use and size enter in. A small maneuverable sport plane will obviously be subjected to more severe maneuvering than will obtain for a heavy passenger or freight transport. It may therefor be reasonable to suppose that load factors of the order of four may actually obtain in the former case, and of two and one half in the latter.

The Aeronautics Branch of the Department of Commerce has established regulations governing the load factor requirements for the design of commercial airplanes. The regulations list requirements which differ for various types depending on gross weight and power loading or weight in lbs. per horse power. In each case the load factor varies inversely with the function. The following are the Department requirements which I believe to be well chosen:

(a) Airplanes weighing 2,500 lbs. or less; the load factor varies from $7\frac{3}{4}$ for a power loading of 10 or less to $6\frac{1}{2}$ for a power loading of 20 or more.

(b) Airplanes weighing 5,000 lbs.; the load factor under similar power loading variations to those given above ranges from 5.9 to 5.

(c) Airplanes weighing 12,500 lbs. or over; the load factor under similar power loading variations to those given above, ranges from 5.1 to 4.5.

For other weights than the specific ones listed interpolation is permitted. Assuming that the figures for *obtainable* load factors I gave above are correct (namely 4 for a sport plane and $2\frac{1}{2}$ for a transport) it is apparent that the above regulations permit of a factor of safety ranging from about 1.6 to 2. It must be emphasized that these factors of safety are low even for the basic maneuvers and corresponding load factors assumed. They will become dangerously low and in fact disappear and thereby make structural failure almost inevitable, if more severe maneuvers than those considered as legitimate for commercial airplane use are attempted. Commercial pilots should be impressed with this fact. Others interested in the progress of aviation should realize and disseminate this information as much as possible, as it will admittedly be a difficult task to restrain pilots, particularly those who have had military flying service, from stunting commercial ships.

The load factors just described represent requirements for the design of the wings under high angle of attack condition. This is the condition which usually governs in maneuvering and is used as a basis for comparing the strength of different designs.

Let us now consider some of the conditions other than high incidence and the type of loadfactor applying to parts of the airplane other than the wings. The other conditions investigated in designing the wings are low incidence, corresponding to high speed flight; inverted flight, diving and roll. Under these varying conditions the center of pressure moves along the wing chord thus designing the front beam and truss under one condition and the rear beam and truss under another. The high incidence condition designs the front beam and has the factors above noted. In the low incidence condition, factors are used which are 65 per cent of those for high incidence, with a minimum of 3. Under this condition the rear beam is designed as the center of pressure moves back. For inverted flight and diving, factors are used that are 40 per cent of those which obtain for high incidence with a minimum load factor of 2. The diving condition frequently designs the drag truss. The rolling condition is based on a differential load between the right and left wings, caused by aileron deflections, and designs the cabane system members in a biplane.

The fuselage is designed by the loads transmitted to it from the wings under the above conditions, and in addition by loads from the landing gear, tail skid and tail surfaces. It is also necessary to investigate the fuselage for the effect of propeller torque and so called nosing over condition. The ailerons and horizontal tail surfaces are designed for a loading in pounds per square foot, ranging from 30 to 20 depending on the airplane weight. The same system is applicable to vertical tail surfaces, the loadings however being but 75 per cent as great. The loadings for ailerons and tail surfaces above described are based on pressure distribution tests with real factors of safety included comparable to those which obtain for the wings. The landing gear is designed for load factors ranging from 6.5 to 4.5 depending on airplane gross weight, and under the following main conditions, viz., level landing, 3 point landing, level landing with side load and braked landing. A drop test design requirement is included for landing gears and tail skids. This requirement governs the design of the shock absorber system, and is based on a free drop ranging from 24 to 18 inches depending on airplane gross weight. It is also necessary to analyze the control system. In this case the requirements are based on loads derived from the control surfaces or from the pilot, as the case may be. All details and connecting parts require analysis and design conditions for propellers are likewise laid down. It is thus seen that every part of the airplane is structurally analyzed, specific conditions of design based on tests or experience, being furnished in each case.

**Methods of Obtaining Load Factors for Analysis Assumptions and of
Checking Accuracy of Design Analysis**

Above I alluded to accelerometer tests. A brief statement concerning such tests appears in order. An accelerometer is an extremely simple instrument, consisting merely of a weight mounted on a spring, with a recording device for obtaining the amount of weight movement against the spring resistance, when the weight is subjected to accelerations. Obviously, knowing the weight movement between zero load and its' own weight, when mounted in a maneuvering airplane, the weight movement to the proper scale will record load factors or accelerations directly. It is essential that, as new types of airplanes are produced, they be subjected to accelerometer tests, thus keeping analysis assumptions abreast of the progress made in aerodynamic design, particularly as regards development in control surfaces.

It may be anticipated that, in spite of the utmost vigilance, designs will occasionally be constructed which will fail structurally during severe maneuvers. This brings up the second source of information to be used in studying propriety of load factor assumptions, viz. the study of accident reports. This is perhaps the ultimate consideration, as it represents the realm of experience and actual practice which will always be a step ahead of theory in any science. After sufficient facts have disapproved a given theory, it must be modified to account for the fact, thus giving us a revised theory for future use, with accompanying assurance against a repetition of the type of accident due to the initial set of causes.

Next let us consider the methods used in checking the accuracy of our analysis. There are many uncertain factors which are involved in structural analysis and design, which may vitiate the results obtained by even the most refined methods. Some of these are structural complication; design of detail parts; form factors of structural shapes; strength of materials; fatigue. It is therefore highly essential throughout the period when the structural analyses are being prepared and also after completion of the airplane, that the theoretical conclusions be supplemented and checked by static tests. Before considering in more detail the nature of such tests, a brief statement will be given regarding the uncertain items which make it necessary to check the design by tests.

(a) *Complicated Structure*: It is frequently necessary in developing a design to complicate it further than is desirable from the standpoint of structure only, by the introduction of redundant members, eccentricities and secondary stresses. Analysis formulae are apt to become so involved when taking full theoretical account of these factors as to render them unusable from the practical standpoint, even for the application by airplane structural engineers, who, as before mentioned are far more familiar with refinement of design analysis than are men performing similar functions in other engineering fields. This makes necessary the adoption of approximations which require static test for verification.

(b) *Detail Design*: The design of fittings and follow through parts from one major unit to another, is at once difficult and uncertain. The likelihood of errors creeping in is further strengthened by the very number of such parts and the complication of loads entering each. Improper design of detail parts is, probably the most potent cause of structural failures. The old axiom, "a chain is no stronger than its weakest link" is peculiarly applicable to the airplane structure, wherein the "links" are so different one from another and so complicated both as to design and loadings. In the field of detail design, static tests are, not only desirable, but essential in order to insure structural integrity.

(c) *Form Factors*: Each structural shape has a form factor, by virtue of which failure occurs at lower loads than are indicated by straight application of theory. A wooden "I" beam will fail at a lower load than will a rectangular beam theoreti-

cally designed for the same load but neglecting form factor. The same condition obtains, but accompanied by a different form factor in the case of wooden box beams, riveted duralumin beams or extruded duralumin shapes. Tests only can determine the magnitude of this form factor. As the art is progressing rapidly, bringing about the use of different shapes in almost every new design, no standardization of shapes, with accompanying form factor tables has yet been extensively accomplished, so that static tests during development are essential.

(d) *Strength of Material:* New materials or combinations of materials are constantly being advocated and used. Before adoption of these, extensive tests are necessary in order to assure the adoption of proper strength values in designing with their use in view. Tests are also necessary to check the current strengths of established materials, although these more properly are an inspection function. Tests to assure the efficiency of joints made by welding or other means must also be made.

(e) *Fatigue:* It is well known that all materials, to a greater or less extent, fail at a load lower than the ultimate under normal static application, when such load is repeated or reversed through a long period. There is, however, a fairly definite stress value, below which an infinite number of repetitions can be imposed without causing rupture. This fatigue or endurance limit is particularly important in airplane structures, where vibrations are present. Therefore, parts which are located in the structure so as to receive vibration must be specially designed for the purpose with endurance limit in mind. An example of this is duralumin propeller design. As the fatigue limit of duralumin is of the order of 12,000 lbs. per square inch (as against 55,000 ultimate in tension) and as propellers are subjected to extremely severe vibrations throughout long periods, it is obviously necessary to keep the unit stresses well down to the fatigue limit. The same conditions should be considered in the design of many other members such as wire pulls, motor mount clips, etc.

Several factors have now been described which make it necessary to supplement theory by tests. Let us now roughly classify the tests involved. These are as follows:

- (a) Structural tests of parts to determine satisfactory strength from considerations of loading, of fatigue and of joining.
- (b) Inspection tests to check unit strengths of materials.
- (c) Drop tests of landing gears and tail skids, to check the design from the stand point of shock absorption in landing.
- (d) Propeller whirl test, required because of the complications involved in propeller stress analysis.
- (e) Sand load tests of completed airplane wings and control surfaces to check detail design and basic assumptions made in the stress analyses.

In conclusion under this heading I wish to emphasize that static tests are of extreme importance and must not be neglected. Unfortunately they are costly, for which reason I fear they are not receiving the attention particularly in Commercial Aviation which they merit. Where it is not considered possible from the standpoint of cost to conduct major tests to destruction, frequently it is desirable and legitimate to carry on a proof test to a load of the order of 75 per cent of the design load. This type of testing is now common practice in the case of wires and may be applied to the sand testing of wings and other surfaces if carefully carried out. In such cases danger exists that some parts will be stressed to a point which is higher than their yield point, thus imposing a permanent set and perhaps making them unfit for use. It is however readily possible to properly proof test surfaces and thus assure a slight real factor of safety.

Refinement of Theory and Computations Used in Airplane Stress Analyses

The last discussion emphasized the desirability, and frequently the necessity of supplementing the theoretical analyses by structural tests. Perhaps in gaining the point at hand, the impression has been left that confidence is lacking in the major stress analyses which are made on every design. If such is the case, I hasten to rectify my position by restating the idea appearing early in this paper. In no other branch of engineering is refinement of theory and computations carried out to such lengths as obtained in airplane stress analyses. I doubt if more than two of the previously mentioned eight per cent of accidents attributable to structural failure are caused by the rupture of main members such as beams or struts. The greater proportion of such failures are due to the breaking of detail parts of joints or improper follow through, which is the particular source of trouble most readily discovered by the static test method.

In airplane stress analyses, the fundamental principles of statics, beam theory and strengths of materials which practically complete the required information in analyzing structures found in the older engineering fields, are supplemented by many refinements, such as the elaboration of the ordinary three moment equation to take care of combined bending and compression, known as the Berry formula. Methods of least work and deflection are frequently used also. In addition to the above type of theory refinement, sight should not be lost of the great number of loading conditions which are investigated for each part of the airplane. At the present time considerable attention is being paid to the theoretical aspect of wing flutter and vibration synchronization. I think we can justly be proud of the cleanness of the record as regards structural failures and of the accurate analyses and advanced methods of computations used in designing our airplane structures.

Materials Used in Airplane Structures

The subject indicated by the above heading merits a discussion of far greater length than can well be inserted within a paper of the scope of the present one. However, for the sake of completeness and at the risk of getting slightly off the subject, the principal materials now used, with some mention of their relation to stress analyses, will be enumerated.

(a) *Wood*. This material has been extensively used in the past, although at present its general use is on the wane. It has a high strength weight ratio and is cheap in small production but is not looked upon as of ultimate major importance because of uncertainty of supply, variations in physical properties, inspection difficulties and deterioration in service. However for use in wing beams on fairly small airplanes, it still predominates and will for some time to come. It will probably disappear eventually from general use, as it has in other engineering structures.

(b) *Steel*. This material has the advantage of reliability of physical properties, and for heat treated alloy steels, a good strength-weight ratio. It is at present extensively used for fuselage structures, landing gear structures and miscellaneous fittings. To some extent it has been used for wing beams and more often for tubular beams of control or stabilizer surfaces. It is difficult to predict the extent of future use, although it is certain to maintain its present position and probably increase in importance. Elimination of corrosion is a real problem, particularly for seaplane use, but a satisfactory solution may eventually be presented. Although at present the extensive use of heat treated steel is not looked upon with favor, the future tendency will probably be toward its being used more rather than less extensively. Aside from the fundamental advantage of high strength-weight ratio, heat treated alloy steel has among its physical aspects one which is particularly

advantageous, namely small disparity between ultimate strength and strength at yield point. In a structure such as the airplane where the real factor of safety is low this quality is particularly important, as its presence in a structural material in such a case insures against stressing any part above the load at which a permanent set will take place, a condition which must be guarded against.

(c) *Duralumin.* The predominate advantage of this material is high strength-weight ratio: It is coming more and more into general use both here and abroad and will, I believe be even more extensively used in the future. Its greatest enemies are corrosion and low fatigue limit, although it may be confidently expected that the problem of the former will be solved, and in the case of the latter, no fear need be held if parts are so placed in the structure as to be relatively free from vibration, or if vibration is present, proportioned so as not to be stressed above the endurance limit.

(d) *Composite use of materials.* Although at present many designers prefer structures which are all or practically all, of one material it is probable that in the future, in general, airplane structures which make use of several materials, each chosen as best suited for the particular portion of the structure in which it is used, will predominate. Even now, when a careful study is made of a particular part in regard to function, loading, location, etc., some particular material will automatically suggest itself as being most suitable. Granting this to be the case, it seems inevitable that composite construction will ultimately be generally adopted, as economy of weight is certainly basic in airplane design.

Conclusion Adequacy of Present Analysis Methods

Present analysis methods, such as are recommended by the Department of Commerce as well as the Military Services, are fundamentally sound, giving little cause for adverse criticism. It is also believed that, at least until more standardization of design has developed, there will be little need for change in general methods or elaboration of formulae employed. In so far as fundamental adequacy is concerned, the stress analysis of Airplanes is on a par or ahead of other phases of Aviation. This of course is logical, as the principles involved are derived directly from fundamental methods used by the older branches of engineering. More refinement however, is employed in their application. The soundness of present methods is indicated by the relatively small proportion of accidents due to structural failures, with an even smaller percentage brought about by failure of main truss members. We must not, however, rest on our oars, but must rather watch carefully for signs of error in our methods which may be indicated by such failures as do occur. The greater stress should, however be placed on the analysis and testing of detail parts.

Possibilities of Improvement in Structural Reliability and Safety

In the main structure attention must be given to the necessity which may later become apparent of raising required load factors due to a gain in maneuverability brought about by aerodynamic design improvement. Such condition may quite conceivably arise from the increasing tendency to provide larger control surfaces, properly balanced to relieve the pilot of excessive stick forces. It should be realized, particularly by pilots, that with such control as above mentioned, it is possible to cause the collapse of any airplane designed to present requirements, if the maneuvers attempted are too violently executed. Under these conditions accelerations can probably be imposed which will cause structural failure in advance of rendering the pilot uncon-

scious from the same cause. This brings before us two considerations which require future attention:

First, there must be a closer coordination between the aerodynamic and structural engineers; between the wind tunnel and the stress analysis. By realizing and making use of this coordination, it will be possible to define in advance just how violently a given design can be maneuvered with impunity. A military airplane recently failed in flight during the performance of a violent aileron roll. (The crew made safe parachute landings.) The design of the particular ship had just been changed from its general type of which a great number had been flown and maneuvered safely with the utmost violence. The changes consisted in increasing appreciably the aileron area, and balancing the ailerons at the same time. After the accident, wind tunnel tests were made and analyzed and the structure re-investigated with the result that it was shown that with a stick force well within the strength of an ordinary man, it was possible to cause cabane strut loads far greater than present requirements would make necessary. The result is of course a new set of regulations governing design conditions for roll. Similar coordination in the future may be expected to bring to light other inadequacies in load factor requirements. Other design improvements may arise which will permit a reduction in the severity of design requirements, as for example those recognized by the Department of Commerce in the case of landing gears using oleo shock absorption. Lower factors are here required than are necessary when rubber or springs only are used.

Second, there must be a greater realization on the part of pilots of the limitations of their machines. Each design type must be used only for the purpose intended. It is obviously unreasonable to expect a large transport airplane to withstand the stresses imposed by pulling sharply from a steep dive, whereas a similarly executed maneuver in a pursuit ship would be entirely in order. Pilots should be made to realize that one reason for lower load factor requirement in large, heavy airplanes, is that they are not intended for use in maneuvers that are at all violent. In fact the Department of Commerce does not include within the load factors specified, a sufficient factor of safety to permit the execution of really violent maneuvers in any of the classes defined.

The greatest reduction in accidents due to structural failure will come about by giving closer surveillance to the design of detail parts and fittings. Such part must be properly analyzed, supplemented by carefully conducted static tests. There is a real need for improvement in this field. A recent series of failures on two or three commercial types were directly caused by obviously improper design of fittings. Particular care must be exercised in the design of details in eliminating eccentricities which may not only adversely effect the fitting itself, but also cause secondary stress in main structural members of such magnitude as to render them under strength. Follow through and avoidance of redundant members are principles often violated. More attention should also be given to possibilities of failure due to fatigue and to the allowance for proper bearing area on parts subject to wear. The proper checking of detail design takes a considerable time to perform, and it is therefor important that in laying out development scheduels, sufficient time be allowed so that this important phase may be given proper attention.

The last item which I would like to mention in connection with improving structural reliability, is personnel. At present there are not sufficient competent airplane structural engineers available to meet the demand of a rapidly expanding industry. This situation can only be remedied by turning out men from the universities who are well grounded in applied mechanics and structures. Heretofore these subjects have in general been slighted in the aero-

nautical courses available to such an extent that the industry was able to obtain men better equipped to conduct airplane stress analyses from graduates of civil, architectural or mechanical engineering courses, than from aeronautical courses. Far better results would be obtained were it possible to secure aeronautical engineers with a proper ground work of the structural subjects.

The four main sources of improvement which we may expect in the future, and which will make Aviation safer from the standpoint of structural integrity, are, therefore: coordination of aerodynamics and stress analysis; more general use of static testing; application of sound engineering in the design of fittings and supply by our universities of aeronautical engineers better grounded in the basic principles of structural design and analysis.

Inspection of Airplane Structures and Materials in Construction and Operation

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The invitation to present a paper before this Congress is an honor greatly appreciated. The general subject of Inspection of Airplane Structures and Materials in Construction and Operation is considered under five principal headings, the first being:

Selection of Materials for Commercial Aircraft Construction

The following remarks are not made in an attempt to thoroughly cover this broad subject, but apply only to that phase which is directly related to the safety of aircraft operations.

Such things as cost and adaptability to particular design problems are only touched upon incidentally and insofar as they affect safety. This cannot be construed, therefore, as a comprehensive study of the selection of materials for aircraft design. It is hoped, however, that it will serve to point out the major items which must receive consideration in order to insure dependable and safe air transport.

Omitting, then, all other aspects of the situation, the safety of aircraft materials depends upon three major items. These items are: first, the initial physical properties of the materials; second, the effect of fabrication methods employed in the construction of the aircraft; and third, the effect on these materials of service operations of the completed aircraft.

The initial physical and chemical properties of structural materials should be known to a certainty. An airplane is designed upon the assumption that the materials employed possess definite specified strength properties. If these properties are not actually realized, the airplane will not have the strength and ruggedness necessary to meet all the service conditions that will be imposed upon it.

A great deal of spruce on the market is vaguely labeled "airplane spruce." Specifications as to specific gravity, grain formation and soundness should be adhered to.

In the case of steel it so happens that the market is flooded with so-called "commercial" steel, which is being purchased for use in aircraft. This grade of steel may possess any physical properties below those of S. A. E. specifications 1020. Its physical properties and chemical composition are not guaran-

teed to the purchaser. It is, consequently, cheap and popular. Airplane designers working with steel tubing and steel plate fittings almost invariably assume that 1020 or 1025 steel will be used, and design the member sizes accordingly. If the manufacturer purchases a cheap grade of commercial steel without specifications and static tests he not only lowers the strength of his airplane, but may actually make the machine a distinct menace by unwittingly including members which are brittle or soft, or which contain segregated grain structure and weakening impurities. It is absolutely essential that the full importance of this situation be realized and that definite purchase specifications be combined with a rigid inspection system to insure the construction of safe aircraft.

Drawn steel shapes, such as tubing, are subject to a number of defects which are difficult to discover and which may become serious in the airplane. Hair line cracks, "pipes," and variation in wall thickness, are some of these defects. A crack will open up when the cracked member is subjected to a compressive load and may cause the member to fail. If materials of this nature are selected for use these inherent flaws must be given due attention.

Heat-treated aluminum alloy castings lend themselves readily to odd and complicated shapes but must be used with discretion. They must be of such shape as to reduce to a minimum the possibility of hidden blowholes and like imperfections. Because such imperfections cannot be entirely eliminated, a generous amount of excess material should always be provided in addition to that calculated as necessary for the required strength. Bolt holes which are subjected to reversing loads will, in general, give unsatisfactory results in aluminum alloy castings unless the working bearing stress is very low. Otherwise, the holes will elongate under continued pounding and will induce a failure in the surrounding material. The recommended procedure is to use these castings at points of minor importance where failure will not wreck the airplane. In such places they will be found to be economical and of comparatively light weight and will give good service if properly designed.

With increased production it will be possible to use with decided advantage a hitherto overlooked type of fitting, i. e., that type which is forged. Aluminum alloy and some steel alloys lend themselves very readily to forging and produce fittings which are more reliable, neater in appearance, and in quantity production, cheaper than the present welded type of steel plate fitting.

From the standpoint of fabrication methods, there are a number of factors to be considered in the selection of materials.

If parts are to be joined by welding, the selection of materials is immediately limited to those which weld satisfactorily and still retain sufficient reliability and strength.

Aluminum alloy, for example, welds beautifully but becomes soft aluminum during the process and retains only the strength of soft aluminum.

All steels are somewhat annealed during a welding process, but some are effected more than others. Chrome-molybdenum steel of S. A. E. specification 4130 is probably injured less than any other commonly used alloy steel and is consequently very desirable for members and parts upon which little or no machining is required. This material possesses such high strength properties when heat-treated that it is extremely difficult to machine and form in the heat-treated state. If annealed first and heat-treated afterward, it produces fittings of great strength and reliability. This process is somewhat expensive, however, and sometimes difficult in view of the distortion coincident with heat treatment, hence it is not widely used.

In the matter of fittings it might be noted that the present almost universal practice of forming complicated shapes by welding together flat steel plates has almost nothing in its favor except comparative ease of design. The exces-

sive amount of welding usually necessary, produces burned and distorted material and induces internal stresses that might be of any order whatsoever. These internal stresses cannot be allowed for in design except by providing ample excess material. This consideration is either forgotten, or if taken into account, results in excessive weight. In cases where the internal stresses are of sufficient magnitude, they will result in cracks which can be detected before the fitting is installed in the airplane, allowing the fitting to be scrapped. If such cracks do not appear until after the airplane is in operation the chances are great that they will not be noticed and they may cause a serious accident. This is one case where a rigid inspection during construction is of little or no avail, the only remedy being extremely careful design and first-class workmanship. Such a remedy is, of course, only partial, but will usually result in an airworthy structure.

Another important consideration is the amount of cold working necessary in the formation of the various members and parts. Heat-treated aluminum alloy has to be worked carefully and bends provided with ample radii to preclude cracking. It is usually difficult, if not impossible, to make the forming operations upon annealed material and heat-treat afterward. In designs, therefore, which necessitate violent cold working or sharp bends, aluminum alloy cannot safely be used. The flanging of small holes in aluminum alloy sheet is a source of cracks, and consequent unsatisfactory members.

The effect of airplane operations in actual service is another major consideration which governs the selection of aircraft materials. There have been cases, for example, in some of the small aircraft, where soft bolts or pins were used for hinges on control surfaces. After some hours of service these bolts were so warm that the control surfaces were loose and subject to fluttering. In some cases the bolts were worn nearly half-way through after only about 50 hours of operation and were in danger of breaking completely. This illustrates the necessity of providing both ample bearing surface at hinge points and hard surface material which will resist abrasion.

Another serious situation is found in the corrosive influence of the elements upon aircraft materials. This is particularly true of aluminum alloy, which must be carefully protected. There is some choice in this matter. One product called "Alclad" is an aluminum alloy with a surface layer of aluminum and is extremely corrosive resistant. If the plain alloy is used there are several types of surface coating available. The electrolytic "Anodic" process is in general use and gives good results. Paints and varnishes can, of course, be used and are satisfactory so long as the surface is not removed by abrasion. This type of protection requires constant care and re-application on the part of the operator and is consequently not so satisfactory as a more durable coating.

Steel must also be protected, although the situation is not so imperative in this case because of the slower action of corrosive elements. Paints and varnishes prove quite satisfactory.

When wood is used the action of moisture on glued joints is detrimental to safety and these must be protected by varnish or its equivalent.

To summarize, then, the selection of materials for aircraft construction is guided by the physical properties required for strength, the necessity for obtaining materials of comparative freedom from imperfections, the methods of fabrication to be employed, the nature of the loads which will be applied to the part in question while in operation, and by consideration of the corrosive and deteriorating action of the elements.

The next phase of this subject to be considered is:

A Recommended Method of Inspecting Airplanes During Construction and Assembly

Inspection under this heading resolves itself into four classifications. These are chemical tests, physical tests, constructional inspection and general assembly inspection.

Chemical tests can only be employed successfully when materials are purchased in accordance with definite specifications. Purchase specifications are, however, imperative if the completed airplane is to actually incorporate the safety factors deemed essential by the designing engineer. Cases have come to light, for example, of manufacturers who were using low-carbon steel bolts in the belief that those bolts were nickel steel. Chemical test inspection should be a routine matter of examining a sample from each lot of material received in order to ascertain its accordance with the required composition and to eliminate the possibility of such a dangerous situation.

Since engineers will be charged with determining the strength properties essential to all of the materials which are built into the airplane, it becomes a simple matter to perform routine physical tests on samples of all material received. Usually these tests need only determine the tensile strength and elongation of tubing or sheet material because these properties give an accurate index to compressive bearing, and shear strength. In some cases, bending tests are required in order to ascertain the malleability of certain materials.

Simple tensile tests on fabric and shear tests on sample glued joints should be regular procedure.

In many cases, it is advisable to proof load all special parts such as wire terminals, although it will usually suffice if occasional parts of analytically indeterminate nature are tested to destruction.

If the manufacturer feels that the volume of his business is not sufficient to warrant the added investment of a static test machine, he can purchase the services of a commercial laboratory at small expense. In any event, inspection by static test is essential to safe aircraft production and such a system must be installed in every factory if we are to progress beyond the blind, groping stage.

Other physical tests which are not so recurrent or essential consist of impact tests, immersion tests and corrosion studies. All three of these may be classified with tests of complete airplane units in that they will seldom or never be employed by an inspection section, but will usually be made for the purpose of obtaining design data.

Visual inspection is an art, or science, which requires skilled workmen whose duties are many and varied. It includes both qualitative and dimensional inspection of all the materials and parts which constitute the complete airplane. All inspection, however, covers three definite fields. These are: first, inspection of materials entering the factory; second, inspection of parts and small assembled units; and third, inspection of the complete airplane assembly.

Much material received at the factory cannot or need not be subjected to physical or chemical tests, but can be examined visually with satisfactory results.

Wood should be checked for specific gravity, grain formation, freedom from knots, and soundness before being placed in stock. Metal tubing and sheet should be checked for gauge thickness and freedom from pits, cracks and other defects.

In the matter of constructional inspection, there are as many specialized functions as there are types of construction. In general, however, the inspector will examine parts for accordance with the subject drawings and for defects of workmanship and assembly.

In welded construction the welds themselves must all be examined to determine that satisfactory fusion has been obtained. In addition, the assembly must be inspected for signs of burning, cracking and distortion.

The inspection of welds can be satisfactorily accomplished only by personnel who have had long training in that particular phase of aircraft construction. A good weld depends upon the perfect coordination of so many factors that anyone of a fairly large assortment of defects may appear. These defects, of course, are not always serious so that it becomes the duty of an inspector to determine the character and degree of any variation from perfect fusion.

A weld may be ruined by improper proportioning of the oxygen and acetylene in the torch flame, by using too broad a flame, or by laying the welding material on the joint without sufficiently pre-heating the parts to be joined. Each of these types of imperfections produces its own characteristic effect upon the completed assembly.

If the welding flame used has contained too great an amount of oxygen in proportion to acetylene the steel around the joint will show an oxidized or burned effect. The outer surface of the steel adjacent to the weld will be scaled and pitted. This is the worst type of poor welding that will be encountered.

A carbonized weld is produced when the welding flame has been provided with insufficient oxygen. The excess carbon produces an effect which is usually but faintly discernible, in which case it is not serious. A slightly carbonized weld is but little less efficient than a perfect one. If the welder has used too large a tip on his torch the effect will be a large area of annealed material adjacent to the weld and some burned material in the immediate neighborhood of the joint. This type of weld can be detected by the bluish cast of the material within a radius of an inch or inch and a half of the weld.

If, on the other hand, the parts to be joined have not been sufficiently pre-heated, the welding material will not form a smooth fillet at the joint and will have quite definite rounded corners, showing that fusion has not been obtained. Where this is the case, the joint will have very little strength.

These remarks apply particularly to oxy-acetylene welding, that being the method in most common use. Electric welding is usually more dependable and is not subject to as many defects, with the result that it is beginning to replace the torch method and will probably continue to do so as fast as the industry becomes acquainted with its advantages.

In wooden construction, the inspector looks for splits, poor glue adhesion and poor workmanship.

A glued joint should be looked upon with suspicion if some of the gluing has not been squeezed out at the sides of the joint. This would tend to indicate either that insufficient glue had been used, that the glue was allowed to become too hard before pressure was applied, or that the joint had not been adequately squeezed.

The necessity for using proper glue and gluing practice cannot be too highly stressed. Casein glue, for example, is more widely and improperly used than any other kind. This glue must be used within four hours after mixing to produce the desired results. The mixing, itself, is an operation which requires considerable care as it is essential that there be no lumps in the glue and at the same time, that the process of stirring and dissolving the lumps introduces no air bubbles or foam into the mixture. A foamy glue will produce a joint that is marked with air pockets and consequently lessen the efficiency of the joint, while one which is lumpy will prevent an even pressure over the surface of the joint and thereby prohibit adequate adhesion.

In riveted construction the most recurrent flaws are cracked or misshapen

rivet heads. Holes may be out of place and too near the edges of parts or the rivet squeezing might cause cracks to appear around the hole. An aluminum alloy rivet might be used in place of an iron one, or vice versa.

The soldering of wire terminals, the serving of cable terminals and splices, the sewing and fastening of fabric and the quality of brazed joints are a few of the miscellaneous constructional details which require inspection.

The next and final phase of inspection concerns the major assembly units. The purpose of this type of inspection is to insure that all units are properly assembled.

The clearance between bolts and bolt holes is a commonly overlooked point that should be covered at this time. At points of reversing load the life of an airplane may be said to vary, within certain limits, inversely as the clearance allowed for connecting bolts. If these bolts are loose they will pound out the holes in a short time and so distort the fitting as to create a dangerous situation. It is essential that such holes be reamed to close limits if a serviceable airplane is desired.

The inspector will also ascertain that all nuts are properly safetied to prevent their backing off and that clevis pins are all fixed in place by cotters. He will check the tautness of tierods and wires and will see that they are taped at points of intersection to prevent chafing.

Another very important point that appears to be a common difficulty at the present time is the chafing of moving members against fixed parts of the structure. For instance, if the aileron control tube were allowed to rub against drag wires or wing ribs, it is natural to expect that after some hours of service the control tube might be so badly worn as to be no longer safe and require replacement. Such a condition has actually existed and should, of course, be prevented by the designer. In any event, however, an efficient inspection system will prevent the designer's error becoming serious.

The power plant installation is an important part of the airplane and is sufficiently complex to merit a great deal of the inspector's time, but as this subject is covered by another paper it will not be discussed here.

Final inspection is given the aircraft after complete assembly. This should not be superficial in any sense of the word, but particularly thorough with attention to parts that require safetizing and to the working of the control system. An aircraft should not be test flown without the factory inspector's final approval and a stamp or tag denoting its service status affixed.

To summarize briefly, an efficient factory inspection system can be divided into three distinct groups whose functions are more or less sharply defined.

The first group will examine incoming materials and will combine chemical and physical tests with visual inspection.

The second and largest group will inspect detail construction and workmanship, and the third group will conduct assembly inspection.

As any one of a thousand details may be fatal to aircraft safety, it is essential that all points be covered and that the aircraft industry realize the futility of attempting to manufacture satisfactory aircraft without a staff of efficient inspectors.

In order to promote safety in aircraft operation, the Department of Commerce has developed an inspection system which provides for a rigid inspection both in the factory and during operations.

This system consists of an Engineering Section for the purpose of checking stress analysis and design data, an Inspection Section to carry on inspection in the factory and the field, a Liaison Office to coordinate the work of these Sections, Supervising Inspectors, Factory Inspectors and Field Inspectors. Chiefs of Sections and Liaison are located in Washington; the subordinate groups are all in intimate contact with the industry in the field.

Materials and specifications are accepted which conform to those of the United

States Army or Navy, the Society of Automotive Engineers or other recognized standards.

Although approved specifications as to materials should be adhered to, it is obviously impractical to develop general design specifications, as in the military services, that would be applicable to the many types of commercial aircraft. There are, however, certain stipulated requirements to be met by a manufacturer of commercial aircraft, propellers or engines, before his product is considered eligible for an Approved Type Certificate. These requirements serve not only as a guide to the manufacturer, but also provide definite limits of safety to which his product must conform.

Discussion of the practical application of a Federal inspection system inevitably leads to consideration of the personnel involved. A factory inspector must possess particular qualifications:—previous experience, ability, good judgment, and sincerity of purpose. He must be familiar with both general and detailed methods of construction from the blue-print to the finished product. His recommendations and reports are forwarded to the Chief of Inspection Section in Washington.

In order that some details may be checked in operation, field inspectors are sometimes notified that certain parts be watched under operating conditions. This information often proves of particular value to the manufacturer.

Although Government and private inspectors work independently, there should be a unity of purpose and complete cooperation between them. Such dual inspection system will not only result in a saving of time and money to the manufacturer but will also give assurance to all concerned that the machines produced are structurally sound.

The Federal factory inspector first definitely ascertains whether the raw materials as used by the manufacturer conform to the materials assumed in the original design of the aircraft. This includes metals, woods, glues, material coverings, protective coverings and all other materials incidental to the fabrication of the aircraft.

Stock is checked over and its specifications noted and checked against the purchaser's invoices. Samples are chosen at random for a determination of their physical and chemical properties and static tests are made at frequent intervals.

Constant inspection is made during the various stages of fabrication of the aircraft. The methods used, the workmen, the workmanship and the machinery are all under careful scrutiny. Details of design and physical dimensions of the airplane parts are checked to see that they conform to drawings.

The next to be noted are the materials used by the manufacturer in guarding against corrosion. This applies to the outside surface of internal members, the inside surfaces of dural and tubing members, and the protective covering on the external surfaces of the aircraft.

The Air Commerce Act of 1926 requires that all aircraft engaging in inter-state commerce be licensed. Since airworthiness is one of the pre-requisites to license, a given airplane which satisfies other Federal requirements becomes eligible upon passing the final inspection.

Licensing is facilitated by the Government factory inspector's assigning commercial license numbers to machines as they come off the production line.

When an aircraft is ready for delivery, the inspector accepts, in proper form, an application for this license in the name of the owner. He then installs in the license holder, clearly visible within the aircraft, a temporary license card. This authorizes operation pending receipt of the permanent license card issued by the Department of Commerce from Washington, D. C. This application for license, together with the inspection report, is forwarded to Washington for record and the aircraft is ready for service.

The next subject to be considered is:

Operations Inspection

In operation, after license, the Air Commerce Regulations require that the aircraft be subject to the following series of inspections which assure its being kept in an airworthy condition. The owner or licensed airman must satisfactorily complete the first three inspections while the latter three are completed by the Federal inspector.

Daily Inspection:

After an aircraft is licensed and between the times that it is inspected for airworthiness by a Federal inspector, the owner is charged with the continuous duty of maintaining it in a good and proper state of repair. The owner, or a licensed mechanic, must give the aircraft a line inspection at least once within each 24 hours preceding flight and the result entered in the log book over the signature of the person making the inspection. This inspection covers the control system, landing gear, propeller, motor and accessories, together with a warming up test, instruments, fuel and oil lines, cooling system, fuselage open to visual inspection and accessible rigging.

Inspection after 100 Hours of Operation:

After each 100 hours of flight, the airplane must be given a "periodic inspection" by the owner or operator and the result entered in the log book by the person making such inspection. This is a more detailed inspection to ascertain the condition and state of repair of the engine installation, propeller alignment, complete control system, fuselage complete, and main plane assembly.

The Quarterly Report:

This report serves as an excellent check on operations of the aircraft and previous inspections. The pilot's personal log book may also be used as a further check on operations. The owner or operator of every licensed aircraft must keep a navigation and engine log book and quarterly transmit to the Secretary of Commerce a navigation summary report in duplicate, showing the number of hours and the approximate number of miles the aircraft has flown during the quarter, the duration and the use of each engine, the engine installation and repairs, and the plane structure and rigging changes and repairs. Both aircraft and engine log books are required to be in the airplane when it is away from its home airport.

Accident Reports:

The Department of Commerce requires that all accidents in the operation of licensed aircraft be reported without delay. After repairs have been made following the accident, the owner makes a full report of the kind and extent of repairs. It cannot then be flown again carrying passengers for hire or reward until it has been inspected by a Federal inspector and found to be airworthy.

Relicensing:

Upon the expiration of the term of an existing license, the aircraft may be relicensed after it has been inspected by an inspector of the Department of Commerce and found to be airworthy.

The inspections covering operations made by the owner or operator are for his protection and the protection of passengers carried by him. For this reason, he will generally make these inspections to the best of his ability. In many cases, however, due to the owner's unfamiliarity with the subject, lack of time, stress of operations, or costs, he may neglect repairs, which though seemingly unimportant at the time may result in later damage, or injury to personnel.

Suggestions from Operations Inspection as to How the Manufacturer may Increase the Structural Reliability of the Airplane

In the performance of his duties, the field inspector is especially well qualified to make recommendations toward improving the structural reliability of the airplane. In his practical flight test with many applicants for pilot's licenses, he will have flown most types of commercial aircraft. His detailed inspections covering nearly all types will have included many inspections of some one type.

In many cases, inspectors have found serious defects in structural design that, though not apparent in the original drawings nor detected during factory inspection, appeared after operation in the field. These defects are followed through until the difficulty has been remedied. In several types of light planes, inspectors have found that wheel spokes were soon loosening under service. Stream lining was removed from the wheels on the occasion of each inspection of these planes, thereafter, in order that the spokes might be examined. In nearly every case, the owner was not aware that such a condition existed, having reasoned that his plane was too new to need an inspection of the spokes. Again, through constant inspection of types, inspectors have found that the rear fuselage construction of a certain type of plane is such as to make inspection of the rudder wires and the elevator push-pull rod exceedingly difficult.

Investigation showed that controls were interfering and not receiving proper lubrication. Subsequent inspections of this type of plane indicated that this condition existed in all models.

In this particular case, the inspector suggested to the manufacturer that an inspection panel be added to future planes to permit proper inspection of control units at that point and also to allow maintenance during operation. It is quite obvious that parts which are inaccessible will not receive the attention that they should, but that such parts when inspected and serviced occasionally will give better service than those which are not.

The cases mentioned are only a few of many found in the field during inspections. It is only through continuous inspection during operations that such defects are discovered and suggestions made to the manufacturer which enable him to improve his product.

In his daily personal contact with many operators and mechanics the inspector obtains opinions from as many points of view, and taken collectively this information passed on to the manufacturer may be of much benefit to him.

In his investigation of all accidents of a serious nature, the inspector occasionally finds it advisable to send some parts of the damaged airplane to the Bureau of Standards for analysis. The manufacturer is, of course, advised of the findings, and without this investigation it is doubtful whether such information would ever have been available to him.

In most cases, it is quite apparent that the manufacturer does not at the present time have enough contact with his product after it has been sold and sent into operation. His present volume of sales does not warrant his having field personnel for the purpose and his dealers are too few and his planes too widely scattered for such information to be gathered and returned to him in time to be of value.

It seems evident, therefore, that only with a complete system of inspection both in the factory and in the field will it be possible for the manufacturer to obtain all information essential to his increasing the reliability of the airplane and only then when regulation is provided which guarantees a definite standard of safety.

Suggestions as to How the Operator May Maintain the Structural Reliability of his Craft

By selecting the best possible maintenance and operating personnel; by using the best of materials for servicing and repair; by a thorough inspection system; through proper maintenance methods and through adequate housing facilities.

In the operation of aircraft it is vitally important that the best of personnel be selected. This holds true for the success of any enterprise, but it is especially true in Air Transportation. Mistakes made by personnel must be detected and eliminated before damage results. The mechanic must not only be thoroughly qualified for his work, but must be entirely dependable as well.

Good maintenance requires that equipment be taken care of before it actually needs attention. The aircraft should be "serviced" at the completion of a day's work. Such details as completely filling the fuel tanks so that condensation does not result is only one of many known to a good mechanic. The craft should be cleaned at the first opportunity, removing mud, oil or grease from the covering. Servicing is completed by cleaning and adjusting the engine and its accessories and making such changes in the aircraft as may be necessary. Detailed inspection is usually completed before the next flight together with a warming up of the motor and a check of the instruments. In operation, the use of the best oils and greases is not only cheaper in the long run, but also results in increased reliability.

Engine and aircraft log books should be accurately kept. The latter is a record of operations and shows inspections and overhaul, as well as parts replaced during any given period.

Housing is also important in maintaining good equipment. Hangar facilities should be provided to keep the aircraft out of the weather whenever it is not in use.

Summarizing briefly, the selection of materials should be carried on with the utmost care. An adequate inspection system should be maintained in the factory and by operators in the field, and the manufacturer should be kept constantly advised concerning the result of operating conditions upon his product.

It may be thought that the Federal inspection system, although not outlined in detail, is nevertheless over-stressed in this paper, but as it has been arrived at only after much experience and careful study it is considered a worthy guide to private practice.

In closing, it is urgently recommended that factories that have not already done so, institute their own inspection systems, following the general principles laid down in this paper, that inspectors employed report directly to the manager of the plant and not to a foreman or production manager, as they should not be influenced in any way by a tendency to speed up production at the expense of rigid adherence to safety standards. It is my opinion that insofar as material is concerned "inspection" is virtually synonymous with "safety" and that in the last analysis practically all material failure can be traced to faulty inspection.

Commercial Airplane—Structural Reliability from the Operator's Point of View

By WESLEY L. SMITH.

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Structural reliability in commercial airplanes has gradually increased, due to our advance in Aeronautical Engineering, so that commercial airplanes very seldom have structural failures in the air. This however, is not true of commercial airplanes on the ground, since most of our structural failures have to do with the

Airplane in landing, taxiing, or taking off. It is a paradox to say this, but it is nevertheless true, that if commercial airplanes or any other airplanes, never made contact with the ground, they would probably last forever. I might point out in this connection, that so called flying accidents are in the majority of cases not flying accidents, but accidents that happen after the flying is finished.

Structure of the Airplane

Let us consider the structural reliability of the commercial airplane, taking each important unit of that airplane in turn. Starting at the front end of the airplane, the first unit to be considered is the propeller. Propellers are very easily damaged in accidents, but the actual cases of structural failure are very few. In order to fly through rain and sleet and to taxi on fields whose surface is composed of cinders, sand or gravel, the propeller must have a metal leading edge from the hub to the tip of each blade, if the blades are of wood or of that composition known as "micarta." A propeller whose blades are of duralumin, needs no such protection, although it is subject to considerable pitting and wear from loose abrasive material that may be on the surface of a flying field.

Duralumin blades have a very good feature; that they bend instead of breaking. In any but the worst crashes, bent blades can usually be straightened and placed back in service, but this process is a difficult one which requires annealing, straightening and then heat treatment. There are not enough service stations throughout the country equipped to do this work, probably because the necessary equipment is rather expensive. The increasing use of this type of propeller, will probably provide the necessary business, so that there can be more of these service stations.

Some of these propellers that have duralumin blades, together with those that have micarta blades, have a steel hub and the pitch of the blades in the hub may be varied when the propeller is assembled. This is a good feature, enabling the same propellers to be used at maximum efficiency on engines of the same horse power, but in planes whose speeds, loads, and other operating conditions vary. This type of propeller, however, needs further engineering work on the steel hub. These hubs have a tendency to loosen after 1,000 hours or so of flying and means of locking the hub against this loosening is not satisfactory at present.

Cooling System

When the plane has a water cooled motor, the next unit to be considered is the radiator, and radiator leaks are structural failures which are quite common. These may be eliminated in part by properly mounting the radiator on shock absorbing material and by being careful not to pour hot water into a cold radiator when the temperature is below the freezing point. This latter procedure causes rapid and unequal expansion in the radiator, resulting in leaks.

In connection with the radiator, I might also mention the radiator shutters which are necessary, to properly control the engine temperature. If the radiator be mounted directly behind the propeller, considerable difficulty will be encountered with structural failure of the shutter blades. I have not yet seen an airplane with a radiator mounted in this position, which did not need to have the radiator shutters re-designed in order for them to stand the whip that they receive from the close passage of the propeller blades, at high speed. Shutters on the so called tunnel radiators or on radiators mounted above the engine, do not suffer such heavy casualties, probably because they are further removed from the propeller.

Where shutters are mounted on a nose radiator, the blades are usually too thin in cross section and have too great unsupported lengths to prevent flutter from the propeller whip.

These shutters must be controlled from the cock-pit and in flying under icy condi-

tions, they must be opened and closed frequently to prevent their freezing into a solid mass thereby causing the motor to overheat. The usual type of shutter control is not strong enough to stand this sort of usage or to exert enough force to break the shutters loose, should they freeze solid.

The Power Plant

Power plants are being discussed by others in this session, so consideration will be given here only to power plants as they relate to the airplane as a structural whole. The most common structural failure in any airplane is a power plant failure, though with our latest power plants when properly serviced, failures occur at the rate of about one for each 100,000 miles of flying. Most of these failures are not in the engine itself, but rather in the accessories; one of the most common ones being failure in the plumbing, which includes water, gasoline and oil lines. These sort of failures can usually be eliminated by the elimination of solid connections. If each pipe that connects the various parts of the power plant or the power plant to the airplane is broken somewhere in its length and a rubber hose connection inserted, or rather placed over a metal sleeve that covers the two ends of the pipe, these sort of structural failures are practically eliminated.

This metal sleeve should be brazed fast over one of these two ends and fit slightly loosely over the other end. This will prevent any rubber from getting into the lines, will permit the rubber to absorb the vibration, and does not reduce the size of the line, as do the more commonly used olives, which fit inside of the two pipe ends.

Air cooled engines eliminate the radiator and shutter troubles but all of the present air cooled engines are designed with the air intake directly under the plane. This feature makes it impossible to take off on snow covered fields, because the propeller fills the carburetor with snow. In the summer this location of the air intake causes a great deal of abrasive dust to go directly into the engine and causes excessive wear on all internal moving parts. We have found it necessary to add an air scoop through the top engine cowling and piping to the carburetor, to eliminate these troubles. The carburetors on air cooled engines need to be redesigned, so that the air intake goes through the top cowling instead of through the bottom.

Tanks

Fuel and oil tank leaks are structural failures, which do not occur as frequently as heretofore, when such occurrences were common. The complete mastery that the Industry seems to have attained in building these tanks out of aluminum seems to have practically eliminated this sort of a failure.

While it has not been proven by tests, it is very probable that the use of aluminum fuel tanks has eliminated a definite fire hazard that was present in steel fuel tanks. This of course is for crashes, where the steel is liable to send out a shower of sparks. We do know, that our Airplanes that are equipped with aluminum tanks have not had as many fires in crashes as those that had steel tanks, so that the saving in weight which the aluminum tank provides is not its only good feature.

Cowling

A very common structural failure, though not a serious one, is the failure of the various cowlings on any airplane. I have yet to see the airplane on which the cowlings themselves and their fasteners are strong enough to stand the wear and tear, that is their lot. Some of these cowlings fail purely from vibration in:

the air stream and others fail from their constant removal and replacement in servicing the airplane.

All cowlings should be designed as rigid units in themselves, so that their shape does not depend upon the way they are fastened to the fuselage.

Landing Gears

Since most of the structural failures of the airplanes occur on the ground, it would be natural to suppose that the landing gear would be the part to fail most often. This was formerly the case and it used to be a very simple thing to break any landing gear with a rough landing. The introduction of the Oleo Shock Absorbing Unit has practically eliminated landing gear failures. This unit which is almost universally used now on every modern airplane, absorbs and dissipates the first hard landing shock. Night flying operations with heavily loaded planes and high landing speeds, such as we now have in commercial aviation, would hardly be possible without the Oleo gear. The Oleo gear has, however, added new maintenance problems since the viscosity of any oil varies with the temperature. Proper maintenance requires the use of a light oil in winter and a heavier oil in summer, together with a periodic elimination of leaks.

For taxiing, taking off, and any but the first shock of landing, the landing gear must also have another shock absorbing unit, which may be either an air cylinder, a spring or rubber in either tension or compression. Rough frozen ground and the use of concrete run-ways, make the work of these units very hard. They usually do not fail, but may reach their limit, coming against some sort of stop and then transfer to the other members of the airplane, forces that they are not designed to take, with the result that we have structural failure where the landing gear attaches to the fuselage. The growing use of a smooth sod surface on airports will gradually eliminate these sort of failures. In general, there is need for more shock absorbing action in this secondary landing gear unit, to absorb the stresses involved while the plane is taxiing on rough ground.

Tires and Wheels

Tires and wheels are very important units of the landing gear. I believe it is safe to say, that wheel failures have been practically eliminated. Tire failures, due to structural failure in the tire itself, are also practically eliminated. Airplane tires are constantly exposed to the weather and get very little actual use, so that they do not wear out, but rather rot out from this constant exposure to the weather. The Oleo Unit in the landing gear has probably eliminated the great percentage of the failures that we used to experience in tires and wheels. Larger tires and wheels are now being used, than was formerly the case for the same load and this has probably done a great deal to eliminate these failures.

Ice Formation

The wing structure of an airplane is the unit that carries most of the load most of the time, and yet in these modern days of aeronautical engineering, wing structural failures happen probably less than structural failures in any other part of the airplane. If the airplanes have external wires in the wing truss, these are a constant source of structural failure in flying through weather conditions where ice forms on the airplane; the wires, being metal, radiate heat faster than does wood or fabric and as a result, these wires are the first parts of the airplane on which ice forms. This ice formation is seldom uniform, with the result that vibration results and these wires break, forcing the airplane down long before the weight of ice accumulated on the plane as a whole, would accomplish this result.

Each one of these wires is usually in duplicate on the plane, so that the pilot has some little time for his landing after the first of a pair of wires breaks. Were these wires not in pairs, we would probably have many serious accidents each winter. In night flying, it is rather hard to see broken wires and our pilots have many times completed trips by sheer good fortune, with part of the wires broken, and unconscious of this fact. Unless we can find some means of keeping this ice from forming on the airplane, it is almost a foregone conclusion, that airplanes whose structure requires external brace wires will vanish from the commercial field, where regularity of operation must be maintained regardless of weather conditions.

There is also a tendency in designing airplanes with external struts to make these of uniform section and thin wall, with the result that these struts are apt to suffer from vibration in flying under ice forming conditions, and also, such struts are apt to buckle in hard landings. More thought needs to be given to the design of external struts in airplanes, when these are necessary, to eliminate the failures that I have just mentioned. These struts need to be designed so that their cross section at any point is ample to meet the stresses that the strut may encounter at that point. The wooden struts that were in use before the tubular strut became common, were always properly built in this respect and never gave us the trouble that we have encountered with these tubular struts of uniform section.

The Fuselage

The advent of the welded steel tube fuselage and those of duralumin have practically eliminated what few structural failures there were in fuselages. Even in the early days of flying, there were few cases of structural failures in the fuselage. The new types of fuselage construction are however, much stronger and suffer a great deal less from crashes. They have the added feature that they are much easier to repair after a crash, than were the old stick and wire fuselages. There is the one thought however, that flying which depends on any sort of a magnetic compass or even the Earth Inductor compass, is handicapped greatly by the possibility of a welded steel tube fuselage becoming magnetized, even while the airplane is in flight, so that it seems that for this reason alone, our ultimate airplane will need to have a fuselage of non magnetic structural material.

The Tail Skid

The tail skid or tail wheel assembly is an equal sufferer with the landing gear in taking most of the punishment and hard usage, that is the lot of any airplane. Where a tail skid is used, structural failures on rough frozen ground are quite common. I am not aware of any tail skid unit that has yet been designed that meets the test satisfactorily in all cases. The addition of brakes to our airplanes makes possible the use of a castor wheel instead of a tail skid and I believe that the impending universal use of this wheel instead of the tail skid is going to eliminate the failures at this point. It is common, where a tail skid is used on frozen rough ground, to have the shock absorbing unit of the tail skid fail, or reach its limit, and for the forces then to cause failure in the rear end of the fuselage, because they are applied on members not designed to take such forces. The period of thawing and freezing that we usually get in Spring is the one in which we encounter these conditions of rough frozen ground. The ground is cut up by the landing gear and tail skid during the thawing period and these ruts freeze solid to cause all of our grief when the next freezing arrives. Proper maintenance of Airports might eliminate this, but the periods of thawing and freezing may follow each other within a few hours and the removal of all ruts from the flying field in this short period of time is well nigh impossible as well as almost prohibitive in cost. As the sod on our flying fields gets older and thicker, this source of structural failure will probably disappear.

Control Surfaces

Control surfaces very seldom suffer from structural failures in commercial airplanes that are doing ordinary flying. This has been so since the day of the first commercial airplane, but there is always the danger with control surfaces and even the wing structure itself, that some enterprising young aviator may attempt acrobatics such as only military airplanes are designed to stand, with resultant failure of either wings or controls. Commercial airplanes are designed with safety factors that are usually adequate for all commercial operations, but there will always be danger of structural failure, when pilots attempt military acrobatics with commercial airplanes. The Department of Commerce has taken a very firm stand on this point and very justly so.

Controls that are operated by wires, operating over pulleys, are apt to suffer from structural failure of these wires as they gradually wear in going around the pulleys. Proper maintenance in changing these wires at the first signs of wear will eliminate this, but the more proper way of doing this will probably be to design the airplane so that the controls will not operate by wires, which must pass over pulleys.

Fuel Tank Vents

One of the serious errors that is made in designing airplanes, is to leave the vents to fuel tanks exposed, so that they will easily become sealed with ice, or even dirt. We have had forced landings from such cases as this. All vents need to be placed so that they open into free air, but at the same time are protected against ice and dirt.

Conclusion

As a general thing, there is room for great improvement in the design of commercial airplanes, in providing more accessibility to parts that need service and replacement and also to parts that need frequent inspection, such as the various controls on the airplane. At the present time, our mechanics spend almost as much of their time getting at the things that they have to do in the daily servicing of the plane, as they do in the actual service work.

General Discussion

CHAIRMAN KLEMIN: The meeting is now open for a general discussion of these interesting papers.

JOHN BONFORTE (Airways Extension Superintendent, Department of Commerce, Washington, D. C.): I would like to ask Mr. Smith to give his opinion as to the proper location for a pilot in a passenger airplane.

MR. SMITH: The best location would depend on several things, where the passenger plane is to be used, and whether the plane has a single engine or several engines, and whether it is capable of sustained flight with one engine out of commission. I believe, first and foremost, that the pilot should ride ahead of his passengers, as a general thing. We should not be carrying passengers unless we are carrying them under conditions of the utmost safety, and if anybody should be injured it ought to be the pilot.

C. W. HALL (Hall Aluminum Aircraft Corporation, Buffalo, N. Y.): Mr. Wright brought up, without referring to it particularly, one feature of aircraft design that we have inherited from the time of the wooden structures, and that is, designing for ultimate loads rather than designing to yield points. Wood, of course, has no definite yield point, and the practice probably arose from that. But in going into metal construction there seems to be many advantages in designing

to a definite load factor which might be less than the nominal load factors in current use, and not stressing any part of the material over the yield points. That would certainly assure a perfectly definite safe condition up to the design loads.

It would also allow of a considerable amount of proof testing of finished planes. That would serve to check defective material and is not a very expensive thing to carry out.

Several references have been made to the corrodibility of the strong aluminum alloys. Of course, all common metals are subject to corrosion. I doubt whether we will ever have a common structural metal that will not be more or less subject to it. This year's experience in using the pure aluminum coated strong alloys under the name of "Alclad" is very encouraging in that respect. It seems to be almost immune from the troubles that we have been more or less used to. Mr. Wright also referred to continued use of wood for wing beams after other parts have been constructed in metal. It is sometimes suggested that wing beams are more difficult to build in metal, but I do not think that this is really true. Mr. Wright also referred to the likelihood of composite structures being used. In almost all other lines of structure we are getting away from combinations of wood and steel or Monel metals and steel or other combinations, which have all been tried out in yachts and automobiles. We are getting back to building our structures of a single material throughout, so far as it is feasible. I think the same thing is likely to be true in aircraft.

In Mr. Howard's paper there was some reference to the difficulty of forming aluminum alloys and the necessity for heat treatments intermediate to forming operations. It is not always appreciated that intermediate heat treatments on aluminum alloys are very much like those applied to other metals; that is, unless there has been quite a large amount of cold work done, one simply coarsens the material by intermediate heat treatment. It seems to me it is more logical in such cases to buy the material in the hard condition, not having been subjected at any time to a solution heat treatment, and give the solution heat treatment immediately before forming, rather than start with annealed material and getting through a beginning operation.

BURKE E. WILFORD (Philadelphia): I would like to ask Mr. Wright what method has been found of insulating vibrations from the fuselage.

MR. WRIGHT: With the water-cooled engines there has just been introduced in the mounting some rubber composition. This, I think, is not adequate. I think the coming thing will be an entire rubber insulated mount. Our recent efforts have demonstrated the practicability of this method, in that we have arranged our motor mounts so that they were entirely surrounded by rubber, and this seems to reduce vibration to a great extent. I think with more experimental work and development of more suitable grades of rubber the transmission of motor vibrations to the rest of the structure can be eliminated, and I believe it will be, probably within a year or two. But I think a great many of the most recently developed automobiles have entire rubber swathed engine mounts, and I see no reason why we shouldn't follow suit. I might add that wooden mounts have been used for minimizing vibration with great success. In lots of ways wood seems to be almost ideal for absorbing shocks. But, nevertheless, I believe that the rubber mounts will ultimately be used.

C. E. NOORDYN (Atlantic Aircraft Co., Hasbrouck Heights, N. J.): Mr. Howard stresses the superiority of chrome-molybdenum steel tubing in a paper devoted to safety. Of course, it is clear to engineers that as far as safety is concerned it can be attained with low carbon steels just as readily as with chrome-molybdenum steels. It is only a matter of the stresses employed. As a matter of fact, I have seen some cases lately which led me to think that there might be some disadvan-

tage to chrome-molybdenum. It seems to crack up in a different way in a crash. I have always felt that we probably learn more about airplanes in the examination of a wreck than from ordinary operation. I have seen lately a chrome-molybdenum fuselage which had a brittle appearance close to the welds in the section made of low carbon steels and several breaks a few inches or so away from the welds. Perhaps in fifty per cent of the cases they were a few inches away from the welds, and in the other they were in the middle of the column. In column failure the chrome-molybdenum is not of much advantage as there is little difference between it and the low carbon steel tubing in strength.

With regard to Mr. Smith's paper, I do not think he has sufficiently stressed the fact that in the latest type of plane, all the difficulty he has met through all those years have been very largely eliminated. Those things that he has described are absolutely the troubles that occur, and they are the ones that the designers who want to give the present purchasers the benefit of that experience have attended to in their latest designs.

R. A. FOWLER (Miller Corp., New Brunswick, N. J.): The designer may calculate a flying wire to take a certain load. But this does not necessarily mean that that wire is going to be sufficiently strong from the maintenance point of view. The designer of today should study very closely the maintenance problems of airplanes.

The question of load factor is certainly very important. The load factor requirements of the Department of Commerce are higher than the military requirements. From the military point of view, the high load factor is maintained by good work in the field. On the other hand, the designer of the commercial plane is confronted with improper maintenance on the field, which is due largely to the lack of competent personnel to carry on the inspection that this needs.

G. P. HERRICK (New York City): I would like to ask Mr. Smith if he feels that the position of the high wing or the low wing had any bearing on the reliability of the structure.

MR. SMITH: I will have to answer that by saying that on the New York-Chicago line we have had no experience with either high or low wing monoplanes.

CHAIRMAN KLEMIN: I would like to ask Captain Carroll what he thinks the safety factor of an airplane is at the present time.

THOMAS CARROLL (National Advisory Committee for Aeronautics, Langley Field, Va.): Load factors due to acceleration have been measured of as high a value as five and a half. We have actually measured in some of our experiments load factors as high as eleven, but this has been in relation to extremely high speeds. But it does seem that the factors which were given by Mr. Wright are those found in ordinary commercial practice. We, therefore, would have to consider our safety factor as one and a half or two.

There is one item that is interesting and that we have been working on, and that is the problem of ice formation and its solution.

The formation of ice on the plane is exactly as Mr. Smith has said, first noticeable on the wires. We have done a considerable amount of work at Langley Field in a study of that problem. By using altitudes to find the selection of proper temperatures and clouds to provide the proper humidity, and we have been able to collect ice almost at will. We also have a wind tunnel which enables us to collect ice on various surfaces. We are studying preventive measures, but it seems to us that the solution of the ice problem is largely in avoiding it.

We have found that ice collects in a region very close to thirty-two degrees Fahrenheit; it is only within a degree or two on either side. It is unusual that it occurs at temperatures other than those in very close proximity to that temperature. Therefore, it is our suggestion that all planes be equipped with an air temperature gage which is visible to the pilot and which will apprise him of the fact that he is in a dangerous temperature area, and then it is quite probable that

he will have a greater opportunity to look for clouds and fog. I believe we all feel that the avoidance of ice formation is the ultimate solution.

MR. SMITH: I would like to say to Mr. Carroll that we equipped one of our airplanes with a thermometer and found that we got ice when it was fourteen below zero and all the temperatures up and down. I think the problem is a deeper problem than you realize or than any of us realize.

LIEUT. E. DICHTMAN (U. S. Army, Dayton, O.): I would like to get the airplane designer to make the inspection of the airplane. He puts in little inspection doors that become dirty and that you can't even get your hand into. If the engineer would occasionally attempt to absorb the operator's viewpoint, attempt to conduct an inspection of the airplane, he certainly would be more intelligent when he got back to his office.

E. P. LOTT (National Air Transport, Inc., Chicago): There is one point which Mr. Wright brought up about the load factor in commercial airplanes. He mentioned that the load factor of two and a half can be expected in normal bumps in commercial aircraft and that three and a half can be expected in vertical turns. It seems to me that greater shock can be expected in rough air than one ever gets in a plane in vertical turns.

CHAIRMAN KLEMIN: I would like to comment on Mr. Lott's remark that he thought in bumpy air the stresses might be greater than in a maneuver. We have experimental evidence obtained by Lieutenant Doolittle that the stresses in bumpy air are nowhere near the magnitude it is possible to impose by violent and premeditated maneuver. I think the order of magnitude of the heaviest bump he got in a flight between Philadelphia and some place over in Pennsylvania was the order of two, whereas he got eight in getting out of a dive.

MR. LOTT: We have in some cases broken wires on ships in purely rough weather, and I don't recall any broken wires in vertical turns. I think the shocks brought on a ship in rough air are greater and do more damage than any smooth flying and vertical turns that could be carried out in ordinary service.

MR. WRIGHT: I think there is a good deal in the point that Mr. Lott brings up. It may be that in a biplane, if it is rigged rather loosely, so that the landing wires slacken up considerably when the wires are under a normal tension, that in bumpy air there is a whipping that causes a, perhaps, greater load than we realize. But, in general, I believe that the action of acceleration does not exceed two and a half in bumpy air.

There was one point I wanted to mention in connection with dirt and designer's inspection. I recently had the pleasure of flying across the country as mechanic and assistant pilot, and I am sure the company got a lot of good out of it, particularly in the matter of cowl fasteners.

There was a point which Mr. Hall brought up in regard to designing to the yield points in contradistinction to designing to the ultimate strength of the material, which I think is very well taken, although I don't yet quite see how it can be handled. It is also connected with the matter which Mr. Noordyn mentioned as to the desirability of alloy steel, and which I brought out in the paper is desirable because there is a smaller disparity between the yield point and the ultimate strength in a heat-treated alloy steel.

There is no doubt, as Mr. Hall brings out, that the factor of safety is directly connected with the yield points rather than with the ultimate strength, as almost any structure, if it is stressed to any great extent over the yield point, will give permanent set, which will cause loads in other members, not accounted for in design, and therefore cause failure.

I don't agree with Mr. Noordyn in regard to the use of chrome-molybdenum steel. I believe there is a real weight saving by using chrome-molybdenum steel, and it is going to come more into use in the future. It can be welded just as satisfactorily as low carbon steel, and I believe that the cases he cited were probably

peculiar to the particular welding rather than to the fact that they used chrome-molybdenum steel.

Regarding Mr. Howard's paper, I certainly wish to endorse the opinion that commercial firms should adopt inspection methods and hire inspectors to the same extent or almost the same extent that military manufacturers have been required to do in the past. I think the whole game is going to suffer very decidedly if the grade of inspection is permitted to deteriorate.

Someone voiced the opinion that likely government control over airplane manufacture would tend to increase rather than decrease. I think that would be unfortunate if that were to occur, but the best way that the commercial manufacturers can avoid additional government control is by adopting the proper inspection and design methods which should obtain in any structure as delicate as the structure of an airplane.

F. J. D. FULLER (White, Weld & Co., New York City): I am a layman and I want to know how safe the airplane is under the worst possible conditions to which I could subject it.

HON. W. P. MACCRACKEN, JR. (Asst. Secy. of Commerce for Aeronautics, Washington, D. C.): I will tell Mr. Fuller that not only is it difficult to find a common factor of expression of safety, but the unfortunate part of it all is that these engineers have different ways of figuring their factors of safety. That really makes it very difficult to reduce it to any common denominator which you can use in conveying the idea to the layman. All that we can do is to try to arrive at factors of safety which we believe will make the airplane safe, otherwise we don't approve it. But when it comes to the relative degree of safety between types of planes, it certainly is impossible to do it unless you take the only method that I know of that is infallible, which is the trial and error method; that is, drop testing your planes and testing the construction of every member and factor of it. When you do that you are going to increase the cost and tend to decrease improvements in design, because if the manufacturer knows that every time he makes an improvement in design that design has to be tested to destruction, he is not going to be so ready to make the improvement, for that is a very expensive method.

CHAIRMAN KLEMIN: Structural failure is very rare. If you follow the load factors as laid down by the Department of Commerce, the Department of Commerce approves your plane. You are reasonably safe in having under commercial use at least a safety factor of two and probably more. All planes designed by competent men and turned out by good manufacturers have about the same degree of safety. There is nothing much to choose between if they have passed the Department of Commerce.

Now, if you want to commit suicide in an airplane you can always do it by breaking the structure in a violent maneuver.

W. C. NAYLOR: One of the most important advances that I know of is the Oleo shock absorber. I have figured out the other day that if a plane is fitted with Oleo shock absorbers with a stroke of twenty-four inches, you can come out of a flat spin without hurting your ship, providing, of course, that the ship is not going too fast. An ordinary flat spin landing could be taken up by a twenty-four inch stroke. I have seen Oleo shock absorbers ride across frozen ground with a six-inch rut, and the riding qualities of the ship are one hundred per cent better with such shock absorbers.

I have seen the old type of tail skid going across frozen ground, and you hear a report like a rifle and look out and see the tail skid go shooting out across the field. The application of a tail wheel helps matters considerably.

Some of the manufacturers have gone even farther than that and have incorporated the Oleo with the tail wheel.

Mr. Wright brought up one very important point, and that is the application of rubber to the motor mounts. To date, I believe the Ford Company has used one motor mount incorporating four rubber supports. In other words, the steel motor mount as in use today has four cylindrical rubber mounts on each leg. Although this ship has not had a great deal of service, indications point that it will be far better than the ordinary fiber or wooden mount. In the smaller type ships, where four, five and seven cylinders are employed, that is particularly applicable. Vibrations produced by a five or seven cylinder engine are naturally much in excess of those nine-cylinder engines. Torque vibrations in particular are very excessive, and we have the problem of eliminating this vibration. The real trouble lies in the engine itself, and vibration should not be transmitted to the rest of the plane.

MR. SMITH: I would just like to say to Mr. Noordyn and the rest of you that it isn't all brief. We operate a regular schedule as near as anyone can do that, and we couldn't do that if we didn't have planes that we could use regularly. I mentioned a lot of things that are wrong. There are also a lot of things that are right. I think we are making progress in aviation, and there is nothing for anybody to get worried or excited about in our present healthy state of growth. It is just that we who are operating them want to see the perfect airplane, and I think we are getting it.

C. W. MORRIS (Student in Aeronautics, New York University): I would like to ask Mr. Smith one question regarding the tail unit. You spoke of using the tail wheel instead of the tail skid, and you also spoke of airports that have a spongy sod. Don't you think that when they do have a spongy surface like that, that we will have to use a wheel instead of a skid, because the skid is more liable to tear up the surface of the ports, particularly with concrete construction?

MR. SMITH: Of course the tail wheel does present a problem on the muddy field. In regard to the use of the tail skid on a sodded field, it is a matter of what sort of a shoe you put on that tail skid. You can put a proper shoe on the skid that will not disturb the sod. So far as the concrete is concerned, it has been my observation that most airport operators wish they did not use concrete.

ADJOURNMENT

Aerodynamics

DR. S. W. STRATTON, Chairman

President, Massachusetts Institute of Technology, Cambridge, Mass.

The Aerodynamics Session was called to order at two o'clock by Dr. S. W. Stratton, President of the Massachusetts Institute of Technology. Two papers were presented "The Desirable Aerodynamic Characteristics of an Airplane from a Safety Point of View" by Professor Alexander Klemin, and "The Desirable Flying Characteristics of an Airplane from a Safety Point of View" by Thomas Carroll.

Dr. S. W. Stratton in opening the meeting said:

"I have long been interested in safety engineering and have kept in fairly close touch with aviation, as a member of the National Advisory Committee for Aeronautics. During the war, and especially in the period that followed, we were appalled by some of the accidents that occurred and the committee undertook to encourage and promote safety in aviation in every way possible. This was not an easy matter. I remember quite well when even the safety council considered this as entirely beyond its province, although it has now taken it up with interest. Safety is the most important problem in aviation, and the greatest impetus that it has had is through the Daniel Guggenheim Fund, which is largely responsible for this meeting."

Desirable Aerodynamic Characteristics of an Airplane from a Safety Point of View

By ALEXANDER KLEMIN

**Professor of Aeronautical Engineering, Daniel Guggenheim School of
Aeronautics, New York University**

The aerodynamic characteristics of an airplane which are desirable from a safety point of view are clearly understood by designers, and the literature of the subject is extensive. In the following notes, an attempt is made to recapitulate these characteristics and to recall the various aerodynamic and design methods at our disposal to secure such characteristics.

Slow Landing Speed

Three or four years ago, opinion both in England and in the United States seemed to be that the airplane had for the time being reached the useful limit of speed. One of the British Civil Aviation reports announced the design of a freight carrying machine with a pay load of 8 pounds per horse-power which was to have quite a moderate rate of speed, well under 100 miles per hour. But at the present time, American planes of all types, whether small two seaters, four or five passenger cabin monoplanes, or large three engine transport planes, sell largely on speed and quite rightly so. High speed is the main justification of the airplane, and a most important factor in its economic success. To secure speed, high power, perfect streamlining and small wing

area are the three essential elements. In the race for performance, designers will always be tempted to increase the wing loading.

It can never be insisted upon too often that safety demands low landing speed.

To achieve low landing speed by very low wing loadings is undesirable. Low wing loading means decrease in top speed, larger dimensions in every way, higher structural weight, and increased cost of construction.

Low wing loading may also be highly undesirable in gusty weather. If the speed is low at the instant of landing, and a powerful head-on gust strikes the plane, there will be an instantaneous increase in lift which may raise the plane a considerable height above the ground. The subsequent drop may be highly dangerous. A plane with very low wing loading is also liable to damage when on the ground in high winds, although the experiences of a private owner of the English light plane, the Widgeon, recently described in *Flight*, seem to contradict this view. Other arguments in opposition to low wing loading may be readily cited.

On the other hand low speed is highly desirable when making an emergency landing, particularly in rough ground. There is no doubt also that slow landings will be far more welcome to passengers than landing at the speed of an express plane.

It would seem desirable to give a pilot the choice of either a moderately high speed or a very low landing speed by the incorporation of some device to increase the maximum lifting capacity of the wing.

In an article in *Aviation*, the author has discussed a variety of such devices, and in the light of subsequent information is even more convinced that the utilization of some such device is bound to become a matter of commercial practice in spite of the complication and increase in weight which may be entailed.

A classification of such devices includes: variable area; conversion of a monoplane into a biplane with very low gap/chord ratio; variable camber; an auxiliary tandem wing; a front slot of the Handley Page type either manually or automatically controlled; rear flaps; combinations of slots with variable area; the use of rotating cylinders in conjunction with an airfoil; prevention of boundary layer detachment by artificial suction or ejection of air; and the use of airfoils of very high maximum lift.

It is impossible to say which of these devices will ultimately be adopted, or whether other interesting devices may not be forthcoming. At the present time it would seem that the use of the rotating cylinder is impracticable. Varying the camber is a cumbersome process not justified by the comparatively small results achieved. Methods of suction and ejection are at present in the laboratory stage only. The use of rear flaps alone does not give a large enough increase in lift. Variable area wings give splendid aerodynamic results, and have actually been used with some degree of success in flight. The utilization of this aerodynamic device depends solely on the mechanical skill of our designers.

The use of the front slot alone, while it may be very interesting from the point of increase in lift, offers the drawback that this increase in lift is achieved at a very high angle of incidence. To take full advantage of the front slot it is necessary to design a stilt like chassis, which means an increase in weight and head resistance. The front slot in combination with a rear flap, may be made to give an increase in lift of nearly 100 per cent, and the use of the rear flap brings down the angle of incidence of maximum lift to quite reasonable values. Particularly when the front slot is automatic in action, the use of a front slot plus a rear flap (which also may be automatic in action) seems highly promising from the point of view of slow landing.

Short Landing Run

While there may be some difference of opinion as to the desirability of low landing speeds, there can be none as regards the desirability of a low landing run.

As we know, very satisfactory results have been achieved with wheel brakes, and their importance cannot be overestimated. When wheel brakes were first introduced it was thought that they would produce a serious danger as regards nosing over. In practice it has been found that a slight forward displacement of the wheels relative to the center of gravity is sufficient to obviate such danger. The forward movement of the wheels imposes a slightly heavier load on the tail skid, but apparently no difficulty is experienced in raising the tail off the ground. The provision of a small wheel at the rear of the machine avoids all danger of tearing up the surface of the airdrome when taxiing.

Entire reliance cannot be placed on the wheel brakes because the coefficient of friction with locked wheels may vary with different ground conditions. It is by a judicious combination of the wheel brakes and of aerodynamic characteristics that the best results will be achieved.

The use of air brakes is a clumsy expedient, although it has often been suggested. One suggested form is that of flaps at the sides of the fuselage, to be swung out and back at the instant of landing, by means of cable control. The area required is so large as to become impracticable. Swivelling struts have been employed on an Italian machine, but the extra air resistance they would give is too small to be really helpful.

A spoiler on the wing, however, in the form of a narrow flap placed on the upper surface of the wing at its center has been shown to be very effective in diminishing lift and increasing drag.

With a machine unprovided with lift increasing devices, the only methods available to the designer are diminish the landing speed by using large wing area or wings of high lift, or a combination of both, and to make the chassis of such length that the plane can be set down beyond the stalling angle. Beyond the stalling angle the lift drops off so that the ground reaction disappears, while at the same time the L/D of the wing diminishes very rapidly. There are obvious limitations to the extent to which these expedients may be used.

Landing directly from a stalled steep glide, so that a considerable portion of the velocity is vertical, and there is a large landing shock, is a powerful method of shortening the run, provided the undercarriage will stand it.

Where lift increasing devices are used much more powerful aerodynamic braking effects are obtainable.

For example if rear flaps are used, they may be depressed after landing to an excessive angle. A manually controlled slot would be held open, prior to landing and then closed. Both these operations would tend to decrease lift and increase drag.

In tests with machines equipped with flaps, the effect of flap manipulation on length of landing run has apparently been small, but with greater experience on the part of designers and pilots their breaking characteristics will be found to have real importance.

Fine Gliding Angle

The desirability of a fine gliding angle is obvious. With an engine failing suddenly on a cross-country flight, the gliding radius increases as the gliding angle diminishes, and therefore the chances of finding a suitable emergency field are increased. Another argument, however, for a fine gliding angle is often overlooked.

With a fine gliding angle, the angle through which the plane has to be turned before making a landing is small and the longitudinal control necessary is also small. The effect of misjudging the height on landing is less serious. A machine landing on a very gentle glide, without flattening out is not so liable to severe damage and nosing over, as one landing from a steep glide. The methods of attaining a fine gliding need not be discussed. They are mainly a matter of good wing section, and refined streamlining.

The author has had the privilege of wind tunnel testing a number of commercial airplanes in the last four or five years. It may be stated that the maximum L/D of such designs has increased roughly by one point in each succeeding year. A maximum L/D of 8 would have been considered quite a reasonable value for a single engined commercial biplane with open cockpit in 1922.

At the present time, a single engined enclosed cabin design, supported by a cantilever monoplane wing, with a cantilever chassis, careful cowling of the engine, filleting of the wing to the body, a well streamlined body, tail surfaces worked in nicely to the fuselage, tail skid nicely streamlined, shock absorbers entirely hidden in telescopic strut or body or wheel, wheels carrying a streamline cover, engine and accessories so designed as to lend themselves to a good nose, should have an L/D in the wind tunnel of at least 12. Nor should this high maximum L/D be accompanied by an undue increase in structural weight. Skill in structural design has kept pace with improvement in streamline. Tapered cantilever wings for example for machines of medium size should weigh no more in pounds per square foot than an externally braced biplane of the year 1921.

The De Havilland Tiger Moth, the Lockheed Vega, are but two of the many examples of refined streamlining in commercial craft which come to mind.

Further aerodynamic progress in airplane design, apart from the attempt to employ lift increasing devices on the wing, will lie in such detail refinement. In particular a great deal of progress may be expected from the use of in-line air cooled engines, completely cowled in, with well planned entrances for the cooling air and from a study of the air flow after it has entered the fuselage and is suitably guided to exits. A fruitful subject of research lies in the study of the nose of cabin machines, in reconciling aerodynamic requirements with the requirements of good vision. Interference between parts, wings and body for example, is also a subject of great possibilities for both wind tunnel men and designers.

We may venture the prediction that a commercial airplane of the future will be as carefully streamlined as a racer.

Good streamlining has other relations to safety besides that of providing a good gliding angle. Increase in speed is always helpful to safety, since gusts affect a machine less the faster it flies. Also with good streamlining, maximum speed can be maintained with larger wing area and consequently lower landing speed.

Steep Gliding

The value of a fine gliding angle is not disputed by designers or operators. Opinion is somewhat divided on the desirability of an aircraft being able to glide down steeply and slowly, with its nose slightly above the horizon. It is the author's opinion, after very careful consideration, that such a characteristic is highly desirable and will sooner or later be incorporated in the design of commercial airplanes.

There is one contingency which is dreaded in commercial flying, and that is being forced to land when enveloped in a dense fog.

In air mail work, the obvious resort is that of making a jump in a parachute. There are a number of jumps on record in such circumstances, and mail has been recovered under such circumstance, although the plane has crashed badly. In passenger air transport, with three or more engines, it is to be hoped that power

plant failure will never be encountered. But in the single engine cabin monoplane, engine failure in fog is bound to be encountered sooner or later; and resort to jumping on the part of the passengers is very improbable.

Under such conditions, an airplane which can glide down slowly and steeply, with its nose above the horizon, will furnish a very important degree of safety. From such a glide no recovery should be needed, provided a long enough shock absorber travel is provided. The plane should land in the very attitude of the steep glide, and providing the landing is made in any sort of open space, the chance of accident will be very much diminished.

The steep slow glide should also be very useful when an emergency landing is to be made in a small field with obstacles, such as trees or telegraph poles.

In such a case the pilot has several alternative plans that he can follow. He can glide down in a fairly steep dive, and flatten out to a high angle of incidence very rapidly just before reaching the ground. This may result in a "zoom" or in excess speed at a high angle of incidence, in which case the plane may float a long way close to the ground. Evidently such a plan is undesirable. Flattening out from the dive to only a moderate angle of incidence, means a two point landing at high speed. It is then difficult to apply the brakes violently, and the emergency landing field may again prove far too short for safety. Again the pilot may elect to make a perfectly orthodox landing, convert his steep glide into a gentle glide, and then flatten out to the conventional three-point attitude. This also may bring him dangerously near the end of the field. In the hands of a very skilled pilot maneuvers such as spiralling down tightly, fish-tailing, or side slipping may be resorted to. But we do not believe that such maneuvers are desirable when a plane is carrying passengers cross-country.

If the steep, slow glide can be achieved with control suitably maintained, we believe that it will offer the solution of a real difficulty.

Apart from the question of maintaining lateral control on the slow glide (which will be dealt with later), there are a number of difficulties in design to be met.

If the glide is steep, say 16 degrees to the horizontal, the vertical velocity is apt to be very high unless the stalling speed of the airplane is low, say round 38 miles per hour.

Therefore the steep, stalled glide is only likely to be of value if some lift increasing device such as that employed for slow landing is incorporated.

Even if lift increasing devices are used on the stalled glide landing, a considerable amount of vertical velocity remains to be dealt with. Therefore designers will have to provide a large shock absorber travel to prevent damage to the plane.

Yet another difficulty in the stalled steep glide is that of actually maintaining it.

The modern airplane if reasonably well designed has when trimmed for cruising, a powerful diving moment at high angles of incidence. This is as it should be and is a safeguard against stalling. In gliding beyond the stall, the diving moment increases rapidly because the center of pressure on the wings moves back. In wind tunnel tests it is frequently found that even when the elevators are turned up to their maximum extent, it is impossible to bring the machine up to the angle of incidence corresponding to maximum lift.

British full flight experiments indicate that even when the stabilizer is turned down at the leading edge to its fullest extent and the elevator turned up to the fullest extent, it is impossible, on many machines, to maintain steady stalled flight without moving the center of gravity back by the use of water tanks. Increasing the total area of the tail surfaces will not help, since the inherent stability of the plane is thereby increased.

Designers who wish to develop a machine capable of maintaining stalled flight will find it necessary to provide a rapid adjustment of the stabilizer through a larger angle than usual, and to increase the proportion of elevator to total hori-

zontal tail surface area. Such provision will also help in securing slow landing speed.

If a front slot and a rear flap are employed in a design, the difficulty of maintaining a stalled glide will probably be greater still because in such a case the wing becomes relatively more powerful in its lift and moment producing characteristics than the tail surfaces, and because rear flap depression may mean a backward movement of the center of pressure of five to six per cent of the chord. The probability is that when front slot plus rear flap are employed in a design, increased tail surface area will have to be provided, as well as rapid stabilizer adjustment and increase in the proportion of tail surface area.

Designers who wish to make their machines achieve a slow glide at 16 degrees or more to the horizontal will also find that the average machine is far too efficient at high angles of incidence. The L/D of the wing is likely to be 7 or 8 at maximum K_y and opening the front slot will rather tend to improve the L/D. Parasite resistance at low speeds is small relative to the wing drag, and the provision of air brakes is futile. To use a spoiler on the wing, such as discussed in relation to length of landing run is not sound; the spoiler may increase the drag, but it will also decrease the lift. We believe that for slow steep glide the use of depressed rear flaps will be found absolutely necessary, whether the front slot is used or not.

It may be interesting to recall that experiments by Anthony H. G. Fokker in a Fokker D VII and by Captain De Haviland in a Moth equipped with slotted ailerons indicate that steep stalled glides can already be realized on some machines without difficulty, and that the under carriages of current practice are already not far from meeting requirement.

Short Get-away Run

There is no argument possible as to the value of a short get-away run, and it is quite clear that our modern airplane still has far too great a get-away run. While calculations of the get-away run are not made frequently, the factors involved are quite generally understood. The requirements are

- (1) a low flying speed, obtainable by methods analogous to those necessary for getting low landing speed.
- (2) aerodynamic efficiency increasing the acceleration with a given thrust.
- (3) a geared down large diameter propeller.

It is quite clear also that a variable pitch propeller would be extremely useful in making a quick get-away.

Steep Climb

For military work rapid climb is absolutely essential. For commercial purposes, steep climb is much more important, since this means the ability to get out of a small field surrounded by obstacles. Observers at a flying field always misjudge the steepness of a climb. Particularly when a fast machine is climbing into a head wind, observers are apt to liken it to a helicopter. As a matter of fact, in calm air the angle of climb of an average machine is not likely to exceed fifteen degrees, and just skimming the top of a hangar is a spectacle too often witnessed at a flying field.

Lift increasing devices cannot be used to increase steepness of climb. Once the machine is off the ground, climb will be better with slot closed and flap in neutral, since the profile drag is thereby diminished and the induced drag is mainly a matter of span loading or aspect ratio, and for steep climb a large aspect ratio is most helpful.

Again climb depends on the weight carried per horse-power, and as in many other aspects of airplane design, lightness of structure is of prime importance.

Structural failures in the air are now so rare, that it is now probably more important to keep down structural weight and weight per horse-power than to increase weight. Large transport planes are not likely to be exposed to the high loads of stunting, but they may get into trouble when getting out of a field heavily loaded.

The greatest climb is obtained when there is maximum excess power. The steepest climb occurs on the other hand when there is maximum excess of thrust over drag. The maximum excess of thrust over drag occurs at a larger angle of incidence and lesser speed than those corresponding to maximum excess power. It might be well if designers of commercial planes placed a little more emphasis on this point.

For example it is conceivable that propellers could be specially designed for steepest climb, and not for maximum climb.

As for a quick get away, geared down engines, and variable pitch propellers may be very helpful, certainly more important than when maximum climb and not steepest climb is sought.

Stability in Normal Flying

The stability of free oscillation of the airplane has been well understood for many years. Securing such stability is mainly a question of the correct location of the center of gravity, of longitudinal dihedral, lateral dihedral and vertical fin area.

An airplane which is stable in small free oscillation, is one which when slightly disturbed from a normal flying attitude will return to that normal attitude without any controlling action by the pilot.

British practice has frequently been in the direction of pronounced stability, and British authors have always advocated stability. As early as 1913 we find records of experiments made by the British Royal Aircraft Factory, in which stable machines were flown hands off in rough weather for considerable distances.

German writers recommend only a moderate degree of stability, coupled with good controllability.

No advocates of unstable machines will be found anywhere, although military pilots may vote for a neutral machine, with great controllability and maneuverability.

For commercial machine flying long distances cross-country, a machine without pronounced stability may be particularly dangerous in foggy weather and will certainly be fatiguing at all times.

The exact degree of stability which a commercial machine should have is still an open point however.

Granted that a commercial machine should be stable, the pilot should always have at his command, controls powerful enough to overcome the stability of his craft under all circumstances. Particularly when near the ground, an excessively stable machine may try to take charge. One of the reasons why the Burgess-Dunne plane did not remain in construction is that it was so stable as to make landings and get-aways dangerous in rough weather.

There is another argument against excessive stability. A machine which is very stable may be quite safe, yet very uncomfortable in rough weather. Let us imagine for example that a plane has large directional stability, and suddenly encounters a powerful side wind. It will head promptly into the resultant wind, which will be the proper thing from a safety point, but not the best from the point of view of keeping a given course. A machine which is very stable longitudinally, struck

by an upward gust, will nose down more than a less stable machine, although the chances are that it will accelerate far less upwards. From the point of view of the passenger, it would appear that there is still a great deal of both theoretical and practical work to be done in regard to the degree of stability which designers should aim at.

Longitudinal Problem at the Stall

Pilots associate trouble at the stall with a spin, and have little recognition of the fact that there is a definite problem of longitudinal stability and control at the stall. Nevertheless there is such a definite problem, related to, but distinct from the problem of lateral control at the stall.

In a recent paper before the Society of Automotive Engineers, the author drew the following conclusions from a series of wind tunnel experiments:

- (1) Even when trimmed for steep climb, modern airplanes having the center of gravity far forward are stable at the stall.
- (2) With the center of gravity far forward, the tail surfaces carry a down load, even when trimmed for steep climb; therefore they are not themselves stalled when the wings fall.
- (3) The elevators do not cease to be effective at the stall. Turning the elevators down will increase the righting or diving moment even at very large angles of incidence for the main wing, partly because the tail surfaces are initially carrying a down load, and partly because of the downwash. Of course the elevators are less powerful than at high speed.
- (4) The righting moment or diving moment persists far beyond the stall of the main wing.
- (5) The backward movement of the center of pressure on the wings is a help rather than a hindrance to "unstalling."
- (6) With the modern longitudinally stable machines having the center of gravity at 30 per cent of the chord or thereabouts, there is not much choice between airplanes of many different design of tail planes or elevators.

With all these apparently favorable characteristics of the modern airplane it seems remarkable that any difficulties should be encountered at the stall.

All these considerations are based on static tests only. Analysis of the dynamic conditions is necessary, and a study of the longitudinal equations of motion at the stall.

When the wing stalls, the lift falls off and the drag increases, which reduces the speed. The combination of the two factors causes the path in space to be curved downward sharply. The inherent stability of the plane tends to lower the nose of the plane. But the angular rotation produced by the stabilizing moments may not be as rapid as the angular change of the flight path, so that the plane does not unstall. If the ship remains on an even keel laterally, a steep stalled dive may result. The correct action of the elevators is increasing the angular rotation of the plane, so that the wing may "catch up" with the downward curvature of the path.

From a study of the equations of motion, it would seem as if the following conditions were beneficial at the stall:

- (1) A large degree of inherent stability at high angles of incidence.
- (2) Large and powerful elevators.
- (3) Large horizontal control surfaces, but with a short arm from the center of gravity of the airplane. With short coupled large control surfaces, the stabilizing moment may be just as large as with a longer arm and smaller

control surfaces, but the damping moments are less. Therefore the stabilizing moment will tend to unstall the plane more rapidly.

- (4) Thrust line of the propeller well below the center of gravity. In case of sudden engine failure, a diving couple will at once be introduced with such disposition of the thrust line.
- (5) Wings with large camber, and large well rounded leading edge. Such wings, as shown by experiments in a number of wind tunnels do not lose lift rapidly at the "bubbling" point and therefore one important contributing factor to the stall disappears. Even wings of this design, however, increase in drag at the stall, so they are far from being ideal. Also wings of this type are apt to have either a low maximum K_y , or if they have a high maximum K_y to be very inefficient.

The slotted airfoil, particularly when automatic, provides a real safeguard against stalling, because it stalls at a higher angle of incidence than the unslotted wing, because it stalls at a lower speed for the same wing loading, and because, owing to the higher angle of incidence, the inherent diving moment at the stall becomes greater.

Characteristics of the "Canard" Plane

A revival, in Germany, of the "Canard" type of plane, with horizontal surfaces ahead of the main wing, is another attempt to improve longitudinal conditions at the stall. With the conventional design of airplane there is generally an increase in the slope of the moment curve when the stalling point is reached, because the center of pressure on the wing then moves back. With the "Canard" type of plane, the horizontal surfaces stall before the main wing. Therefore the sharp increase in the slope of the moment curve may be made to occur before the stalling point itself. The "Canard" type of plane has the further advantage; that a third landing gear wheel may be placed at the front end of the plane, thus providing an additional safeguard against nosing over, and facilitating the violent application of brakes.

We have discussed the problem of the stall under the apparent assumption that a stall there must be at times. In normal level flying, with a pilot of fair skill, and a machine having the generally desirable characteristics stated above, it is very hard to see why a stall should occur.

In rapid climb, and particularly on the steepest climb of which a machine is capable, sudden failure of the engine is very likely to produce a stalled condition.

Airplane manufacturers are apt to state with some degree of pride that their machines cannot be spun. We believe that what they should really state is that their machines cannot be stalled voluntarily, since a stall is a preliminary to a spin. Planes that cannot be stalled voluntarily are really deficient in elevator control. When they are stalled on the climb, such planes are likely to be quite dangerous.

Our general conclusion is that particularly when slots, a large degree of stability, and powerful elevator controls are available, there will be sufficient safeguard against stalling.

It should be pointed out here that the use of the front slot has another advantage in maneuver at the stall. The conventional and generally the best manner of coming out of the stall is to pull the elevators up so as to decrease the angle of incidence, making a dive with nose down the preliminary to recovery; with a slot which increases the lifting capacity of the wing at the critical moment, it may be possible to hold the stick back and make a steep descent with the nose of the machine above the horizon. This may be particularly useful when a stall occurs in climbing out of a field, and a steep descent in the same direction of motion is the best plan.

Anti-Stall Devices

At least two anti-stall devices have actually been used in the air. That invented by Dr. Rohrbach is described by M. L. Bramson as follows: "The object of Dr. Rohrbach's invention is to prevent stalling. He achieves this object by means of a horizontal vane stably suspended in the air-stream at the tail of the machine and adapted to control what might be called the gear ratio between the control column and the elevator in such a manner that the tail plane movement produced by a given movement of the control column diminishes as the incidence increases." Such a device is evidently a safe guard against an erroneous use of the elevator by the pilot. On the other hand, if the stall is due to engine failure on the climb, then the elevator control will be least operative, just when it should be most powerful.

The Savage-Bramson Anti-Stall gear is described by Mr. Bramson as follows: "The stall detector is a horizontal vane facing the air stream, statically balanced on a horizontal pivot and unstable with reference to the air stream. It has a free movement of about 7 degrees and the stops are so positioned that at normal flying angles the air pressure on the van is directed downwards; the vane therefore rests against the lower stop. On reaching the angle of incidence (say 14 degrees for a normal machine) at which the pilot ought to be warned that he is about to stall, the lift on the vane changes sign and the vane flicks up against the top stop through an angle of 7 degrees. This movement of the detector is utilized to operate a pneumatic relay, which in turn, applies pressure to a piston attached to the control column. This pressure represents a forward force of 7 to 20 pounds at the pilot's hand, depending on the size of the machine, and can be easily overcome by him if he so desires; but it is impossible suddenly to provide that extra pull backwards without knowing it. The pilot is therefore effectively warned, and if the circumstances are such that a stall would be obviously dangerous, he will comply with the hint and put the stick forward. When the incidence has decreased by 7 degrees the detector vane flicks down again and the pressure on the piston in the warning unit is released to atmosphere. The pilot then feels the sudden disappearance of the force previously applied and knows that he is well away (over 7 degrees) from the stalling incidence."

For a plane unequipped with the front slot, however well designed, there is no doubt that the Savage-Bramson anti-stall gear should be most useful. It is rather surprising that it has been so infrequently employed on American machines.

A plane equipped with manually operated front slots should be safer at the stall than a plane not so equipped. The pilot, when he finds his machine badly stalled has two immediate steps at his command. (a) pushing the stick forward so as to get the maximum unstalling moment from the elevator; (b) opening the slots so as to unstall the wing, and secure a greater lift coefficient from the wing. The two maneuvers should effectively prevent the path of the plane from curving violently downward in space. But with manually operated slots, safety still depends on the pilot. The Bramson-Savage should still be useful, particularly if it could be made to control the slots.

If a plane is equipped with the automatically operated front slot, the dangers of the stall from the longitudinal point of view are greatly diminished. In such a case the Bramson-Savage gear does not seem necessary. But it would constitute another safeguard nevertheless. Even though with slot open, flight at a high angle of incidence becomes comparatively safe, it is generally better to reduce the angle and glide down at a higher speed which always improves the controls.

Lateral Control at the Stall

The British have issued a large number of publications on this subject, and it

may now be said to be thoroughly well understood, much better understood than the longitudinal problem at the stall.

From a safety point of view it is probably much more important to check the spin at its very beginning than to design machines which come out of the spin very readily.

The following are the main contributory items of the incipient spin, following a stall:

- a. If the stall follows on sudden engine failure, the torque of the engine disappears. If it was balanced in normal flight by appropriate wash-in or wash-out of the wings, a tendency to fall off on one wing is always to be expected.
- b. When a wing is stalled, the rolling moment resisting roll disappears; there is more likely to be a moment producing autorotation.
- c. The roll will produce more drag on the low wing.
- d. The ailerons lose in rolling moment and their adverse yawing moment increases.
- e. The rudder is blanketed by the fuselage and tail surfaces, and may be not powerful enough to overcome adverse yawing moments due to the roll and the ailerons.

If the longitudinal conditions at the stall are only those of the usual machine, and the above unfavorable factors are found, we can see why it may be difficult to check the incipient spin.

The remedies for lateral difficulties can be indicated with much more assurance than the remedies for longitudinal difficulties.

For a machine not equipped with a front slot, or with slotted ailerons:

- a. The most careful design of the conventional ailerons, so as to give as little loss in rolling moment and as little adverse yawing moment as possible.
- b. A very powerful rudder. In normal flying too large a vertical surface introduces stability difficulties unless balanced by an appropriately large dihedral. A very large dihedral means increase in weight and decrease in performance. The American designers will have to give this question of oversize rudders very careful consideration. Wind tunnel tests frequently indicate that rudders designed from the customary empirical formulae are not powerful enough.
- c. Wings having a flat lift curve which may be useful even with some sacrifice in wing efficiency.
- d. The use of differential ailerons.

The use of symmetrical tip controllers floating in the air stream is to be considered very seriously. Theoretically they are every bit as promising as the slot and aileron controls.

The slot and aileron control has been proved, to the writers' mind, to be quite effective in maintaining rolling moment and reducing adverse yawing moments to a negligible amount.

A radical departure from the conventional designs of today cannot be urged too strongly in regard to the problem of the stall.

Turning in Restricted Areas

After an engine failure in climbing out of a field, it is almost a maxim that the pilot should go straight on, if there is any kind of a field ahead. Turning is considered, and quite rightly so, a dangerous invitation to a spin. If however the approaches to a field are quite unsuitable for landing, the pilot may be absolutely forced to make a gliding turn back into the field. It will be a great step forward if machines can be designed that can perform such a maneuver. Complete con-

trollability at slow speeds is again a requirement. Next the machine should be able to make a 180 degree turn with minimum loss of height. The subject has been considered by Moriatry and Glauert, among other writers. The height loss of the gliding turn as shown by Glauert is proportioned to $\frac{W K_a \csc \theta}{S K_l^2}$, where

θ is the angle of bank. The minimum loss in altitude occurs therefore when the angle of bank is 45 degrees, and K_a is a minimum which occurs very near the $\frac{K_l^2}{K_l^2}$

stalling attitude. It is advantageous to have a low wing loading, and a high lift coefficient for the wing.

Getting out of small fields may be accomplished by a steep climbing turn. Again complete control near the stall is required. Low loading per square foot, or high lift capacity, or both, and low power loading are desirable in order that the turn may be made with the smallest possible radius.

In practical flying, in fog and sometimes in clear weather, in avoiding collisions, safety may depend on the ability to make a very sharp turn. Again control at low speeds, low loadings and high lifting capacity will be helpful.

In the above paragraphs for low loading per square foot we may consider it feasible and desirable to use conventional loading with an automatic slot.

Spinning

It is impossible in this brief paper to discuss the spin adequately. From the now voluminous literature of the subject, it would appear that both in the spinning nose dive and in the flat spin, the following are helpful for recovery:

- a. forward position of the center of gravity.
- b. good aileron control at large angles.
- c. powerful elevator.
- d. powerful rudder, which is not blanketed at high angles of incidence.
- e. moments of inertia as nearly equal as possible about the three axes, so that precessional inertia effects may be reduced.
- f. wings not too susceptible to autorotation.

Conclusion

From this brief review of the desirable aerodynamic characteristics of an airplane, two striking facts seem to emerge:

The aerodynamic characteristics desirable for one element of safety are likely to be desirable for another element of safety.

The present state of the art is already such that a machine having the greatest possible measure of aerodynamic safety can already be designed.

The writer has the conviction that within the next two or three years an aerodynamically safe airplane is sure to be available.

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General Discussion of the Paper

(After Prof. Klemin read his paper, the meeting was opened for discussion by the chairman.)

R. D. SMALL (Aviation Finance & Trading Co., Chicago): I would like to ask Professor Klemin to give us the status of the variable pitch propellor in respect to safety.

PROFESSOR KLEMIN: Its only relationship to safety is that a variable pitch propellor on the ground may stop the plane in a shorter distance and may also enable it to land more steeply. The difficulty is that these properties are most needed when the engine has failed. Therefore the variable pitch propellor, while likely to improve efficiency and climb, has only an indirect bearing on the problem of safety.

MICHAEL WATTER (Chance Vought Corporation, Long Island City, New York): Designers know very well that they are capable of solving the problems of performance, but, the case of stability is somewhat different. While longitudinal stability can be calculated, the designer has difficulty in solving the problems of lateral control mathematically.

General safety will only be achieved when the designer is able to control and calculate all the factors of stability. While spinning is an unnecessary and undesirable factor in commercial planes, in military maneuvering a certain kind of plane must be spun continuously and the pilot must be able to come out of this maneuver. The problem of spinning is very complicated and is of such vital importance that I would like to bring up a few points which are misinterpreted at times. There is undue stress given to aerodynamic factors in spinning, while it is the dynamic factors that are the main source of danger. In this regard I would like to suggest the use of the front slot on the tail surfaces. If the pilot should find himself in a spin and is unable to come out he could open the slot and, since the angle of attack of the plane is very high, I think the slot would give him the additional control necessary.

In normal spinning the angle of attack is around thirty-five degrees, and in a flat span it may be almost seventy degrees. The use of the slot on the tail surfaces would seem to be a logical thing.

In talking about stability and controllability, etc., I believe it is vital for designers to have definite factors to deal with and I would suggest that, while stability is more or less experimental, still we know by comparison just how to deal with controllability.

J. S. McDONNELL (J. S. McDonnell & Associates, Milwaukee, Wis.): I should like to ask if a plane which can land at thirty-five miles an hour is necessarily dangerous near the ground.

PROFESSOR KLEMIN: Not for an airplane which has high wing loading.

HARLAN D. FOWLER (Miller Corporation, New Brunswick, N. J.): I wish to thank Professor Klemin for mentioning my own development. I have been working on this device for twelve years. My device provides additional wing area when landing or taking off.

CHAIRMAN STRATTON: Professor Klemin mentioned the relation between the designers and the pilot. It is quite true that in the early days the pilots were very

skeptical of the scientific men; but now the gap between the designer and pilot is passing away. It is from the user of a device that we learn of its faults and it is for the laboratory man to correct them if he can.

We have with us this afternoon an example of the pilot who is interested in the development of the scientific side. The test pilot on the National Advisory Committee for Aeronautics, Mr. Thomas Carroll.

The Flight Characteristics of an Airplane from a Safety Point of View

By THOMAS CARROLL

**Chief Test Pilot, National Advisory Committee for Aeronautics,
Langley Field, Va.**

In the airplane of today, and of the immediate future, there is no quality which is so essential to the rapid success of aviation as safety. Speed, range, beauty and reduction in cost are important, but at the present time are entirely secondary.

We choose to approach the subject of safety in aviation without recourse to the fanciful possibility of hovering flight. We pass with only a remark on the truth of the safety of any flying machine which can arise and descend vertically, remain stationary in the air, and so forth. We feel that to discuss this particular phase of flying here, prior to its greater development, would be to devitalize an issue which is important and whose ends seem to be attainable with the more orthodox practices of the present time as a basis. Our consideration is, therefore, confined to airplanes as we know them, although we concede that their use will always incur certain elements of danger.

There are certain characteristics which all airplanes must embody to some extent. In order to be considered safe they must have all of them to some degree, although deficiency in one element may be effectively offset by superiority in another.

It is, of course, not our purpose to consider those qualities which are not flying qualities, but which contribute to safety, including structural strength, protection from fire, facility of maintenance and inspection, and so forth.

The flight characteristics of a safe airplane include the following: Stability, controllability, maneuverability, reasonably low landing speed, visibility, and comfort.

In defining these qualities, it is our intention to depart from or to elaborate upon the pure technical definition of the terms. Thus, stability may be considered as the characteristic of an airplane by which it tends to remain in constant steady flight at a speed within the cruising range and to return to that attitude if it is disturbed. This condition is generally referred to as the trimming speed and may be varied by the manipulation of the movable stabilizers or the elevator control. It is desirable that this variation in speed be capable of being carried down into the range near the stall and under later developments and improvements in design, to below the stalling speed. The importance of this is clearly discernible in any case. In level flight through "bumpy" air, should the airplane lack stability, it is bound to incite over-control by the pilot of lesser experience. Over-control in itself, must be regarded as a hazard, for it destroys smooth handling, induces flight with irregular, even though mild, acceleration, which from its involuntary constancy, disconcerts the pilot, creates a tenseness, and destroys his confidence in himself and in his airplane. Under such conditions he is less able to cope with the task in hand, even when no unusual occurrence, such as a forced landing, intervenes. Should such a thing occur, he is almost at its mercy in his weakened and uncertain condition.

Stability, at or near, and particularly when possible below the stalling speed, is an immense safety factor. When it is borne in mind that a landing is no more than a deliberate stall executed as close as possible to the ground, the value of stability is appreciated. Stability here may be negatively defined as the absence of any tendency to depart from the speed and attitude chosen by the pilot, which is most frequently manifested in a "falling off" on a wing due to lateral instability.

The next quality to be considered, controllability, is too frequently confused with maneuverability. It is closely allied with maneuverability, as it is, inversely, with stability. An airplane can hardly be maneuverable without controllability, but it is frequently controllable without maneuverability to a commensurate degree. The deficiency is found in excessive stability whether provided by large size or inherent stability characteristics due to other causes.

Controllability consists in two factors, the response to control movement, rotating the airplane about its axes, and, the reaction in the control system to the degree of force necessary to be applied by the hand of the pilot. An airplane which is responsive to the heavy touch of one pilot may be slow and unsatisfactory to one of more delicate touch. Again, while controllability may be slow, usually referred to as "sluggish," due to excessive stability, on the other hand, usually quick response due to oversized or balanced control surfaces without the impediment of stability, may be as unsatisfactory or worse, due to the condition which is often referred to as "flicky."

Maneuverability consists of a blending of stability and controllability which permits more involved maneuvers; as for example, a continued turn, either steeply banked or while climbing within a reasonably small radius, not to mention the more involved maneuvers of "stunting." Overloading in either wing or power loading detracts from maneuverability, as can be readily appreciated.

Reasonably low landing speed can not be defined in the abstract. It is entirely dependent upon the case. A speed which would be entirely adaptable to one case would not apply at all to another. It can be considered, however, that for all cases, landing speed which may be considered reasonably low should fall within the range of from 30 to 60 M. P. H. The behavior of the airplane while landing with regard to stability and positive controllability through the landing condition, is of much greater importance than any definite determination of what this speed should be.

Visibility, or more accurately, improved field of vision for the pilot, is of great importance from a safety point of view. It is usually considered only in the reduction of blind angles. It appears more important that certain ranges of vision, forward and down, particularly, should be definitely open. Forward vision while taxiing is very important and is too often neglected. Defective visibility while flying is one characteristic which often may be offset by good maneuverability permitting a zigzag course, but this remedy is, of course, inapplicable to commercial airplanes, particularly of the larger sizes.

The comfort of the pilot is not generally considered as a safety characteristic and yet it is readily imaginable, that a pilot who is cramped and uncomfortable can not be acute in the prosecution of his piloting duties, nor in his watchfulness for the hazards of collision, and so forth. Simply roominess is not comfort. Proper seat height, leg room, rudder and control stick position are of even greater importance. To explain, even though the actual seat and cockpit may be as comfortable as a fireside chair, should the control stick be centered so far forward as to require reaching, as is so often the case, the pilot, during a long flight, is very uncomfortable. The relief of heavy control forces by means of stabilizers or "bungees," rubber cord or springs is very important (and it must be considered that under some circumstances, any continuous force upon the control stick or rudder is heavy). Proper wind shielding, if the cockpit is open, is of very great importance.

The safe airplane is in itself of indefinite distinction. What may be properly considered safe in one instance is distinctly unsafe under others. While again, the airplane which is safe in one type of service may be clumsy and ungainly in another.

We will therefore consider two rather widely differentiated cases. On one hand, the private owner pilot of small or mediocre piloting experience and ability, who flies a small airplane intermittently of occasion and for pleasure only; and on the other hand, consider the operator of a large flight service who contracts to transport passengers and valuable express matter under the hand of a thoroughly skillful pilot. It is readily appreciated that the specifications for safety in these cases are at variance. The private owner pilot demands safety from the hazards of an unfinished piloting technique almost to the exclusion of any other source of danger with the possible exception of those hazards which are incidental to landing and taking off in such small and unimproved fields as he may possibly choose to use.

The commercial operator on a large scale must require of his equipment that it be capable of maintaining its schedule under any and all conditions. It is to be assumed that he has incurred no additional hazards in the selection of his piloting staff, that his pilots are thoroughly trained and experienced, and are capable to overcome routine difficulties. It is impossible to avoid bad weather and its attendant danger and his equipment must, therefore, be capable of surmounting unusually bad ground conditions at his terminal airports. It must be capable of flying through fog, and other bad weather conditions while on the course and particularly to cope with the ever attendant hazard of being forced to land at an emergency field due to weather conditions or from mechanical difficulty within his airplane.

Consider the case of the owner pilot. While it is, of course, appreciated that many of this class are excellent all-round pilots, it nevertheless, appears reasonable to suppose that many have had no experience other than upon their own airplane, which is frequently the one upon which they have learned to fly. From this point of view, it is also obvious that while they probably are thoroughly well acquainted with the characteristics of their own airplane, they lack the broadening influence of more general experience.

For the average case, it seems highly desirable that his airplane be a very stable one. This stability should be of a very high order longitudinally, laterally and directionally, that its pilot may be relieved as far as possible of the necessity of continually flying the airplane. The lateral stability is probably most easily secured. Longitudinal stability is hardly of greater difficulty, provided by movable stabilizers or spring loaded control surfaces which are variable with the speed of the engine and are not so complex of operation as to incur the possibility of their being neglected by the operator. Directional stability is not so frequently solved, although it appears that it is not more difficult through the provision of the same medium as in the case of the stabilizer and elevators. This provides an airplane which, once taken into the air to a desirable altitude and placed on a course, requires the minimum of attention. It is safe, therefore, under this condition, because, if its pilot will let it alone it will keep itself out of difficulties. Even in the case of fog flying or in other low visibility condition, this fact will remain true.

This covers the condition of low angles of incidence, but he must, of course, in climbing, increase the angle of attack and possibly unconsciously approach the stalling angle. Here it is of great importance that no unusually sudden break in the lift of his wings shall occur. The tendency of wing design, with and without auxiliary appliances, tends to provide him with this desirable quality. When this condition is met a very appreciable range of increase of angle of attack should be permissible without serious loss of lift, or of stability. A righting moment which tends to put the nose down and assume a safer angle of attack should be provided.

Sooner or later, while making a turn, climbing at a high angle of attack the tendency to stall and fall off will occur. No sudden break, which is characteristic of the start of the spin, must occur. It must be free from any tendency to the unintentional spin.

The controllability must be good but restricted, that is, small angular changes on any axis must follow control movement, but the controls, particularly the elevator, should be small in angular displacement, or undersized to the extent that brutal handling of the control will not suddenly incur such great changes of attitude as will be hazardous. This limitation of control is a most important safety factor in the case which we are considering, but it need not interfere with the desirable flying qualities of the airplane within its proper use in its class.

It should hardly be necessary to balance the controls to relieve the force necessary to be applied by the pilot. In fact, it should be borne in mind that it is important that a reasonable degree of resistance is extremely desirable in order that a pilot have the proper "feel" of the controls. If this is eliminated by balancing or other such means, it will induce over-control to a hazardous degree among pilots of this class, perhaps more than in any other.

These features connect directly with the maneuverability of the airplane. For the owner pilot maneuverability is entirely of secondary importance. It should be neither desirable nor permissible that it be capable of being thrown through any involved maneuver. Safety demands conservative flying of this class and with the combination of stability and controllability which we have considered, it may be flown through all of the simpler maneuvers gracefully and easily, while it will be at no time robbed of the ability to dodge obstructions or avoid collision should such a condition be imminent.

Speed range is of no great importance to the airplane of this class. It is difficult to believe that its high speed need be very great, say upwards of 90 or 100 M.P.H., but it does not appear that the owner pilots will be satisfied with maximum speeds of very much less than this figure. Therefore, abnormally low landing speed is hardly attainable. Landing speeds of 30 to 35 and possibly 40 M.P.H. must be considered conservative and safe for this class. Below 30 M.P.H. the landing speed must be considered abnormally low and desirable only when it can be obtained without interference with the cruising and maximum speed.

The landing characteristics are undoubtedly of the greatest importance to an airplane of this class. Whatever the landing speed may be, the lateral stability and controllability at high angles of attack in landing must be excellent. With the stability which seems possible on the latter design and the restriction of control which has been mentioned, it appears possible that an airplane can be provided at the present time with which in order to effect a landing, all that need be necessary to do should depend upon the proper selection of a point and altitude above a field, with regard to its size and the direction of the wind, where the airplane must be placed at a certain speed and from thence on all that is necessary to do is to throttle the engine and pull back slowly on the control stick and wait. The airplane will proceed to land itself. This is only dependent upon proper stability in the stalled glide and with limitation of the control which prevents an angle of attack higher than necessary for a stalled glide together with a landing gear preferably of the Oleo or pneumatic types which will sustain the shock of landing which need not be of unusual force. Wheel brakes add greatly to safety in any case and particularly in this one, providing as they do, greater ability to handle while taxiing as well as to prevent running into objects on the ground. Taking off with an airplane of this general specification should also be quite safe since the speed range will indicate the reserve of power which guarantees rapid acceleration, low angle of attack in the initial part of the take-off and rapid climb without the tendency to stall thereafter.

The visibility of the pilot should be as good as possible, both in the air and while taxiing. In general, it might be said that the poorer the pilot, the more desirable is good visibility. Still it would not be desirable that a poor pilot be placed in an airplane in which he had perfect forward visibility due to his being seated in the very forward part of that airplane, on account of the fact that he is thereby deprived of any visual assistance in lining up some parts of his airplane with the horizon. It is a matter of experience that most pilots of lesser ability are habitual "rocker-arm" flyers, those who line up certain forward parts, as the rocker-arms of their engine, with the horizon, using this as their sole guidance to maintain level flight.

The airplane should provide very considerable comfort for the pilot, as on account of his lack of experience he will be certainly more susceptible to the reaction of physical or mental fatigue than in the more experienced.

With these specifications reasonably met, the owner pilot should be provided with a safe airplane, certainly as relatively safe as ground transportation which is in step with the times.

We will now look to the opposite case; of safe equipment for the larger commercial operator. As we have said, the case is initially free from the hazards of a poor piloting technique. Errors in judgment by men is a condition which we may only hope to see reduced and never eliminated. There can, therefore, be no greater protection against these hazards, or no inherent qualities of an aircraft which would assist in the elimination of the hazard than faith in the selection of the personnel.

Of the airplane itself, we would say that it should be stable to a reasonably high degree. It should be as stable as possible to the limit of any possible interference with the control. This may appear to be an unnecessary or incongruous statement, but it is important to emphasize that stability in this case is only a virtue to the point where it affects the controllability to any appreciable degree. It is believed that well within this limitation of its stability, the airplane will have a marked tendency to maintain its course, which is highly desirable, if not indeed absolutely necessary, to assist the pilot to come safely through local areas of fog or reduced visibility which are bound to be encountered in this class of service. While the airplane should certainly be equipped with complete navigational instruments which naturally are of great assistance to the pilot in this instance, it is nevertheless true, that with an airplane of any lesser degree of stability, the pilot would be deprived of that "feel" of his ship which is provided by an airplane of positive stability and upon which he bases all of his control movements.

Good stability at low speed or with high angle of attack range is a positive requirement in this case. In taking off under conditions where the airplane is loaded to capacity and where the ground conditions are bad, as for example, where necessity demands that the take-off direction be to some degree across wind, accompanied with the further handicap of a soft field, the pilot may find that he is faced with the necessity of pulling up to his maximum climbing angle before he has acquired the flying speed which should be necessary for the maneuver. This possibility, of course, is based solely in the instance where he is confronted with obstructions over which it is necessary to pass. In this case, there is an absolute demand for stability of a high order which would prevent any tendency to drop a wing. If the stability is satisfactory in this case, it seems clearly evident that in the case of landing that no additional hazard would be incurred. Here, in general, with regard to stability, it can be said that it is of definite necessity which controverts the idea which we frequently hear expressed in approbation of commercial airplanes with the "pursuit touch." This might indicate neutral stability.

In the consideration of its controllability, it may be admitted that in general practice this is not necessary to a high degree; that is, for taking off from an air-

port, maneuvering only in large circles and holding a constant course over a route and effecting a landing after the manner of the take-off. But we must bear in mind the possibility of collision which may be averted by ready response to the controls, and it must therefore be considered that this ability is essential in the safe aircraft of this class.

Considering the ability of the pilots who are flying in this class of service, any amount of controllability which may be provided them will hardly be a handicap through the possibility of its engendering over-control. This does not include control action which is so light as to eliminate a positive reaction which is felt by the hand of the pilot. This reaction, as we have said before, is definitely important, and while it may permissibly be reduced, it must remain appreciable.

Since we are considering that maneuverability entails only sustained or involved maneuvers as opposed to the simpler movements which we are considering under controllability, it appears that in this class of airplane the maneuverability may be safely neglected.

The landing speed requirement in this class must be expected to be reasonably fast due to the demand for high cruising and maximum speed. Under full load conditions it should not be considered abnormal if the airplane land at 50 or 60 miles per hour and even up to 70 miles per hour maybe, in the light of current practice, entirely permissible. Practice and experience have developed that landing a large airplane at these relatively high rates of speed does not involve the difficulties which a smaller airplane would encounter at the same speed. The characteristics of landing in this class should only demand that the landing must be made in an orthodox, though skillful, way. For the comfort of the passengers, however, it should be regarded that the shock absorption of the landing gear be excellent, not only to absorb the initial shock of striking the ground, but also to absorb such rolling shocks as would otherwise tend to "bounce" the airplane in the air. Brakes are, of course, a necessity in this class.

In regard to visibility for the pilot, almost any extreme is desirable to provide him with the best that is possible. In the newer commercial ships of today this is quite well provided for, although some criticism may be made of the visibility in a single engine or trimotored airplanes where the pilot is placed immediately behind the center engine. Where this necessity exists, improved visibility on one side at least is secured where the pilot is offset from the center line of the airplane, and it is our opinion that good visibility on one side is better than mediocre visibility on both sides. This arrangement, however, may incur some difficulty in the visibility while taxiing, but since in this case when the pilot is placed to one side, there is generally another seat beside him which is almost invariably occupied, he may use the occupant of this seat to assist him in avoiding ground obstacles.

In this class of airplane, arrangement is frequently impossible which would provide rearward vision for the pilot, but where there is any possibility of providing rearward vision, it should never be overlooked.

The comfort provided for the pilot is of some importance, although to a lesser degree than in a case which involves a less experienced pilot, because, in view of his longer and broader experience, he will not only have been accustomed to the relative discomfort of the usual cockpit, but will also have discovered means of making himself comfortable even in view of these limitations. The placement of the pilot in the airplane is a subject of some disagreement. In an airplane which carries passengers, there can be little question that they are entitled to the position which may be the safest should an accident occur. This must mean that the pilot should be placed forward. But should the airplane be designed solely for the carrying of mail or express matter, particularly when it is to be used considerably in night operation, there can equally be no question that the pilot should be placed as far to the rear as is possible. Any detriment to visibility or any unusual position

in regard to his placement in the airplane is quickly overcome by the adaptable pilot, whom we may expect to find in this class of service.

And thus in the case of the commercial operator we feel, as we said concerning the owner pilot, that an airplane of these characteristics from the safety point of view, will be as relatively safe as other modes of transportation.

In the rapidly moving science of aeronautics, it is to be expected that the conditions which we have presented here will soon become insufficient. It is beyond the ability of the observer of today to predict the possibilities of the future, at least until such time as revised design provides us with materially different aircraft than we are now familiar with. Pending that time, it is our belief that airplanes bearing the specifications as they have been presented should be considered safe aircraft.

(After Mr. Carrol had read his paper, the chairman again allowed discussion to be opened.)

J. S. McDONNELL (J. S. McDonnell & Associates, Milwaukee, Wis.): I should like to ask the speaker if he considers a landing speed of 60 miles per hour for a two ton commercial airplane just as safe as a landing speed of thirty miles per hour for a two-seater light airplane in private use.

MR. CARROLL: Sixty miles an hour is a little high. Between fifty-five and sixty miles per hour would be a satisfactory landing speed for the heavy airplane and equally as satisfactory as thirty miles per hour for a light airplane.

WM. H. MILLER (Curtiss Aeroplane & Motor Co., Garden City, N. Y.): Landing speed should to some extent depend upon the reliability of the airplane. I consider that sixty to sixty-five miles an hour is too high a landing speed for any plane. No matter what wing is employed. I agree with Mr. Carroll that the speeds of commercial cargo and passenger machines may well be in the neighborhood of sixty miles an hour, whether equipped with slots or not.

W. C. NAYLOR (Stout Engineering and Finance Co., Dearborn, Mich.): I would like to ask Mr. Carroll what results were obtained in the tests, made at Langley Field last summer, on the P. T. airplane equipped with front slots.

MR. CARROLL: Most of us at Langley Field are not satisfied that all the possibilities of the slot, as built and installed on that particular airplane have been developed. But there is no question that the placing of the slots on that machine has given a different characteristic in stalled flight than that found in an unslotted machine.

In the experiments referred to, we could not find a large quantitative difference. But there was a qualitative improvement in the accomplishment of the various maneuvers of stalled flight.

One very definite result was a complete difference in the whole procedure of the incipient spin, once a spin was accomplished. While you are definitely out of control, the airplane seems to be controlling itself and carrying on a little better with slots than without.

CHAIRMAN STRATTON: Any further questions? If not, that finishes the program for the day.

I wish to express my great appreciation for the speakers who presented these papers and also the men who have entered into the discussion. I thank you very much for your attention.

ADJOURNMENT

Power Plant

HON. EDWARD P. WARNER, Chairman

Assistant Secretary of the Navy for Aeronautics, Washington, D. C.

The Power Plant Session was called to order by the chairman, Hon. Edward P. Warner, Assistant Secretary of the Navy, at 10.15 a. m. on Friday, October 5, who then addressed the meeting.

CHAIRMAN WARNER: It has been fashionable, and sometimes convenient for a good many years to place on the innocent and unprotesting engine the responsibility for poor maintenance or no maintenance at all, and for various faults of judgment on the part either of ground or air personnel. It is no news to anybody who has occasion to fly that a great deal can go wrong with an engine. There can be a great deal of power plant trouble without any immediate adverse effect on the safety of the aerial operation, but we can not go on having engine trouble indefinitely without serious consequences resulting to the aircraft and its occupants sooner or later.

Every pilot from time to time, and in fact at some time in the course of almost every flight, has to trust to his power plant. He has to rely upon its continued operation for his continued safety. We get so much in the habit of such reliance that we think nothing of it, but it is a fact that the pilot and the passengers are very much in the hands of those who design, build, install and maintain the engine.

That there are so few accidents wholly attributable to engine trouble is a strong testimonial to the high average of performance of the various classes of people concerned with the power plant from the time the design is started to the time the propeller is swung and the plane ready to take the air.

The lesson of safety so far as the power plant is concerned is reliability. We want other things, high performance, low power plant weight, small frontal area, ability to operate in all temperatures, and many other qualities. But when we think of safety, we must think of engine reliability. It must keep on running once it is started until the pilot cuts the switch, and running at substantially constant speed and power output until he varies the throttle setting.

Those who have been in aviation for a long time need no written history to prove that there has been an enormous progress in engine reliability in the last ten years, to which a great many people have contributed, but it would have been impossible to make that progress without constant study in a laboratory where the features of engine performance can be analyzed one by one, where difficulties can be broken up and considered separately, and without any danger to anybody.

The history of engine laboratory work in this country is very largely a history of the aeronautical power plant section of the Bureau of Standards which began its work when America entered the war, which has been carrying on continuously up to the present time and is now making all the routine type tests, virtually all, for the Department of Commerce. It is at the same time carrying on those various researches which date back to 1917 and their results have been incorporated in numerous reports published by the Bureau of Standards and the Bureau of Aeronautics.

The work of the engine laboratory of the Bureau of Standards is very largely due to Dr. H. C. Dickinson, who has been in charge of this laboratory for many years and who will present his paper "Laboratory and Service Tests of Engine Safety."

Laboratory and Service Tests for Engine Safety

By H. C. DICKINSON

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Failures of the power plant, according to the best available data on civilian flying, constitute somewhat less than 20 per cent of the causes of airplane accidents. This, however, is about three times the percentage attributed to all defects of the plane, including aerodynamic qualities. Personnel failures and adverse flying conditions account for most of the remaining 75 per cent. Training, experience and improved facilities can greatly reduce accidents of this latter sort so that the individual pilot and the management of flying fields can contribute greatly to increased safety in these respects. As regards the power plant, however, those whose personal safety is most concerned can accomplish little in the way of improvement. It is doubly important, therefore, that every practicable means should be used to protect the pilot and his passengers where they cannot protect themselves, viz., in the matter of power plant safety.

It is probable, moreover, that faulty functioning of an engine has been a contributing, if not a primary, cause of many accidents attributed directly to personnel. This is especially liable to be the case with inexperienced pilots, of whom there must be many as civilian aviation gains in popularity.

Engines which have been developed through comparatively long experience in the hard school of military service generally have attained a good degree of reliability. However, this result has been attained by the gradual elimination of weaknesses developed in severe service; nor has the item of cost ever been a prime consideration either in the design and development of these engines or in their mounting in the plane.

For the commercial engine designed and built solely to meet commercial conditions, the situation is entirely different. There has not as yet been the same opportunity for gradual elimination of faults and causes of failure, since few of these engines have had so long a period of use. Moreover, the question of cost must necessarily be of much greater importance here than in military equipment. It seems inevitable therefore that for some time to come engines built for purely commercial use may be less reliable than those in military service, notwithstanding that engine reliability is at least equally important in civilian flying.

How, then, can safety be obtained? The title of this paper correctly suggests that laboratory and service tests can contribute to safety; but no matter to what length formal testing is carried, it can only contribute to safety, not assure it. This being the case the length and severity of tests are matters of compromise depending upon various factors.

The British Air Ministry was among the first to prescribe a type test as the basis for approving engines to be installed in licensed aircraft. The maker of a new type of commercial airplane engine must specify the main characteristics of the engine. The type test comprises the following: (1) a power curve test, (2) a 50-hour endurance test, (3) tests of slow-running and acceleration, (4) a high-speed test, (5) a high-power test, (6) a second power curve test, (7) a complete teardown inspection followed by a final one-half hour test at normal speed and 90 per cent full power.

In addition each individual engine manufactured is required to pass an official acceptance test of two hours duration before it is placed in service, and one engine in fifty is subjected to the type test.

The air commerce regulations of the Department of Commerce provide

that engines which have passed the regular endurance tests of the Army or the Navy will be approved for use in licensed aircraft and that all other engines submitted for approval will be tested at the Bureau of Standards. The present test requirements call for general specifications from the maker, including drawings of the engine, together with the log of a 25-hour preliminary run at at least one-half rated power. The test proper consists of (1) a 50-hour endurance test, (2) a power curve test, (3) tear down and inspection and (4), a flight test. However, the flight test is being waived in the case of engines which have a record of successful performance in the air.

Causes of engine failure may be classed for convenience somewhat as follows:

Seven Causes of Engine Failure

(1) Mechanical or structural failures, such as breakage or other injury to any of the major mechanical parts of the power plant, such as to cause its stoppage or a very marked decrease in power.

(2) Failure of the fuel supply, through stoppage, breakage of lines, exhaustion of the supply to the carburetor either from lack of fuel or failure of the main supply to reach its service supply tank.

(3) Failure of ignition due to any of the various faults or accidents which may prevent the production of igniting sparks in one or more cylinders.

(4) Failure of lubrication, which may occur due to faulty operation of the oil pump, of the supply system in general, or of the supply to some essential part, to the over heating of some part or possibly to the use of a lubricant of too high or too low viscosity.

(5) Failure of the cooling system to maintain safe operating temperatures, either from loss of cooling medium (in water cooled engines) or as a result of some fault in lubrication, fuel quality, ignition timing, etc.

In addition to the causes mentioned above, which are more or less directly dependent upon the design, construction and maintenance of the power plant, there are other causes of failure which depend more directly upon the operation of the engine.

(6) *Engine Speed.* Mechanical stresses increase rapidly with speed and speeds which are liable to cause failure may be reached by driving with open throttle, or by the use of too small a propeller.

(7) *Fuel.* Maximum cylinder pressures and corresponding stresses depend largely on fuel quality. The use of fuels which "knock" in a given engine may result in over-heating, preignition, spark plug failures and in extreme cases, major mechanical breakage.

Of the causes mentioned above, by far the most important two, as regards number of accidents, are the fuel system and the ignition system. These together constitute more than half of all accidents due to power plant failures in civilian flying. Next in importance come structural failures of the engine. Lubrication and cooling each constitute only 2 to 3 per cent of the causes of failure. Some 25 per cent of accidents due to the power plant are listed as cause unknown. In some cases the evidence is destroyed by a crash; in others failure is due to one of the causes enumerated above, such as temporary stoppage of fuel (vapor lock) or ignition; others may be due to such things as collection of ice in the carburetor or manifolds.

The bearing of laboratory and service tests on safety of the power plant depends upon the character and the limitation of such tests. Under laboratory tests we shall include the operation of the engine either on a dynamometer stand or torque stand or with a calibrated propeller, as well as special

laboratory tests of accessories, such as carburetors, ignition devices; etc. Under service tests we shall include operation of the complete power plant in a plane either on the ground or in flight.

Laboratory Tests

Laboratory tests can serve as follows:

(1) They determine the operating characteristics of the engine, such as power-speed range, fuel and oil consumption, consistency of operation, cooling requirements, etc. On these points definite information is had by a brief series of tests. Barring gross mechanical faults, the figures obtained should apply to any individual engine of the same design and construction. While this information has no very direct bearing on the safety of the power plant, it does determine the suitability of the engine for use in a given type of plane and for a given kind of service. It is, therefore, essential to the selection of a safe combination of engine and plane.

(2) Laboratory tests afford information as to structural safety and reliability. By running an engine for long periods at loads and speeds equal to or greater than those expected in practice, serious inherent mechanical weaknesses will probably develop into failures or show up on subsequent inspection in excessive wear, local heating, incipient cracks or loosening of threaded parts. On the other hand, such tests alone give little information as to the margin of safety of the structural design. Parts may be stressed too near their elastic limit, and might fail from repeated stresses if run for longer periods or at speeds somewhat greater than in the tests. The structural materials used may not be sufficiently uniform in composition or in heat treatment, so that occasional failures may occur, in service, although the individual engines tested did not happen to contain any faulty parts and successfully completed the tests. Thus laboratory tests alone on a very limited number of engines cannot give complete assurance against structural failures, but can very greatly decrease the chances of their occurrence.

(3) Laboratory tests may serve to point out faults in design which would lead to unreliable operation or failure after long use. For instance, a design may have obvious mechanical weaknesses such as points where stresses are concentrated, or parts in which the material is not well distributed for maximum strength. There may be parts liable to displacement or which may become loose, or parts too difficult to service properly. Some such faults are indicated by failure or incipient failures; others are noted on inspection by the members of a skillful and experienced test crew, even though no failure has occurred. Most of such faults have been eliminated from the engines which have been long in production, and they will be relatively rare in new designs drawn up by engineers of long experience in the aircraft engine field. These faults are, however, discouragingly common in the newer designs of commercial engines, many of the designs of which have had only limited experience with modern aircraft power plants. Careful testing and inspection are, therefore, of utmost importance in these cases.

As already pointed out, fuel supply and ignition are responsible for the greater number of failures and these are to some extent capable of independent test. Insofar as the fuel system is a part of the engine, laboratory tests of the engine should show up its weaknesses. Special laboratory tests can be used to determine whether the carburetor will function properly in all positions which it may assume in flight. Since the fuel supply piping on the test stand is usually different than that used on the plane, no useful information regarding this part of the fuel system is obtained by laboratory tests.

The complete ignition system, including spark plugs and wiring, can be tested independently of the engine if necessary, although the laboratory test of the engine should develop any very serious faults in ignition.

Usually the carburetor, ignition system and spark plugs are of types which have previously been used on engines of other designs so that their characteristics are known. Special tests, therefore, are necessary only when new or unfamiliar designs of these units accompany a new type of engine.

The discussion of laboratory testing so far has dealt primarily with what may be termed "type tests," i.e., rather exhaustive tests of one or a few engines of a single type, or sample engines of a production lot. There is another class of laboratory tests which is also of importance, i.e., condition or acceptance tests which involve the running of an engine for a comparatively short period of time to determine whether it is in satisfactory operating condition, followed by a complete disassembly and inspection. In fact tests of this sort are essential to check the condition of each individual engine before it is mounted in a plane. Such tests are required by the British Air Regulations and some others. Where these tests are not required under official observation, it is common practice, and should be universal practice to subject every new engine to a brief full power run with subsequent take down and inspection before it is finally assembled for service.

The object of a condition or acceptance test is to determine whether the fits, clearance and adjustments of the individual engine are correct and whether the fuel, ignition and lubricating system are in proper order. A tear-down and inspection of parts after a run for an hour or two at rated load and speed should reveal any serious defect in these items which might later cause a failure.

The same sort of tests also should be made on any engine which has undergone a major overhaul. A brief test should again be made after reassembling and before the engine is taken into the air. This final test may be made either in the laboratory or after the engine is mounted in the plane.

Service Tests

Service tests in which the entire power plant is operated in the plane in flight necessarily lack the accuracy of measurement and the detailed observations of engine condition which are possible in laboratory tests and for this reason cannot replace the latter, particularly where type tests are concerned. On the other hand, laboratory tests are limited in their application as they furnish information only as to the engine itself and not as to the character and reliability of the oil, fuel and water, i.e., the "plumbing" connections between the engine and the plane, the engine mounting or the general adaptability of the engine for service tests and inspection of the carburetors and fuel systems may indicate whether they will function properly under all service conditions. The conclusions thus reached should be checked in service.

The chief function of service tests, therefore, is to show whether the parts of the power plant which connect the engine proper with accessories mounted on the fuselage are reliable, i.e., whether the "plumbing," the wiring, if any, and the structural supports are properly designed and installed. So far as design and workmanship on these parts are concerned, much can be learned from careful inspection by experienced inspectors, particularly as concerns type installations.

From the nature of the case, the information as to the reliability of the power plant, afforded by flight or service tests, is of a rather uncertain and indefinite nature. In general, information is obtained only when some

failure or obvious fault is noted. For instance, one of the most serious faults to be detected by such tests is liability of breakage of oil and fuel lines. In fact, the latter is perhaps the worst single hazard of the power plant. However, provided the piping is of suitable materials and is properly installed, such breakages are largely a matter of chance. There is no assurance that a limited number of flight tests will show all weaknesses in design which still may result in relatively frequent failures. This is typical of most other things on which information is needed from service test results. For this reason flight testing of civilian planes is generally confined to type tests which may show up obvious weaknesses of a design.

While the results of formal flight tests are of limited value, data which only can be obtained in flight are of utmost importance. There is fortunately another means of obtaining these data, viz., by systematic analysis of the records of accidents and of power plant failures. In fact, this is probably the only means whereby the relative safety of different engine and plane designs, and their combinations can be definitely fixed. In order to secure and make available these data there must be full cooperation between the flying personnel, the management of flying fields and the Department of Commerce. With such cooperation, the accumulating data will afford an even firmer foundation for safer and safer power plant design and construction.

The present requirements of the Department of Commerce for airworthiness certificates for engines, should be looked upon as a first step only in securing such safety as can be had through governmental regulation. They set only a minimum standard which will doubtless be made gradually more rigid as commercial power plants improve. In the last analysis, however, safety will depend more on the knowledge, skill and honesty of the designers, production department and the individual mechanic than on any governmental requirements, no matter how rigid and well enforced they may be.

Crossing the Ocean by Air Craft

CHAIRMAN WARNER: Eight years ago there was a little group of people who thought that the obvious way of eliminating the cooling troubles of the aircraft engine was to resort to air cooling. Now we have enrolled among air cooling enthusiasts practically everybody concerned in aviation. The history of air cooling and of air cooled development in this country is summarized in the history of ocean flying. It is interesting to see what has been done in the way of ocean flying and what it shows us about engines.

I think I am correct in saying there have been during the last year six trans-Atlantic crossings by aircraft, including those on the short route, of the North Atlantic, not counting those of the South Atlantic. Of the six, five have been with Wright engines. There have been five complete or partial crossings of the Pacific. By partial I mean at least to the Hawaiian Islands. Of these five have been made with Wright engines, which is a pretty good testimonial to air cooling and to a particular type of engine which has a long history.

All of these remarks tie together because it was one of those bold pioneers in whose experience with engine design and air cooling the history of the Whirlwind engine is summed up, and who symbolizes from his own experience a very large part of the history of air cooling applying to aircraft engines. We are singularly fortunate in having the second subdivision of this general subject, "Safety Requirements of an Aircraft Engine and Its Installation," presented from the point of view of the designer and manufacturer, by Mr. Charles L. Lawrence.

Safety in Aircraft Engines and Their Installation

By CHARLES L. LAWRENCE

President, Wright Aeronautical Corporation, Paterson, N. J.

1.—Engine Design

A.—GENERAL ENGINE DESIGN: While high performance of aircraft engines in terms of weight per horsepower is of great importance, it is only of interest if the performance is obtained at no sacrifice of reliability, and many elements of design should be particularly considered from this point of view. It is useless to design aircraft engines on the assumption that they will always have expert care, expert use, high grade fuel and good oil. The manufacturer cannot stress too highly the importance of all these factors, but everyone knows that they will not always be possible. The fact that the engine will from time to time be abused must be in the designer's mind. In other words, the margin of safety must be such that minor defects in material and minor carelessness or ignorance on the part of users will not cause failure.

a.—Detonation: In order to obtain a reasonable performance every new engine must be designed for the use of at least as good a quality of aviation gasoline as is obtainable at most flying fields. However, the engineer must not overlook the fact that occasionally such fuel will be impossible to obtain and that the user will be forced to employ whatever fuel is available, possibly, a poor quality of motor car gasoline. This emergency sometimes happens under the conditions of a forced landing, where the full power of the engine may be required to leave the field, and where safe flying requires reaching a considerable altitude. The detonation arising in such emergencies must not cause failure of pistons or cylinders. As in other respects, the engine must be more or less fool-proof.

b.—Oils: Manufacturers of aircraft engines usually specify certain brands of oil which should be used in their particular engine, or at least give a specification of such oil. It has been my experience that most users of aircraft either through the sales talk of someone, or from the natural desire to experiment are always anxious to use some other oil than the ones which are recommended. The designer might as well face this fact in designing an engine and any power plant which can only operate satisfactorily with very special lubricants, is bound to be unsatisfactory, to the average run of airplane operators.

c.—Lubrication of Minor Parts: Nothing indicates the different degree of care with which aircraft engines are maintained in the field as much as the care and lubrication of minor parts of the engine. Some users are very particular about this, while others will allow the engine to run for a great many hours before attending to the lubrication of the less important parts. The lubrication of rocker boxes of air-cooled engines is a case in point. Some users lubricate these parts very frequently, while others are very careless about this, and, frequently, do not use the proper quality of oil. The designer must recognize this and so design the parts of the engine requiring outside lubrication that they will run for a long period without attention and if, on the other hand, they are lubricated too frequently, see that the oil does not leak out over the outside of the engine.

d.—Minor Defects in Material: Aircraft engines are designed on the assumption that a very high quality of material is used throughout, but in the manufacture of any product on a large scale, and even with the very best inspection, small defects of material, especially in the case of steel, are liable to occur. It is impossible to expect the material to be perfect and sufficient factors of safety must be provided in order to allow for the minor defects which will undoubtedly exist.

e.—Running at More Than Rated Speed: Another point which should be taken into consideration is the high speed at which some of the engines will be run in competition. Given a rated speed, for which the engine is guaranteed, it is certain that most of the competitors in a race or aerial tour, will run their engines considerably faster than the speed recommended by the manufacturer, perhaps for a period as much as twenty or thirty hours, and it is essential that the valve gear, connecting rod bearings, and other moving parts of the engine, shall be easily able to stand this overload. Otherwise, the engine will get a bad reputation and serious accidents may occur.

B.—DESIGN DETAILS CONTRIBUTING TO SAFE OPERATION

a.—Measures to Prevent Ice Forming in Carburetor: It is well known that in low temperatures, and especially under certain conditions of cold and humidity that ice will form in the carburetor of aircraft engines, and that even if this does not occur, the use of very cold air in the intake manifold tends to prevent proper carburetion with the consequent increase in the fuel consumption. There is a difference of thought on the best method of overcoming this difficulty, but it is certain that either heating of the intake air or the use of a hot spot between the carburetor and the engine or both are necessary for the proper operation of an engine in cold weather, or at high altitudes, and this problem must be satisfactorily worked out by the engineer before the engine is fit for use.

b.—Air Cleaners, etc.: Another accessory that must be provided by the engine manufacturer is a method of preventing sand or water getting into the carburetor. Under the dust conditions of some of our fields in the South and Southwest, so much sand may be taken into an engine as to completely destroy the major working parts in as little as fifteen hours of running, necessitating the entire replacing of cylinders and pistons. This is particularly the case in the type of radial engine having its intake at the bottom. In this case, it is necessary to equip the engine with some air cleaner which will catch most of the sand and dust. It is possible that an air intake at the top or at the side of the cowl will overcome this difficulty, although the V type of water cooled engine with the carburetor intake in the Vee is also subject to this difficulty, but to a lesser degree. Some simple form of air cleaner may be the ultimate solution. For use in seaplanes where the propeller stirs up a very considerable spray, protection against water is necessary, as otherwise, the engine will frequently draw in so much water as to foul the spark plugs. And in the case of a seaplane which has landed and is taxiing to its mooring or mother ship the salt spray which gets in through the carburetor will cause rust in the piston rings and valves guides.

c.—Ignition Wires: Another important detail that should be looked to is the chafing of ignition wires or their deterioration through heat or contact with oil. This presents no particular problem, except that the engineer must study the design of a suitable ignition manifold which will properly protect the ignition wires.

d.—Multiple Valve Springs: Another design detail which is desirable is the use of more than one valve spring to each valve, so that the breakage of a spring will not completely cripple the operation of that cylinder.

e.—Broken Valves: Another desirable detail is some method of preventing broken valves from falling into the cylinders. Although engines often have completed their flight with a broken valve in the cylinder head, the damage always necessitates the replacing of the cylinder and piston, and in many cases, causes a wreck of the entire engi: ..

f.—Dual Ignition: Partial failure of the ignition apparatus must be provided for by dual ignition. Possibly, not in the source of the current supply, but at least by the use of dual breakers, dual distributors and dual spark plugs. Inci-

dently, it is well known that dual ignition properly synchronized, produces additional power and to a certain extent overcomes detonation.

g.—Oil Strainers: The oil system must be designed so that no dirt or chips can get into any of the pumps. It is usually considered inadvisable to place a strainer in the suction line between the tank and the pressure oil pump. When the oil is cold, it may be impossible to draw oil through such a strainer into the pressure pump, and bearing failure may ensue from lack of lubrication. On the other hand, an oil screen between the pressure pump and the engine must be sufficiently large so that it cannot be clogged by dirt in the course of a few hours. Otherwise, the oil pressure will burst the screen and the dirt will all be discharged into the engine. The screen in the oil return from the engine sump to the scavenging pump need not be of a fine mesh, but is necessary to prevent large chips getting into the pump which might break or jam the gears. Needless to say, the oil strainers should be so located that they are easily accessible. The engine designer should use his imagination as to how the average aircraft builder will probably locate the elements of his engine mount and place the strainer in a position where it can be most easily removed. Otherwise, the strainer will be cleaned infrequently and the reputation and reliability of the engine will suffer.

h.—Rotary Induction: Up to now most aircraft engines have had the ordinary motor car arrangement of carburetor and manifold, usually not more than three or at the most four cylinders to one carburetor intake. Recently, rotary induction with all cylinders on one manifold has been adopted by some manufacturers. Rotary induction has the advantage of giving distinctly better distribution to all of the cylinders. But, on the other hand, the failure of a single inlet valve which may stick open, will greatly interfere with the operation of the remaining cylinders possibly stopping the engine although the rotary induction may be sufficiently powerful to force some mixture into all the cylinders in spite of the leakage around the stuck valve. In a military operation where one of the intake pipes is shot through by a bullet, a similar leakage would occur. With the old system as used in motor cars complete failure cannot occur. In the case of a nine cylinder engine, if a valve were to stick open, it would only incapacitate three cylinders connected with that manifold and the other six would continue to operate; however, the distribution and fuel consumption with this system is less efficient than with the rotary induction. The aircraft engine designer must balance the advantages and disadvantages of these two systems in laying out his engine, considering on the one hand the safety of the old system and, on the other hand, the better fuel consumption and the ability to supercharge of the more recent system.

i.—Accessibility of Accessories: A moment ago I spoke of the accessibility of oil strainers, but I wish to point out that all the accessories of the engine must be carefully considered with a sympathetic thought for the problems of the aircraft engineer who has to install the engine. Enough stress cannot be laid upon the important accessible accessories and influence upon the mind of the user.

2.—Engine Testing

A very natural tendency of many companies building the experimental engines of a new model is to exercise more care with the first engines, than with the subsequent manufactured product which often has also been modified for manufacturing reasons, with the result that the tests of the new model do not give a proper idea of the possible weak points of the manufactured engine. Such experimental engines generally are carefully built by the best mechanics with a certain amount of hand fitting and from carefully selected materials, and are tested under good conditions of weather, fuel, oil and maintenance. The tests, often, are not very severe, the intention being to carry on more severe testing later on

the manufactured product, but to pass some kind of a type test as soon as possible. This later testing is often delayed, due to lack of testing equipment, the necessity of testing other models, or false ideas of economy, so that the first information of the limitations of this particular design often come from the hands of users. It is a natural tendency of engineers to assume that the user is an ignorant person who "has abused the motor," thus, in their minds establishing an alibi.

A.—TORQUE STAND OR DYNAMAMETER TESTING

a.—Testing Under Conditions of Overload: Actually, the complete testing of a new model should be carried out as soon as possible after the first manufactured engine has been completed to find out all its weak points, both in respect to design and material, and also to check up on the unexpected and unexplained difference which nearly always occurs between the hand made engine and the manufactured one. Duration tests should be run at considerably higher speeds than at which the engine is to be rated, and, if the engine is equipped with rotary induction, by turning this into a supercharger so as to obtain a higher volumetric efficiency than is normally used, or in the case of an engine of the type having an ordinary carburetor and manifold, by means of an attached super-charger such as a Roots blower. High compression can also be used in these tests, though of course it is obvious that some anti-knock fuel will be necessary. Finally, runs at high speed accompanied by high mean effective pressure will give a test which will demonstrate any weak points that may exist and incidentally prepare for the development of future models. Another important test is a duration test using ordinary motor car gasoline to determine the amount of damage, if any, this inferior fuel oil will cause. Parts that are supposed to be oiled only occasionally should be given no lubrication during a long duration run, which can be combined with one of the other tests to determine the amount of wear this severe treatment will produce. Another endurance test should be run at a very lean mixture to determine whether it is possible to overheat the engine by this process. Nothing, in the case of air cooled engines, will show up a defective cylinder design more quickly than running with a lean mixture. And in the case of engines having a rotary induction system, where the distribution is very good it may be possible to lean the mixture to such an extent as to cause high cylinder temperatures. The piston and valves must be developed until they are able to stand this treatment.

b.—Testing to Check Design Changes: Frequently, changes in design are made which, to the engineers at the time, seem unimportant but it is surprising how often some apparently minor change will cause trouble where it is least expected and except in a change of the most minor description, it is good policy to run tests sufficiently comprehensive to insure that no change in the operation of the engine has occurred.

B.—FLIGHT TESTING TO CHECK OPERATION UNDER ALL POSSIBLE CONDITIONS

a.—Operation of Carburetor at Altitude: All manufacturers of aircraft engines should have at their disposal suitable aircraft with which they can conduct flight tests of the engines which they are developing. The importance of these tests is very great and unless they are carried on by the manufacturer it will devolve upon the unfortunate user of the engine to make these experiments for them. The most important flight testing of a new engine is carburetor testing at high altitude and checking the range of the mixture control. This testing should be carried on in conjunction with the representative of the carburetor manufacturer and may involve the design of whatever heating attachments are provided, and which I will touch upon later. Often, it will be found that a mixture control is

too sensitive or that it is not sensitive enough, and, in order to give the pilot proper control of the mixture it should be so regulated that the full throw of the mixture control lever will control the mixture through the range necessary for the operation of the motor. The fuel consumption curve should be checked under propeller load conditions, to be sure that no abnormal lean or rich spot occurs within the flying range.

b.—Hot and Cold Weather Testing: Until an engine has been in the air under conditions of both very hot and very cold weather, the engine manufacturer is unable to determine how it is going to behave. Conditions of both very hot and very cold weather are particularly important for the water cooled engine, and very cold weather for the air cooled engine. These tests will show the amount of radiator area which is necessary and the amount of cooling that will be required for the oil and whether the ventilation of the cowl is adequate, while very cold conditions will affect the carburetion and the entire lubrication system. These tests cannot be made in a few days, and the complete results can only be obtained through long months of intensive flying.

c.—Intake Protection Tests: While these tests are going on, other experiments should be made to determine whether the intake system is properly protected against dust and water with tests of various air cleaners, which may even go to the extent of producing an artificial dust by the slip stream of another airplane so as to simulate the conditions which obtain where a lot of aircraft are gathered on the same field.

d.—Exhaust Collector Experiments: Experiments with exhaust collectors are also very important. If these are not supplied by the engine manufacturer, which is a very desirable thing, they will be furnished by the airplane builder, and unless the engine manufacturer has complete data on the cross section area and proper design of such manifolds, it is certain that a lot of unsatisfactory attempts at manifold construction will be made by the airplane builders. Their natural tendency is to make the exhaust collector too small in cross section, causing back pressure, heating of the exhaust valves, and loss of power.

3.—Engine Installation

A.—Engine Mounts: In the installation of engines in aircraft, the problems are as many as there are different types of planes, but they all have certain features in common. The mounting of engines in aircraft and the structure by which they are held is properly a subject which concerns the airplane designer. Unless the mount is so designed as to properly withstand the torque reaction, the engine will vibrate, and carburetion will be bad.

a.—Torque Reaction: The engine mounting must be sufficiently rigid to withstand the torque reaction of the engine and this rigidity must be carried back into the ship until it is finally communicated to the wing structure. In the case of geared engines, this is a matter of no small importance, for in some cases, a poorly designed mount has been the means of condemning a perfectly good engine, when the real fault was with the airplane. I can recall at one time when I was building small three cylinder engines, scarcely any manufacturer installed these engines properly. When a strong enough mount was provided with a proper tie into the wings, the engines ran very smoothly.

b.—Engine Mount Design: It goes without saying that no member of the engine mount should be subject to vibration, nor should they, in the case of tubular mounts be subject to bending stresses. Yet I have noticed occasional cases in tubular mounts where some of the struts did not come together at the junction points, so as to form triangles everywhere, but were so separated as to cause considerable bending moments. Such design cannot help causing local stresses which may result in crystallization.

B.—FUEL SYSTEM

a.—Solid Construction: It is most important that the fuel system of all airplanes be properly engineered and designed with heavy gauge tubing and proper fittings of an approved type, such, for instance, as those used by the Army and Navy. The tubes must be properly supported at suitable intervals so that no vibration can occur and all fittings must be sufficiently strong so that the efforts of an energetic mechanic with a powerful wrench will not wreck them too easily. They must be laid out to avoid all vertical bends which might cause them to be air-bound and a new installation should be tested in every flying position before leaving the flying field in order to be sure that no airbound condition can exist.

b.—Suction Lines With Small Lift: All suction lines must have as small a lift as possible especially when tanks are nearly empty. Although they may operate properly at sea level, the suction may break down at high altitude if the lift is too great, and for this reason it is advisable to take advantage of gravity for the flow of fuel as much as possible. In any installation where fuel must be located well below the fuel pump, as in the hull of a flying boat, or in the pontoon of a seaplane, it is necessary to have a separate fuel pump located in the tank and driven by a flexible shaft, a windmill or an electric motor.

c.—Traps for Water: Enough stress cannot be laid upon the matter of proper traps to catch any water that may be found in the gasoline. The condensation of water in the tanks often accumulates in considerable quantities in or at the carburetor and unless caught in a trap will interfere with the operation of the engine, and in case of cold weather will freeze below the jets and prevent the flow of fuel.

c.—Protection Against Fire: In designing the part of the gasoline system inside the cowl, it is very important that the arrangement of pipes should be such that in case of a breakage of any part of the gasoline line, the consequent discharge can under no circumstance come near the carburetor inlet, either in the form of vapor or fluid. After such a breakage, the fuel in the carburetor float chamber will be quickly exhausted and will usually be followed by a backfire in the carburetor intake. If the air scoop is too near the gas flow from the broken pipe a fire may ensue. Carburetor air intakes located at the top or side of the cowl are therefore desirable, and should be air tight.

C.—OIL SYSTEM

a.—Protection Against Cold and Heat: A difficulty in the oil system of airplanes in cold weather is the sluggish flow of oil to the pressure pump and the pipe from the tank to the suction side of the pressure pump should therefore be of ample proportions. This, and all external pipes on the engine, should be adequately protected against cold by cowling with adjustable openings so that the oil system can be maintained sufficiently cool in hot weather and protected from the cold in winter. Cool oil will do more to insure a large number of hours between overhauls than any other one thing, except the exclusion of dust and proper inspection, and an oil cooler located within the cowl where the temperature can be controlled by shutters is a very valuable adjunct to any power plant.

b.—Reserve Oil Capacity: It must be remembered although the oil consumption of modern aircraft engines is very low under normal conditions, that through any condition of undue wear in the cylinders or through some failure of the piston rings, considerable clearance can develop within a short time with a consequent sudden increase in oil consumption. Therefore, the oil tank should be very much more than sufficient to supply the usual needs of the engine. Oil consumption of say .02 pounds per horsepower hour is usual, but the tank should be at least designed to take care of an oil consumption of .04 or .05 pounds per horsepower

hour. I have already spoken of oil strainers, but in this connection I again wish to bring home the point of having them easily accessible.

D.—COWLING

a.—Cooling of Crank Case: Cowling is provided on an engine in order to complete the stream line form of the fuselage, but must provide for proper cooling of the parts of the engine which are covered up. The general tendency, especially in the case of air cooled engines is to cool the head of the cylinders which are in the slip stream, but to neglect the crank case and cylinder barrels. The cylinder head cooling is of no possible interest if the other parts of the engine are allowed to get too hot and the proper supply of cold air must at all times flow inside the cowl, not only through large enough openings to let it in, but as is often overlooked, through just as large openings, to let the air escape. This air flow will also take care of the oil cooling and should be controlled by shutters.

c.—Cooling of Exhaust Collectors: The exhaust collector, whether it is supplied by the engine builder or by others, must be so designed that the air flow can pass on all sides of it, and that no spot becomes very hot. This is important, not only from the point of view of the life of the collector, but also as a protection against fires in a crash. The British have developed exhaust collectors where no part of the collector reaches a temperature sufficient to ignite the hot oil which might be projected upon it from the crank case at the time of an accident.

E.—CONTROLS

a.—Strong Controls: Controls shall be positive and strong so that a pilot can use, if necessary, considerable strength without damaging anything. They must be positive in both directions and free from play or vibration. It is very desirable to avoid all offset rods whenever possible, or if this is impossible, to provide operating rods of good diameter.

b.—Sensitive Controls: The controls shall have the proper degree of sensitiveness with leverages so worked out that the full motion of the control handle by the pilot produces exactly a full movement of the lever on the carburetor, magneto or other device.

c.—Standard Operation: Needless to say, all controls should have a standard direction of operation and be suitably and comprehensibly marked.

4.—Inspection of Aircraft Engines

a.—The inspection of aircraft engines, properly carried out, has more influence on the success or failure of any airline or military operation than any other single thing connected with flying. The personnel should be trained in the inspection of all details of the engine after specified numbers of hours and all this should be systematically carried out and nothing overlooked.

b.—Inspection Sheets: In order that this be done in the most efficient way without any possibility of error, all aircraft engine inspection should be suitably worked out on a printed chart, indicating exactly after how many hours of running each detail of inspection shall take place. In order that the chart may be comprehensive enough and worked out to cover the proper periods of time between inspections, it should be based on other inspection charts for the same engine already in use and should be submitted to the engine manufacturer for criticism. It can then be further developed by such changes as may from time to time appear best to the user. Mechanics should be given no leeway with regard to changing any of the system laid down unless officially approved by the management.

The third paper, prepared by Captain L. M. Woolson of the Packard Motor Car Company on "Field Service and Maintenance of Aircraft Engines" was read by Mr. G. J. Mead, Vice-President of the Pratt & Whitney Aircraft Engine Corporation.

Field Service and Maintenance of Aircraft Engines

By L. M. WOOLSON

Aeronautical and Research Engineer, Packard Motor Company, Detroit, Mich.

The general subject of field service and maintenance of aircraft engines admits of such broad interpretation that I am limiting my remarks to those phases of the subject which should be particularly apparent to the engine designer.

I have always claimed that a certain amount of actual operating experience in the field on the part of the designer, particularly with a new design of engine, is indispensable. Many engineers claim that such field experience is entirely unnecessary and state that if the engine is put through a standard course of ground testing that is all that is necessary. I have always been opposed to this viewpoint, as evidenced by the fact that I have participated in the initial trial flights of every new Packard aircraft engine during the past several years. In this fashion it is possible to anticipate and avoid considerable field maintenance work which would otherwise become necessary and it is this thought that "prevention is better than cure" that justifies the following remarks under the heading of this paper.

Considering first of all the questions involving the durability of the engine, it has been shown in the past that even the most strenuous ground testing does not bring into play some of the forces brought about in actual flying. Typical examples common to many different makes of aircraft engines are found in timing gear failures, for example. Such failures in the air are undoubtedly brought about by crankshaft torsional vibrations which are not present in ground testing either on the dynamometer or with test clubs. Supercharger drives have also given trouble in the air in a relatively few hours, whereas duration tests on the ground failed to reveal any weaknesses.

Then again, take the question of accessibility. We all appreciate how important an item this is in reducing the cost of operation and maintenance and yet it is very difficult to criticize an engine from this standpoint when on the test block. Certain important parts of the engine which must be accessible, such as gasoline and oil screens, may be very inaccessible after the engine is installed in the plane, and a simple change in either the engine or plane design may overcome this difficulty. Similarly, engine controls may need revision in location after the engine has once been installed in a plane and the proper action taken by either the engine or plane designer before quantity production is started will save countless hours in the field later.

Then again, the question of proper functioning of the engine in the air can never be foretold with certainty. Influence of the slip stream on carburetion, engine pick-up after a long glide, and ice formation in the carburetor under critical conditions of atmospheric humidity and temperature are simple instances of questions which arise in actual service and should be settled satisfactorily by the engine designer so as to avoid service troubles later.

In many cases it has been customary to rely solely on the test pilot's report as to the behavior of the engine in flight and to believe implicitly his diagnosis of possible troubles. Even the judgment of the best of pilots is by no means infallible and in many cases the pilot is more concerned with the handling of the ship than the action of the engine, so that the proper thought is not given to those

characteristics of engine operation, in which the engine designer is vitally interested.

In this connection I recall a rather amusing incident when the pilot insisted that a certain engine was developing roughness at regular intervals and he was convinced the engine should be pulled out for examination. Accompanying him on a flight I found that the roughness came in as reported, but it was due to tail flutter, certainly far removed from the engine!

And lastly, the engine designer gains invaluable experience from riding behind his engine. Frequently this brings about rather insignificant appearing changes, but nevertheless changes of vast importance from the safety standpoint. For example, a forced landing from the breaking of an oil line rigidly attached to the engine will develop a modification to the engine oil connection which forces the plane builder to install a flexible hose connection at this vital point. Or similarly, experience with fire in the air due to the breakage of a gasoline line fastened rigidly to the engine and free to vibrate between the engine and firewall will make the engine designer sit up and take notice and provide a connection on the engine which permits of nothing else but a flexible connection to the airplane piping.

To state that all engine service troubles were due to the engine designer and were preventable, of course, is going too far, but there are innumerable cases where service troubles or delays can be avoided by minor changes in design. As an instance, many engines have been designed to require a special propeller hub wrench which is naturally too heavy to carry around with the ship and frequently cannot be found around the hangar. A few years ago some bright genius made a propeller retaining nut which was tightened up by means of a 1-inch bar passed through the nut. This design has been extensively copied and deserves to be, for the simple reason that it is no longer necessary to look for a special wrench, but merely for a round bar, which can be easily located practically anywhere.

Another bane of the service man's existence is the lack of uniformity in the sizes of hexagon nuts, plugs and screws used around an aircraft engine. The result is that his kit of tools must include wrenches for a great many sizes which differ perhaps only by one-sixteenth inch measured across the flats. It would frequently happen that the addition of a few ounces in weight to an engine would result in reducing the number of various sizes of hexagons so that the saving in weight of several pounds in wrenches to be carried could be attained.

Another question on which there is a wide variation of opinion and which should be settled in the interest of conserving the service man's time is the matter of safetying bolts, nuts, screws, plugs, etc. Years ago it was considered essential that everything should be either cotterpinned or safety-wired around an airplane engine. Nowadays a more liberal attitude is adopted, and while everybody is agreed that parts inside the engine should be cotterpinned or safety-wired in an approved fashion, the same procedure is not usually adopted on parts outside the engine which are visible for inspection.

So far as my personal opinion is concerned, I do not believe that either cotterpins or safety-wire are really essential on any fastenings outside of an engine. It is certainly true, however, that from an inspection standpoint it is much more satisfactory to look over a job and see the cotterpins and safety-wire installed in an approved fashion rather than have to judge by the appearance of or actually try a wrench on each bolt or nut to be inspected. From the service man's standpoint, however, both cotterpins and safety-wire materially lengthen the time necessary for making adjustments or repairs and consideration should be given to eliminating such locking means wherever considered practicable.

Another question worthy of serious consideration is that of brass or steel plugs entered into threads cut in aluminum. There are a great many places around

an airplane engine where such practice is countenanced, and I am referring, of course, to such plugs as are removed for inspection or repair purposes from time to time and not studs which are anchored in aluminum and not intended to be removed. For example, carburetor strainer plugs are almost invariably screwed into aluminum, and should a careless mechanic get the threads slightly crossed or should the parts be put together without the proper compound on the threads there are very good chances of spoiling the whole assembly through damaging the threads. I believe that such instances represent cases where the demand for light weight has gone too far, and I think that steel or brass inserts should be invariably used in the aluminum to avoid the damage to soft threads. A possible exception is in the case of spark plug threads in aluminum cylinder heads of air-cooled engines, and it would be very interesting to gather some statistics as to how satisfactory such construction has proven in the field.

Although engine designers are fighting weight increases at every turn, it is believed that the provision of permanent lifting eyes or hooks on an aircraft engine are warranted. This perhaps might not apply to well organized transport lines which are well standardized on their equipment and have all their shops supplied with standardized lifting devices, since in such cases carrying around the extra weight of the lifting hooks, theoretically at least, robs the plane of that much pay load. However, in the case of the privately owned plane or the independent operator it certainly would seem advisable to have such lifting means permanently attached to the engine.

These few remarks have been offered in the hope that they may help in some slight measure to bring about an improvement in the much needed co-operation between the man in the field who is operating and maintaining aircraft engines and the engine designer. Good constructive criticism on the part of the field man, pointing out how simple changes might improve accessibility or durability, would be a fair exchange for the engine designer's assistance in providing such aids to the service man as have been briefly touched upon. Co-operation between the engine designer, the field service man and the pilot will be very valuable in working out designs for engine repair stands, valve lifters, piston ring compressors, pullers of various descriptions and the few special wrenches that any good design may require.

General Discussion of the Papers

(The three papers were then opened for discussion by the chairman.)

MR. MEAD (Pratt & Whitney Aircraft Engine Corporation, Hartford, Conn.): I think it is only fair to say that in the well-established transportation companies and likewise in the case of the plane manufacturers, the engine builder now receives cooperation such as he wished he could have received a number of years ago. There is a constant interchange of information, trouble reports coming in from the operator and changes going out to correct the troubles from the manufacturer.

CHAIRMAN WARNER: The appropriate subtitle of that paper would be "The Infinite Importance of Little Things."

It is not merely those who are engine designers who can make valuable contributions to the discussion of these papers. The subject of safety is one that interests the potential consumer of air travel and the non-technical lay viewpoint is often of the utmost importance. Obviously, likewise, the viewpoint of the man who uses the engine, any pilot, is of very great importance.

F. J. D. FULLER (White, Weld & Company, New York City): I am a layman and I feel that perhaps I represent those who believe almost anything they read. We only hear gossip that is rather contradictory and don't know exactly what to believe. I have heard stressed this morning the importance of cooperation between

the engine designer, those who are testing the engines, and also those in charge of maintenance. There is one point I have not heard discussed, but which is important and that is the cooperation between the aircraft engine designer and the airplane designer. The aircraft engine designer will always face the problem of improper use of aircraft engines, and if as a result of improper use failures occur, the aircraft engine manufacturer will be forced to take responsibility whether he wants to or not. I have in mind the use of an engine of lower power than is necessary on certain planes requiring the engine to be driven at excessive r.p.m. resulting in more frequent failures than would otherwise occur.

I have also in mind multi-engine planes. I think the public is under some delusion, perhaps, as to the safety provided by more than one engine. It seems to me that perhaps a multi-engine plane when it once has attained its altitude may be safer because it has a wider choice of landing terrain. As to the increased safety on the take-off or immediately after, I am in great doubt.

CHAIRMAN WARNER: The matter of cooperation between the engine designer and the airplane designer is certainly of the utmost importance. Mr. Fuller suggests, when he speaks of overloading the engine to another matter of importance, the real significance of the term "cruising speed." Cruising speed in some cases seems to be anything that the manufacturer of the airplane likes to make it, but in other instances where it does conform to some kind of standard, it is stated on a more or less fixed per cent of the maximum power output and r.p.m. of the engine, somewhere around 85 per cent of maximum.

There is one man who occupies a very prominent position in the aircraft engine field—who states that to rate engines at 15 per cent less than the maximum normal rated speed, is nonsense. It is perfectly justifiable to push the cruising speed up and it ought to be justifiable to run the engine for long periods of time at a point very close to its so-called rated power and speed. Is 85 per cent a figure that contains any particular virtue or is there any other figure which we can establish to mark the level at which we are justified in expecting an engine to run with commercial economy for long periods?

On the general topic of the power of the airplane manufacturer to ruin the performance of the engine and the reputation of the engine builder. I may say that an eminent engineer in this field has repeatedly expressed to me the conviction that the airplane engine manufacturer ought to take over more responsibility. He ought to design the engine mount, and the exhaust manifold, and even the cowlings of the airplane and give a complete detachable power plant unit with everything pertaining to the power plant included in it so far as possible, and it ought to be bolted under the front of the airplane, naturally with a certain amount of option in form to fit various forms in designs.

LEE D. WARRENDER (Vacuum Oil Company, New York City): Dr. Dickinson spoke of the failure due to cooling and lubrication of about 2 per cent. May I ask if that is in operation or in laboratories?

H. C. DICKINSON (Bureau of Standards, Department of Commerce, Washington, D. C.): This percentage is based on the records of the Department of Commerce on accidents in civilian flying for the first six months of the current year, not in laboratory test, but in service. In laboratory tests, I believe we have had no failures due to lubrication directly. There have been some failures or near failures or some rejections due to failure in cooling, but it should be recognized that those are more or less experimental designs, and where failures have been due to failure in cooling, it has merely been a question of revising the design to make it satisfactory.

W. C. NAYLOR (Stout Engineering & Finance Company, Dearborn, Mich.): May I ask Mr. Lawrence, and Mr. Mead also, what has been their experience on rubber motor mounts or other means of dampening the vibration of radial engines?

CHARLES L. LAWRENCE (Wright Aeronautical Corporation, Paterson, N. J.): I will begin with the question of rubber mounts. I know the National Air Transport Company has taken to mounting all its Liberty engines on a rubber motor mount with a very increased length of time between overhauls so they now run above 200 hours. Curiously enough, one thing they found was that they practically eliminated the difficulty of cracked water jackets which does not seem to have any very close connection with the engine mount. There may be a vibration of a very high period which caused some vibration in the water jackets of the Liberty engine, causing it to crack.

With regard to the vibration of nine cylinder radial engines, I believe Mr. Mead will agree with me that in a great many cases where we hear of such vibration, it is traced to unbalanced propellers, but there is no doubt that the engine equipped with a rotary induction system is a very much smoother running engine than the type having the regular triple carburetor such as we used on the J-5 Whirlwind. When the distribution is improved by the rotary induction, the engine becomes about as smooth as the smoothest motor car, and I think when some of you gentlemen have the opportunity of trying that type of engine, you will find that it is exceedingly smooth.

Somebody asked about cooling of engines on test. There was a question of how much failure was due to cooling and how much failure was due to lubrication. In the past the air cooled engine builder has had a great deal of trouble in developing suitable test stands and dynamometers which would cool the engine, especially in hot weather, due to insufficient air space and the fact that very high power for a blower was needed in order to circulate the air properly. We all underestimated the power necessary with the result that most air cooled engine dynamometers, electric dynamometers, did not have an adequate supply of air. We have always been handicapped and always found when the engines were mounted in ships and flown they cooled much better than in the laboratory.

With regard to the rated horsepower, Secretary Warner said that somebody had spoken to him about the fallacy of running at eight tenths or nine tenths of rated power. Why not run at the rated power all the time? When you run at full power of the engine, say at 1,900, it merely means that 1,900 r.p.m. is the cruising speed. The engine should be able to stand an overload. In other words, the engine could be rated higher if it could stand running at full throttle. If an engine is rated at a certain power and is run at that speed all the time, it merely means you are rating the engine higher. If it will stand it, well and good. The question of rated power is really what the user can find is the satisfactory speed to suit his route.

For instance, the Pitcairn air lines have a very high schedule of speed. They have to run their engines at very nearly full throttle all the time. Some other users who have an easy route do not need to make so much speed. They can use their engine more lightly. Obviously the man who is hard on his engine will have a shorter life between overhauls and may have more engine failures.

MR. MEAD (Pratt & Whitney Engine Company, Hartford, Conn.): Rubber mounting will probably receive a good deal of attention for a reason other than that of the engine itself. In most three-engine ships with an engine mounted on the nose, there is quite a little vibration transmitted back to the body of the ship, whereas the shutting off of the center engine and running the other two eliminates a lot of this vibration. I think passengers are going to insist that in air transportation we do not go backwards in our standards of comfort.

As to surplus power in rating, it seems to me they are pretty well tied together. If the engine is operated at full throttle the rating is raised.

The Lufthansa in Germany operate at about 65 to 70 per cent of their horsepower. The B. M. W. Company talk about engines being 800 horsepower. They

are actually operated at 500 horse-power with 300 in reserve. That is the sort of surplus horse-power we have to have in this country. It is all right to say we can operate the engines at full throttle or rated power, but it does shorten the life, and what we want for three-engine safety in taking off is ample horse-power. We have all been so worried in this country about keeping the cost down that we have put in the smallest power plant that would possibly do the job. With the air cooled engine it takes very little additional weight to give you a very considerable increase in horse-power. And the difference in first cost is not very much. The cost over the life of the engine will be much less on account of the lower depreciation, resulting in a gain in increased safety with at least no increase in cost.

DR. H. C. DICKINSON: Another phase of the question which Secretary Warner mentioned and which Mr. Mead just discussed is the relation between cruising and rated horse-power and safety. The question of rated horse-power is a perfectly arbitrary one. To say that you operate at 85 per cent rated horse-power does not mean anything whatever, because the rating is arbitrary, and I believe it is rather important for us to develop something which can be recognized as fairly approaching a standard rating. It does not make so much difference what the rating is. It may be the maximum horsepower at which the engine can safely be run or it may be 75 per cent of the maximum horsepower or the maximum speed at which the engine may be safely run, but it should be something fairly consistent.

We have the same program, of course, in a rating of almost everything. An electric lamp is fixed on some arbitrary choice as to the relation between hours of operation and cost of the lamp, but it has been worked out to a fairly definite point so that rating a lamp is a fairly definite thing. A more indefinite case is the rating of a truck. A truck of 3 ton capacity is often run customarily with 6 or 7 tons load and will keep on running. There is no definite standard.

In the case of aircraft engines, it seems to me from our point of view, that we ought to develop a basis which can be standardized to a point where you can say that cruising power should be 85 per cent of rated power or 90 per cent, or whatever the case may be.

CAPTAIN R. W. A. BREWER: I would like to know if the Department of Commerce has any rule by which an engine of a certain type may be rated. It seems to me engines now running get type certificates on any kind of a rating. I have heard of engines getting type certificates issued at very much below the maximum available horsepower of the engine.

DR. DICKINSON: To answer Captain Brewer, I may say that the rating is fairly definitely handled by the department, but it depends to a certain extent necessarily, upon the speed at which the maker is willing to have his engine run. That is, if he presents an engine for test and says that he wants it rated at 1,800 revolutions, for instance; that means he is willing to subject that engine to a 50 hour endurance test at 1,800 revolutions and within 5 per cent of the maximum horsepower which the engine will develop at full throttle at that speed.

There have been a number of cases in which engines have been rated at horsepower very much lower than claimed for them, but in all cases the ratings which have been given out by the department are probably within 5 per cent of the horsepower which the engine will develop at full throttle at the rated speed. In some cases the operation of some of the engines has been somewhat irregular and the ratings have been fixed at the power which can be consistently maintained.

CHAIRMAN WARNER: It seems to me that the logical procedure is for the rating to be determined by the confidence the engine designer has in his own engine. There may be several engines of 800 cubic inch displacement. One man may think his engine will develop 300 horsepower. If it can and if it will run indefinitely at that power, the rating should be allowed.

It goes without saying that the slower you can run an engine or other piece of machinery, the less the wear will be. If we take a lamp and lower the voltage

5 per cent below normal, its life will be greatly increased. It is important to realize that the rating is not at the cruising speed and that the rated power of the engine ought to be a power at which it is capable of operating indefinitely.

In England this summer I had the good fortune to cruise around quite a bit in British machines. In one I flew in, there was a brass plate on the instrument board on which the rated speed of the engine was given as 2,100, and it was capable of operating safely, continuously, and indefinitely at that speed. Of course, though, it would have run much longer without overhaul if cut to 1,800. The engine manufacturer must realize that that is what rating means. Perhaps some of the pilots realize already, that if they run the engine full throttle it is not going to blow up. It should mean merely that the wear will be more rapid. There should not be any liability of structural failures at rated power.

MR. REID (National Advisory Committee, Langley Field, Va.): I wish to concur in our chairman's remarks about the manufacturers of engines designing the engine bearers and cowling, and similar parts. While we have had no particular trouble with engine bearers or mountings, I really believe that that is really part of the engine builders' job because there no doubt can be failures due to mounting. I am sure the engine builders should design the cowling. We are in the midst now of some rather elaborate tests on engine cowling and cooling in our propeller research tunnel, with which you are familiar.

One of a series of tests has been made on a cabin type of monoplane model, full scale, using an air cooled engine. We made some tests first without an engine in place and with the nose of the fuselage well stream lined. Then we made a test with the engine mounted, as is often done, with no cowling whatsoever. Of course under those conditions the fuselage and the engine combination had a very large drag. Then we cowed the engine one-third, two-thirds, three-quarters, and then completely cowed the engine; that is to say, from any viewpoint whatsoever except looking directly through the cowl you could see nothing of the engine.

We have had considerable difficulty with the cooling even with the one-third and two-thirds cowling and we were in a splendid position to know what the cooling was because we had some 60 odd thermo-couples distributed around the engine cylinders. Of course, we knew where the hot spots were, where to make changes in cowling in order to obtain proper cooling. However, the airplane builder or the man who is cowling the engine is not going to be in such an advantageous position. He is not going to have a great many thermo-couples around his engine to find out what his cooling is. Therefore, he is going to build a cowling which cannot be as satisfactory as if the engine builder were to make the study and cowl the engine himself.

We found that with the two-thirds cowling, which is quite common with the air cooled engine, the percentage of drag, (difference in drag between the stream line fuselage with no engine in place and the uncowed engine) was reduced about 30 per cent, whereas with the completely cowed engine, the difference between the uncowed and no engine condition was reduced about 85 per cent. This shows that the performance of the airplanes can be considerably increased, and it seems that the engine builder is in a very good position to do this work and give the aircraft manufacturers the benefit.

LT. C. R. BROWN (Washington, D. C.): I have some statistics here which should be rather interesting to everyone connected with building and manufacture of aircraft engines. During a period of seven years of navy experience there were 115 deaths, fatalities from aircraft accidents, and of those, in only 18 did the aircraft engine figure. Every one of those also had the personnel element introduced. The pilot in one particular case was doing a stunt in a type of engine known to cut out under those conditions. Not a single case of a fatality from engine failure pure and simple is on record during that period.

DR. DICKINSON: Lt. Brown's remarks throw very great credit on the work done by the Navy and also the Army in securing reliability of aircraft engines. As I noted in my paper the reliability of these engines is very high indeed. I think we should not lose sight of the fact, however, that similar statistics on civilian flying involving the proportion of the new commercial engines and large proportion also of the same military engines, show a considerably larger number of accidents due to engine failures. If we aren't careful with the newer engines representing a larger and larger percentage of the total the engine failures are going to account for an even larger percentage of accidents. From the point of view of testing, that is a thing that is giving us a great deal of concern.

ADJOURNMENT .

Power Plant (Continued)

GENERAL JAMES E. FECHET, Chairman

Chief of the Army Air Corps, War Department, Washington, D. C.

The second session on the Power Plant was called to order at 2:50 p. m., by General James E. Fechet, Chief of the Army Air Corps, chairman.

CHAIRMAN FECHET: The first part of the program with which we are concerned is the "Modern Power Plant From the Point of View of Safety," by Mr. George J. Mead, who graduated from the Massachusetts Institute of Technology in 1915. His aeronautical activities consist in service with the Wright-Martin Aircraft Corporation; the Power Plant Laboratory of the Air Service at Dayton, Ohio; as Chief Engineer of the Wright Aeronautical Corporation, and at present as Vice-President of the Pratt & Whitney Aircraft Corporation.

The Modern Power Plant from the Point of View of Safety

By **GEORGE J. MEAD**

Vice-President, The Pratt & Whitney Aircraft Company, Hartford, Conn.

Infalible. That, in a word, is the requirement of a safe aviation power plant when used in heavier-than-air machines. With no other prime mover is the penalty for failure apt to be so severe, and yet the very character of flying requires the weight per horsepower to be a very small fraction of that which is permissible and customary with the others. It used to be thought, and still is by many, that because of their light weight, aviation engines would never be reliable.

The problem, therefore, has been to make the light power plant more reliable than its heavy transportation contemporaries. How well this has been accomplished, may be gathered from the fact that modern power plants, weighing a pound and a half to a pound and three-quarters per horsepower, have run without accident 50,000 to 60,000 miles between overhauls. This is equivalent to some 500 hours of flying. The air cooled type of engine has been of great assistance in meeting the demands of commercial aviation. The elimination of the water cooling system has done away with one of the most prevalent causes of trouble that was encountered with the engines of several years ago. The weight saving, too, has its effect on the safety of the plane from the passenger's standpoint, since it may be put into a greater reserve power. As air cooling has become the accepted standard, I will not attempt to cover the safety situation in regard to water cooled engines.

A powerplant that is 100 per cent safe will continue to propel the plane under all normal flying conditions as long as its supply of fuel and oil is maintained. It will not itself catch fire nor ignite the plane either on the ground or in flight, and it operates without excessive vibration. From this it will be seen that defective design, material, fabrication, installation or operating care may all cause the power plant to stop. The record of safety achieved by the modern power plant is due to the efforts of its manufacturer, its operators and the Government. To fully appreciate the part each has had in this development a general review of their activities will be undertaken. These remarks represent the more or less

composite practices of the few experienced and well established engine builders and plane operators.

The Manufacturer

The manufacturer's work and interest starts with the design, and it might be added, never ends until the engines are all scrapped. Design is a matter of experience in an industry as young and revolutionary as ours. There are very few standards or precedents such as older engineering professions have, to check by. Under these circumstances, the safety of a power plant may be measured to a large extent by the experience of the designer, and the "know how" of the shop. The engineer must first determine the type of power plant to be built. This involves the question of the number and disposition of the cylinders and the proper displacement for the required speed and fuel to be used.

Much of the future success of a design depends upon the amount of displacement provided. If too little, the engine must work harder than necessary, both when taking the plane off and in cruising. A good design involves basic rigidity in the engine structure, and minute attention to the gradual change in section in the various parts. Localized stress cannot be permitted. Serious consideration must be given the matter of vibration when choosing a type. Poor mechanical balance, inherently bad distribution or firing orders cannot be tolerated. Vibration may cause engine failures, but more probably mounting a piping breakage due to crystallization. Provision for ample heat transfer must be made in parts, such as cylinders, pistons, valves and bearings. Hot spots must be avoided, not only on account of causing the parts to become overheated and thus be a fire hazard, but because of limiting the engine's output. Each joint must be made oil tight. This is extremely important as a fire preventive.

It has been found that lubricating oil thrown on hot surfaces of the engine is responsible for most of the fires resulting from a crash. The fuel and oil lines incorporated in the engine must be carefully worked out so that there is no vibration in the piping, and that the joints are properly made and locked. Extreme care must also be used in locking each engine part in some manner so that it cannot become loose or fall off. Ready access to all parts requiring periodic inspection and adjustment is essential. Adequate carburetor control must be provided so that proper mixture may be supplied to the engine under all temperature and barometric conditions.

It is interesting to note that the normal temperature range met in flying over our continent is from -50° F. to $+120^{\circ}$ F. Reliable and waterproof dual ignition is required. A carefully worked out exhaust system is also a necessity. The determination of the proper material and heat treatment for each part is a problem in itself. Uniformity in all material is essential. Here production problems, and the fatigue value of the material must be taken into account, as well as its physical properties. Needless to say, all these factors should come in for detailed consideration in every design. The more carefully they are provided for, the safer the resulting power plant. An experienced manufacturer subjects each new type to a great number of over-load and duration tests of his own before submitting it to a Government type test. It usually takes six months to a year to complete the manufacturer's tests alone, and generally involves the operation of several engines, both on the dynamometers and in flight.

Even after satisfactory experimental engines have been developed, the problem of their duplication has to be solved. This involves quantity procurement of uniformly good materials, tooling up the shop and Inspection Department, and development of the necessary shop "know how." The general public does not realize that our most experienced engineering staffs require nearly three years to develop a new type to the point where the shop is ready to produce it in quantity. It is common practice to incorporate changes in production engines immediately

that they are found necessary, and the change proven. This is very different than is customary in other industries where changes are usually made in new models only. To insure the maximum safety, all users are notified of the change so that they may replace the parts in their own engines which have been improved. To this end, changes are made in such a way that they are applicable in general to all engines of the same type previously built. In this manner continual refinement and improvement are taking place in a design.

Extreme care is used in the manufacturing operations, and these are all checked by the inspection department. In the case of one company, the inspection department reports to the chief engineer instead of the factory manager so that quality, not quantity, is their sole object. Never before has such minute inspection been carried out on such a large scale. The inspection department is responsible for the condition of the material in each part and its dimensional accuracy. All the castings are checked by chemical analysis of the material of each heat, and important castings, for physical properties by means of test pieces attached. In addition to this, they are all given dimensional inspection, particularly for the uniformity of sections and visual inspection for surface imperfections. The steel used for all important parts is analyzed chemically and tested for physical properties. Bar stock is examined by heats for chemical properties and by individual bars for physical properties. The bars of steel for the forgings of the rods and shafts are each chemically tested. The forgings are individually tested for the required physical properties by the use of test pieces which are integrally forged with the part. If the part is small, several are taken at random from each lot and used as test pieces, while all the other forgings in the lot are brinelled.

Extremely careful visual inspection is given each steel part for surface defects, such as seams, cracks and hair lines. To facilitate this work, the parts are etched several times during the process of manufacture and finally given a high polish. All important parts carry numbers all through their manufacture, and retain these in their finished state so that their metallurgical history may be checked back to the raw material. This provides a way to determine the cause of a failure and avoid it in the future. Complete dimensional inspection is provided for and at each stage of the fabrication of the important parts. Before each piece goes to the finished stock room, all its dimensions have been checked by "go" and "no go" gages, micrometers and form gages. A check on this inspection is had by the assembly of the parts. The individual inspection of practically every piece of each engine is a tremendous task, since there are often some 3,000 parts involved.

This all adds considerably to the cost of a power plant, but we feel that the utmost vigilance is absolutely necessary. Each complete engine is run with a propeller load usually at least from eight to ten hours before shipment. Prior to the acceptance test, which is of one hour's duration, each engine is disassembled for inspection. At this time a final check is made of the fits and limits of the running parts. Such a rigid inspection program provides as nearly as possible that every part that reaches the user is perfect from a metallurgical and dimensional standpoint. The matter of inspection has been gone into in detail, as unless one is familiar with the process, it is surprising to find the amount of care exercised and the amount of work involved.

Each type of installation is usually passed on by the engine builder. In this way the builder endeavors to see that a proper mounting is provided and that there is provision for temperature control by means of suitable cowling, correct and substantial piping for the fuel and oil lines, etc., etc. The matter of temperature control of an air cooled engine is extremely important. Not only must some means be provided to regulate the temperature of the lubricating oil, but also of the fuel mixture. It has been shown by the operation of the Transcontinental mail that it is readily possible to have the oil so cold in flight that it will not flow, and that ice may form in the carburetor chokes unless the necessary amount of heat is

provided. The matter of proper installation is of the utmost importance. Records show that many of our present day failures are still due to "plumbing" shortcomings. How often we hear of planes forced down because of fuel line failures or oil line breakage!

The manufacturer usually maintains a service department. This organization covers the country by means of expert service men assigned to various districts. By this means the different installations are checked and immediate assistance made available for any user. The information made available for the designer by this department is invaluable, both as to correcting faults which may appear, as well as improving new models. We have found that most large commercial companies are most helpful in keeping us in constant touch with their operations, especially the Boeing and Western Air Express Companies. This is of the greatest assistance, as their operations are what might be termed a "final" proving ground.

The Operators

The first problem of the user is to determine the amount of power that he will require for each type of airplane. In the case of passenger traffic it is becoming common practice to divide this power into three units. A generous amount of surplus power should be provided. Abroad, Luft-Hansa cruise with 65 to 70 per cent of their full power, so that they have quite a good surplus, while some of our companies have used as much as 85 per cent and even full throttle on their regular runs. The engine installation should be laid out in such a way that the personnel and facilities available along the line can quickly and efficiently take care of it. It is becoming a common practice to send the foremen of the field crews to the plant of the engine manufacturer to become acquainted with each new type which is put in operation on their line. This is the very best way of insuring that the engine receives proper care in service. Practically every well run transportation company has a routine inspection form of power plant items to be checked before each flight. This is a most important procedure from the standpoint of safety. In this manner the necessary routine inspection is not left to chance. Any faulty operation of the power plant is reported by the last pilot, and corrected before the next flight. In this manner the power plant is kept in its most efficient operating condition at all times. No matter how good the engine, it will not run consistently without systematic attention. Besides these inspections, the power plants are completely disassembled every 300 to 500 hours, depending on the service. This is a case of "A stitch in time saves nine," as it is very much safer, as well as cheaper, to discover and correct trouble before it occurs than to remedy it afterwards.

The Government

Several branches of the government are instrumental in checking the reliability of each type of power plant, its various installations, and its operation. Originally the Army and Navy were the only divisions safeguarding the general public. Even this was incidental, and came about because practically all new types of engines were built for either one of the services, and before they were approved, were tested by means of type tests set up by the division. At the present time, passing either the Army or Navy type test is sufficient to obtain a Department of Commerce certificate. Recently the Aeronautics Branch of the Department of Commerce has been established, and all strictly commercial engines must pass its 50-hour type test. This department also passes on plane design, which includes engine installation, and provides for yearly re-inspection.

Suggested Improvements

The occasional failure that still occurs is what we are now anxious to prevent. Naturally, these failures are apt to cause the most serious results in single engined

ships. For this reason multiple-engined ships are the only safe machines for passenger travelling. It is, however, necessary, even in the multi-engined ships, to have ample surplus power so that the ship may continue safely on its way with one power plant inoperative. Analyzing the cause of the failures that occasionally occur even with the modern engine, it seems that they are more or less equally divided between improper design, material fatigue, and defective "plumbing." Very, very few of the failures can be charged to negligence on the part of the inspection departments. How to reduce the number of these failures is our problem. Studying each of the three causes individually, it is possible to make certain suggestions for future improvements.

Design

Most of the design failures are experienced with new models, as might be expected. To overcome this, manufacturers should improve existing power plants wherever possible, and continue them in production until further improvement can only be had by a complete re-design. New engine models brought out solely for the purpose of having new sales talking points should be avoided. This may be all very well in the motor car business, but even with them, an entirely new model is usually in production two or three years before all the "bugs" are eliminated. If an automobile stops no one is hurt, but in aviation it is different. Every change must be proven necessary, and a definite improvement. A really good power plant incorporates the proven suggestions of the engineer, the shop, and operator, collected over a period of years of operation. Regardless of all the testing and care that is taken in manufacture, certain defects show up only in service, so that each really "service perfected" engine type is not to be lightly discarded. An entirely new type or model must go through the same process of refinement covering several years of service operation to be a real improvement over its predecessor. Testing one engine often fails to unearth all of the defects. Several of the engines of an entirely new design should be given a good many hours of real service flying before the type may be considered safe to be released for production.

It is essential that the type tests are sufficiently severe to bring out any latent defects in the design. Unless these tests show up major defects, someone is apt to be injured in a crash before they are discovered. Our commercial flying with modern equipment has been so much more successful than was anticipated, and the engines run so long without the necessity for overhaul that our previous ideas on type tests need revamping. For example, a desirable change might be to make the present Department of Commerce fifty-hour type test one hundred hours at rated power and speed. This does not seem at all too long in view of the performance expected from commercial engines. Running at rated power for this period provides a certain overload which accelerates the wear and fatigue on the parts so that it probably would not be necessary to run three hundred hours as is expected of a commercial engine somewhat throttled. As a matter of fact, the British Air Ministry test is one hundred hours now. In this connection it is interesting to note that the United States Shipping Board require a thirty day continuous test of a new type of Diesel engine.

The wider use of aluminum and magnesium forgings instead of castings is desirable, as it insures greater uniformity of strength. Casting defects are often difficult to detect, such as blow holes, porosity, thin sections, etc.

The Problem of Fatigue

Fatigue is the most difficult problem we have. The principal trouble is that our knowledge is so deficient as regards certain properties of the special alloys that are used, especially the light alloys and valve steels. Constructive aid can be

given us by the metallurgist in providing data on the relative fatigue values of materials, the effect of temperature on these, and also its effect on the elastic limit of the material. From our experience, it seems probable that a good deal of improvement may be made in the properties of our light alloys. Lighter or stronger materials will be of great assistance in improving our strength factors without adding weight. Inspection devices to determine the interior condition of a piece of material, especially steel, would be of great value. Our methods of surface inspection are, practically speaking, perfect, but we do not necessarily know from them whether there is an internal flaw. Fortunately the sections of many parts are comparatively thin so that external inspection is almost sufficient. Nevertheless, we want to eliminate this cause of possible failure entirely.

"Plumbing"

A large proportion of our present forced landings are due to "plumbing" failures. For this reason the plane builder should co-operate to the fullest extent with the engine builder in order that the installation may be made properly in each new type of ship. I am glad to say that this cooperation quite generally exists. It would further be desirable if the Department of Commerce would make an even more careful check of the engine installations in checking and approving each new type of plane. "A chain is no stronger than its weakest link." It is, certainly illogical to perfect both plane and engine and then pay little attention to the combination of the two. This is one part of the plane which has not been improved very much since the days of the Wrights.

The Future

As the industry grows, and because its growth is now extremely rapid, new problems involving safety will confront us. The manufacturer with large unfilled orders may feel the urge to increase his production at the expense of quality. It is not likely that a reputable manufacturer who has been identified with the industry for any great length of time would be guilty of lowering his standard of quality. On the other hand, there are a number of new companies entering the field without experience, and they may unintentionally set up inferior and unsafe standards, which would be a very serious matter.

On account of the rapid growth, we may soon have a shortage of experienced mechanics. The average automobile mechanic without aviation experience is of very little assistance. Good schools for mechanics are most essential. Some of the manufacturers are doing what they can to establish schools at their own plants, but these will not be sufficient to fill the demand.

Universal service is becoming necessary. A country-wide service organization will be essential for every reputable manufacturer. Purchasers will expect this, just as they have in the case of the motor car, and as a matter of fact, it will be the best way in which the manufacturer may safeguard the public. "Genuine" replacement parts will thus be available and intelligent service. The matter of "pirate" parts will be serious, and some way will have to be found to discourage their sale. Since the "pirate" part builder has no particular reputation to sustain, he will not take the care, nor will he have the experience, to make the parts properly.

Those of us who have lived with aviation for some time have learned by experience some facts regarding safety requirements which will bear reiterating. A safe engine is not built to a "price." The builders of small planes have asked for 120 H.P. engines to cost \$1,000. An engine could be built to sell at this price, but in the present small quantities it would either not be a "safe" engine or it would be so heavy per horsepower as to be uninteresting. In aviation, as in everything else, one never gets more than he pays for. Safe aviation power plants involve a great

many expensive operations not required, for instance, in a motor car engine. It is, therefore, not safe to anticipate a proper price based on automobile costs, especially so when the relative quantities involved are considered. Continuous quantity production of a single type will, and is, bringing costs down without sacrificing safety. Of the two, production volume, not design, has the greatest influence on cost.

Another truism is that mere pounds in a power plant are not synonymous with dependability or safety. Commercial engines, in order to have a long life and therefore low rates of depreciation, will weigh something more than a fighting engine. The weight difference need only be slight with proper designing and should be small if the plane in which the engine is used is to carry the maximum pay load. Reverting to our heavy pre-war engines will not make aviation safe. For the most part, these weighed twice as much as the reliable modern power plant. One measure of the efficiency of the commercial plane is weight saved in the plane and engine. In other words, more and more pay load must be more safely carried per horsepower, if we are to progress.

Surplus power is another safety requisite. Underpowered planes are dangerous in high winds or in combating ice-forming moisture on the wings. In avoiding obstacles in a fog, a rapid rate of climb may prevent a crash. This same ability makes it much safer to get out of a small field. This all requires ample power. Fortunately, with an air cooled power plant, surplus power may be provided with the addition of very little weight.

No matter how good a power plant is, and how well it is installed, it will not prove infallible without the proper fuel and oil. Poor fuel is usually used because it is a few cents cheaper a gallon. If the operating costs were analyzed, it would be seen that the fuel cost is approximately 5 per cent of the total cost per mile. The cost of the more frequent overhauls and the new parts, greatly offsets any slight immediate saving. This all affects safety because continued use of low grade fuel ultimately causes piston, spark plug and sometimes valve troubles. In an emergency the modern aircraft engine may be operated on low grade fuel providing it is throttled to prevent knocking. At present "Aviation" gasoline means little or nothing. It depends principally on what part of the country you are in as to how good it is. Straight West Coast fuel is usually good from a knocking standpoint, while East Coast fuel is usually bad, even though they both meet the present Army and Navy specifications. If the East Coast fuel were "doped" satisfactorily so that it equalled the other in anti-knocking properties, the term "Aviation" gasoline would mean something and the resulting uniformity would be a great help towards increasing safety. The chemist could assist us greatly if he would devise some satisfactory means of measuring the anti-knock value of a fuel. We all realize this is a difficult problem, but it needs a satisfactory solution just the same. Lubricating oil of inferior quality or improper viscosity may also cause forced landings due to piston or bearing seizures. Here again the cost of oil is so negligible an item that there is no excuse for running this risk.

The entrance into commercial aviation of the large transportation companies with ample means and experienced executive management has done more, perhaps, to make aviation safe than anything else. Modern equipment is expensive and the individual operator usually could not afford it even though he knew it was much safer and cheaper to operate. In other words, aviation was not showing what it could do. The large operators had the good judgment to use modern equipment exclusively, and it has paid. One of the most valuable things the Guggenheim Fund has done has been to finance a model passenger line and thus show that it was safe to fly with proper equipment. The Western Air Express Company was one of the first to carry passengers on such a large scale in this country. This example and that of the Boeing and N. A. T. Companies, which are now both operating ten and twelve passenger ships, is sufficient to prove to the American business that aviation is here.

Airminded shop personnel is most essential. After all is said and done, our safeguards all depend on the care of the individual, whether he be engineer, mechanic or inspector. If these men fly, even occasionally, they realize the necessity for extreme care. One ride, for example, with the Transcontinental mail will do more towards convincing anyone as to the necessity for extremely efficient inspection than all the talking and regulations.

Commercial aviation has just found its wings, and we are on the threshold of regularly established long distance passenger transportation, thanks to the trail blazing of the Transcontinental mail. Ship and engine types are bound to be influenced by the experience gained in the next few years of commercial operation. Greater safety is going to be the keynote of this development. More accurate design will be possible because of the increased experience of the engines. It is hoped that the chemist and the metallurgist will also add materially to our knowledge, and make available more and more reliable materials to work with. Universal airmindedness will do more to make flying safe than anything else.

Discussion of Mr. Mead's Paper

CHAIRMAN FECHET: Is there any discussion?

CAPTAIN BREWER (of Philadelphia): One of the most important things that we have before us is the question of testing, particularly in view of the fact that so many new makers, are coming on the market, and a good many of them undoubtedly have had no experience, or very little experience as actual designers or manufacturers of aircraft engines. Some of these engines have been taken up as the result of knowledge gained in looking at other people's work, and it is a very different story to criticise other men's mistakes and to put an engine out that doesn't have those mistakes, presumably, but which also embodies very many of the manufacturing tricks to which Mr. Mead referred and which only can be known and understood by people who have had long and extensive experience.

I suggest, in respect to the question of type testing, that it would be very valuable, after a type test has been made, to run the engine to an actual breakdown, for then we would find out some of the weaknesses in the engine which do not develop under ordinary conditions of the type test.

Secondly, I want to endorse strongly Mr. Mead's suggestion that periodic tests of actual production jobs be made, for I think that is extremely important, especially in view of the fact that the type test may be passed by an engine which has been particularly constructed to undergo a type test and nothing else.

Designers of modern commercial engines are always being faced with comparisons with engines designed for military purposes only. I would like to ask Mr. Mead's opinion as to what might be an allowable increase in weight in order to save twenty-five or fifty per cent of the cost of the engine. This is very important to the commercial engine user.

MR. MEAD: None of us have had enough experience to get down to actual figures. The nearest I could come to answering that question would be to venture the opinion that the addition of a quarter of a pound per horsepower or perhaps a half a pound per horsepower would be ample. Our modern military engines are getting down pretty close to a pound and a quarter per horsepower, and our modern commercial engine is somewhat heavier than this. It weighs, depending on the size, between a pound and a half and two pounds per horsepower. We must all appreciate in using this figure that we are required and want to use certain accessories in the small engines that we use in the large engines, and, therefore, the weight per horsepower of the small engine is greater than that of the large engine. On that basis, I should think that a quarter to a half-pound addition for the particular type in mind would be sufficient.

You see, what we meet with is the idea that all you have to do is to put on a quarter of an inch of that or a pound of this or that, and if you keep on doing it you soon would have an engine that very easily weighed four or five pounds per horsepower, and that isn't permissible, as I see it. It is easy for us to take that attitude and just make it heavy. That is easy. But I don't think that is fair to commercial aviation, if we consider all the facts, and we must keep our weight down.

MR. FAYE: How many points did you say there were to inspect in an aircraft engine?

MR. MEAD: It depends on the size, but the average runs about twenty-five hundred to three thousand, including cotter pins and everything else.

J. O. SCHERER (Junkers Corp. of America, New York): May I make a suggestion in connection with the weight of the engine? I think fuel economy and not dollars and cents is the primary consideration. A heavier engine can frequently be built with higher fuel economy than the extremely lightweight engine. The military engine calls for two or three hours of flight, and the lightweight engine is essential. With the commercial machine, I believe that with more pounds in engine weight you get an increase in fuel economy and an increase in fuel economy means longer cruising radius.

MR. MEAD: There are two things to be considered in this connection. The maximum run of the transcontinental air lines, under average weather conditions, is about two and a half or perhaps three hours, and it is then necessary to come down to pick up mail. The same short runs will apply to commercial passenger transportation until our planes are considerably different from what they are now, partly because it is very uncomfortable to sit still in an airplane for a good many hours at a stretch, and partly because it is necessary to pick up and set down passengers at frequent intervals. It does not seem quite as necessary yet to have the long range in a commercial ship that we once thought essential.

You may be hinting at the Diesel engine in your remarks. Diesel engines, of course, are not heavy because of considerations of fuel economy. They are heavy on account of the cycle on which they operate. We have yet to find that the fuel consumption of the Diesel is any better on the average than it is with good gasoline engines, although I will admit that our experience with Diesel engines in this country is small.

MR. SCHERER: I think there is another factor to be considered. The heavier engine is built with a considerably lower r.p.m., giving a higher propeller efficiency. The airplane with the same weight of engine and less power may perform equally well as it will with the fast turning propeller engine with more horsepower.

MR. MEAD: That is again a Diesel argument. It cannot run as fast, so it runs slow. We are having to go up in speed to decrease the weight per horsepower, even though we have to consider safety always. We could arbitrarily slow the engine down to fourteen hundred, but the more advanced way is to try to develop the engines to hold to the present weight, or even less, which can be done by running the speeds up, and yet maintain reliability. In the future we may have a Diesel engine that will compare very favorably in weight with our present engines and that will run perfectly well. I know of a 500-horsepower Diesel engine that was built experimentally in Germany that weighs two and a half pounds per horsepower. That is an engine which has to be seriously considered. But all the early Diesel engines have been too cumbersome and heavy to be considered for aviation purposes. We may next year say that our viewpoint has changed, but at this time the utility of commercial engines does not depend very much on fuel consumption. An extra cost of five per cent in fuel is of little importance. We must also realize that our ideas of speed have changed a great deal. We used to think one hundred miles an hour was all right for a commercial plane, but many of us feel now that it is essential to have higher speed and many manufacturers

are laying down large commercial planes that will cruise at one hundred and twenty-five at the least. It is very likely in the next year that planes will be built that will cruise at nearly one hundred and fifty miles an hour. This will change the problem of propeller efficiency. The faster the speed of the plane, the less need there is of slow propellers.

MR. HENRY REID (Langley Field): I wasn't going to say anything about our work on Diesel engines that the National Advisory Committee did at Langley Field until I heard this brought up.

Theoretically, the Diesel engine has many advantages, and I believe that we will soon see Diesel engines a real competitor of our present-day gasoline engines. It is hard to say how soon that will come, but with our ever increasing speed of attaining knowledge, I think it is coming very soon. Of course, the Diesel engine has some advantages from a safety standpoint. In the first place, it will have no electrical ignition system, with its attendant liability of failure. Furthermore, it will have no carburetor with its liability, under certain conditions, of becoming clogged up with fuel. In addition to that, the Diesel engine burns an oil with a very low flash point, and, of course, in case of crash the danger from fire is very much reduced. In fact, small fires may be easily put out by fuel being dumped under the fire in large quantities.

The Diesel engine is, perhaps, more readily made to operate on the two-stroke cycle, and thereby, by increasing the power per unit weight you can still save in weight of the engine, and in order to have the same strength of engine, you can reduce the weight; or, if you want to increase the safety somewhat or the length of time the engine will operate with a certain amount of overhaul, you can increase its weight to get the requisite strength of the parts.

ADJOURNMENT

Fire Prevention

GENERAL JAMES E. FECHET, Chairman
Chief of the Army Air Corps, War Department, Washington, D. C.

The Session on Fire Prevention was held immediately following, General James Fechet again presiding.

CHAIRMAN FECHET: Fire during flight may be caused by ignition troubles or through the breaking of a gasoline line, the consequent escape of the gasoline and its contact with the hot exhaust pipes or wires causing it to ignite. Fire hazard due to ignition and wiring troubles have been practically eliminated. From the generator to the battery the danger of short circuiting has been largely avoided by placing in the cockpit a control box with circuit breakers. In case these go out of adjustment there is also a master switch which throws off all electrical leads to all parts of the plane excepting to the motor. In addition, the motor leads, or ignition leads, are switched off by independent switches. Independent switches to the radio apparatus, instrument lighting apparatus, landing lights, landing flares and heater apparatus are, of course, a means of cutting off any independent known short circuit which might occur.

Fire may also occur in the magneto in such planes as are equipped with magneto ignition. A fire-proof ventilating hole cap has been devised which diffuses and cools the flame from the vent hole, thus preventing fire outside of the magneto. These caps are applicable to all existing types of magnetos.

Gasoline tanks: These are covered with a heavy rubber fabric envelope of such character that a bullet piercing the tank causes no immediate damage. The rubber fabric closes up the bullet hole and prevents the leakage of gas. This not only prevents fire but conserves the gasoline supply and may allow the pilot to return to his airdrome without a forced landing.

In most military planes there are several types of gasoline tanks, such as the wing, main and auxiliary. In several types of planes provision is also made to carry what is termed a "belly" tank, this to permit an extended cruising radius. In case of trouble during flight the "belly" tanks with their contents can be dropped clear of the plane simply by pulling a lever in the pilot's cockpit. Gasoline being a grave fire hazard in case of a forced landing or in the event a safe landing is doubtful because of a small or strange field, danger of fire may be avoided by pulling another lever which releases all the gasoline supply in the space of a few seconds, the lever opening a large valve in the bottom of the gasoline tank.

Pyrene: In the newer types of planes the motor can be drenched with pyrene simply by pulling a knob in front of the pilot. In case of trouble the pilot rarely has much time to pull a fire extinguisher from its socket and spray the motor. In addition, the air blast practically prevents any beneficial effects through such a method. With the present system the pyrene sprays the entire motor, leaving the pilot and passengers free to control the plane and devote the limited time at their disposal to other matters requiring immediate attention.

We shall now hear the paper prepared by Captain Oliver P. Echols, U. S. Army Air Corps, Wright Field, Dayton, Ohio.

Fire Prevention in Modern Airplanes and Recent Experimentation

By CAPT. O. P. ECHOLS

Chief, Equipment Branch, Material Division, Wright Field, Dayton, Ohio

There are available no statistics on the airplane casualties due to fires during the recent war. Everyone knows that there was a large loss of life due to both fires in the air and fires due to crashes. On the front, the greatest fire hazard was due to bullets in the gas tanks, and as far as can be determined the only real efforts at fire prevention, or the reduction of casualties therefrom, were the covering of the gas tanks with rubber and an attempt by the Germans to use parachutes.

It was not until after the armistice was signed that the large percentage of fatalities due to fire compared to the total number of accidents became apparent, and studies were begun by the Engineering Division of the Army Air Corps as to the causes of fires and the means of preventing them. There were no statistics available, and there was then, as there is now though to a lesser extent, a great deal of difference of opinion as to the causes of airplane fires. There was prevalent an idea that most crash fires were due to ignition, while very few thought that ignition was the primary cause of fires in the air. As I will bring out later, subsequent experiments have proven to our satisfaction that just the reverse is the case.

As early as 1918 it was apparent that the fire hazards in certain types of planes was greater than in others. The DH-4 airplane was considered particularly bad in respect to fires in the air, and the percentage of deaths in crashes was unusually large. It was found that many of the fires in the air were due to back-fires through the carburetor. After this was determined to be the cause, the trouble was easily eliminated by placing a stack over the air-scoop extending well outside of the cowl- ing so that in case of a backfire the fire was not only confined to this stack, but all flame was outside the cowl- ing, and, also, by requiring that carburetors be carefully checked to assure that the air-scoop contained no recesses or plugged openings which would allow gasoline to stand in puddles.

From 1919 to 1924 continuous studies were carried on in connection with fire prevention in aircraft. The most important accomplishment during this period was the development and adoption of the standard parachute, which has resulted in the saving of a large number of lives. A few of the outstanding studies follow:

- (a) Underslung, rubber, crash-proof fuel tanks.
- (b) Main tanks in lower wings.
- (c) Tanks in upper wings.
- (d) Use of air starters in lieu of electric starters.
- (e) Aluminum exhaust manifolds.
- (f) Carbon tetrachloride bombs installed directly behind the engine, so that in case of crash they would break and flood the engine compartment.
- (g) Elimination of pressure fuel system.
- (h) Improvement in oil and gas line installations.

These studies were interesting but proved of little value as in many cases they seriously interfered with the performance of the airplanes, and in other cases the complications involved were too great to justify their use. Further, we still had no definite information as to what caused fires, particularly crash fires. Authority was obtained for the construction of a crash runway for the destruction of obsolete and unserviceable aircraft in an effort to obtain authentic engineering data as to the actual causes of fires in aircraft. This runway was completed in July, 1924, and was approximately 566 feet in length, the first 360 feet of which was a grade of about 5 per cent and the difference in elevation of each end was about 20 feet. At the lower end a reinforced concrete wall 10 feet wide, 3 feet thick, 14 feet above

and 6 feet below the ground was constructed. Shields and bomb shelters were placed in several locations, near the wall, for the protection of photographers and observers. Obsolete and salvaged aircraft were obtained and assembled with gasoline tanks, power plant, landing gear, and other necessary equipment, but minus wings. The airplanes were then placed on the runway and after the engine was sufficiently warm they were released and allowed to crash into the wall; the idea being to simulate the worst conditions of a crash, and slow motion pictures, as well as normal speed pictures, were taken from both sides. These pictures, after development, were studied under a microscope and the origin of the fires located.

Crash Fires

During these tests, which covered a period from July, 1924, to October, 1926, there were 83 airplanes crashed. All of the then available combinations of airplanes, engines, exhaust manifolds, fuel tanks, gasoline systems and ignition systems were used in making these tests. The results obtained on each type and combination of types are available in the Material Division Report on these experiments.

The tests were divided into six series. In the first series, known as Crash Series No. 1, 26 airplanes were crashed and 6 fires resulted. In this series, various types of engines, exhaust manifolds, fuel tanks, gasoline systems, and magnetos and generators were used. The battery, the most accused member of the ignition system, was placed below the airplane on the landing gear axles and was knocked off by striking a stop in the runway 25 feet before the plane crashed. Up until this time we had considered that the battery was a very serious fire hazard in crashes, and in this series of tests wished to determine what fire hazards other than that due to the battery existed in the various combinations. As a result of the Crash Series No. 1, the following data were prepared:

(a) *Fires with respect to kind of gasoline tank:*

Kind of Tank	No. of Crashes	No. of Fires
Leakproof or Crash-proof.....	8	2
Plain	18	4
Total	26	6

The conclusion arrived at from the above was that the value of leakproof or crash-proof tanks in crashes was questionable.

(b) *Fires with respect to ignition systems:*

System	No. of Crashes	No. of Fires
Magneto	14	2
Generator alone.....	2	1
No ignition (battery knocked off just before crash)	10	3
Total	26	6

It seems reasonable to conclude from the above that, in crashes, ignition is not a fire hazard of any great magnitude.

(c) *Fires with respect to gasoline systems:*

System	No. of Crashes	No. of Fires
Air Pressure.....	14	3
Gear or syphon pump.....	10	2
Gravity	2	1
Total	26	6

It will be noted that according to the above data there is no distinguishable difference between the hazards of air pressure, pump feed, or gravity feed gasoline

systems. However, in this case we have refused to place much confidence in our own figures. We feel certain that the air pressure gasoline system was one of the worst offenders in regard to fires and, of course, in time of war a bullet in an air pressure tank is a more serious proposition than one in a tank not under pressure.

(d) *Fires in relation to exhaust systems:*

Kind of System	No. of Crashes	No. of Fires
"Saxophone" manifold.....	5	3
Night Flying manifold.....	1	1
Individual stacks of 12 inches or less.....	8	1
No exhaust stacks.....	12	1
Total	26	6

As a result of this compilation it was believed that some very strong evidences as to the origin of the fires had been obtained. It led to the belief that the exhaust stacks were mainly responsible for crash fires. This was borne out from a study of the moving pictures and notes of the observers. Fairly definite information was available that, of the six fires, four started at the end of the exhaust manifolds, one started at the exhaust port on a plane which had no exhaust stacks, and the origin of the other could not be determined. It will be noted that four out of the five fires whose origin could be determined were started by the exhaust manifolds. The conclusions reached thus far were that in the case of crash fires, ignition is not a hazard of great magnitude, while the exhaust manifold is a serious hazard. Further tests were conducted in order to affirm these conclusions and the following is a summary of the results obtained:

Crash Series No. 2.

In this series individual 12-inch air-cooled aluminum exhaust stacks were compared to other types. Sixteen planes were crashed: 10 with 12-inch air-cooled stacks, 5 with no exhaust stacks and one with the standard steel saxophone manifold. Only one fire resulted, this one from the standard manifold. This was considered ample proof that exhaust manifolds are a great fire hazard and individual, aluminum, air-cooled exhaust stacks are not sufficiently hot to ignite when gasoline is thrown over the engine from bursted tanks.

Crash Series No. 3.

This series was run to determine the efficiency of individual steel stacks. Four planes were crashed, with no fires. On account of the small number of planes involved, this test was considered inconclusive.

Crash Series No. 4.

The same as Crash Series No. 3, except that a different type of engine was used. Fourteen planes were crashed and three fires resulted. Out of the fourteen, four were declared "No Test" as examination of the motion pictures showed that no gasoline reached the exhaust stacks. The conclusion arrived at was that the individual steel stacks are not as great a hazard as the manifold, but are not satisfactory, as all three fires in this series started from the exhaust stacks.

CHAIRMAN FECHET: You have heard this very excellent paper on fire prevention. Is there any question that anyone would like to ask?

MR. BAILEY: I wonder if Captain Echols would say a few words on fire extinguishing systems on airplanes?

CAPTAIN ECHOLS: We use a pressure type fire extinguisher on our planes. The material in the extinguisher is released under pressure and forced into the "V" of the engine. While that is not standard equipment, it is the equipment that we use and recommend.

MR. BAILEY: What is the material in it?

CAPTAIN ECHOLS: It is carbon tetrachloride at this time.

Discussion of Captain Echols' Paper

By J. W. SHOEMAKER

Bureau of Aeronautics, Navy Department, Washington, D. C.

The Bureau of Aeronautics feels that it has been very successful in eliminating fires in naval airplanes. Fires in the air are of negligible occurrence, and fires after a crash are practically unknown.

The following items appear in the specifications for naval airplanes, and have been insisted upon continuously since 1926:

(a) *Structural.*

(1) A flame-tight, fireproof bulkhead or fire shield shall separate the engine compartment from the rest of the fuselage and from the crew and fuel tanks to localize any fire which may occur in the engine compartment.

(2) The fire bulkhead shall be constructed of tinned, galvanized, or terne sheet steel, or shall be built of two sheets of 0.02-inch (minimum) aluminum separated by $\frac{1}{8}$ -inch asbestos sheeting.

(3) The fire bulkhead shall fit closely to the cowling all around the section of the fuselage and shall be pierced with the minimum number of holes practicable. Where structural members, control leads, pipe lines, or other parts must pass through the bulkhead suitable fire-resisting stuffing boxes or bushings shall be provided.

(4) With the exception of the engine bearers, which may be of wood, no wood or other inflammable material shall be used on the engine side of the fire bulkhead. The structure shall consist of metal members and fittings and wires.

(5) The sides of the fuselage for a distance of at least 9 inches behind the fire bulkhead shall be metal covered.

(6) The bottom cowling shall be so designed as to be self-draining, with an opening at the rear edge extending the entire width of the fuselage at the fire wall. The bottom of the fuselage behind this point shall be metal covered for approximately 3 feet.

(7) The cowling around the engine and engine compartment shall be of sheet metal, and shall be easily removable in part or entirely to permit of access to the power plant. It shall be suitably ventilated to prevent accumulation of gases.

(8) The cowling and its fastenings and mountings shall be designed for ruggedness and security, with a view to securing minimum head resistance and maximum protection from the weather for the engine, as well as protection to the crew and structure from oil and fire in the engine compartment.

(9) Care should be exercised in the design of the cowling around the engine to prevent short-circuiting of spark plugs or other interference with the power plant.

(b) *Electrical.*

(1) An approved type of high tension ignition wire terminal must be used.

(2) The junction of the H. T. wires with the spark plugs must be covered with Rajah type rubber nipples.

(3) Ignition circuits shall be secured against excessive vibration and adequately protected against short circuits or grounds caused by chafing.

(4) Ignition circuits shall be installed in such manner as to be protected from spray while taxiing, and from excessive dampness due to rain or fog.

(5) Ignition circuits shall be installed in such manner that they cannot come in contact with fuel or oil from leaking fuel or oil lines or tanks.

(6) All high-tension wiring shall be incased in suitable conduits.

(c) *Engine fuel system.*

(1) In every installation all carburetor air shall be led to the carburetor through an air-intake pipe so designed and installed that in event of backfire through the carburetor, flames shall be led into the open air clear of the fuselage and engine cowling.

(2) Intake pipes shall be flame-proof and shall be so designed and installed as to withstand temperatures and pressures which may occur in the event of a carburetor backfire.

(3) All joints between carburetors and air-intake pipes shall be gasoline tight, with no openings whatever within the engine compartment.

(4) In the design of intake pipes care shall be exercised to avoid pockets which may collect free gasoline. Where such collection of free gasoline is unavoidable, a drain connection shall be provided at the lowest point, and a pipe shall be led therefrom which will drain all gasoline outboard to the open air free of the engine compartment and fuselage.

(d) *Engine exhaust system.*

(1) It shall be so designed that all exhaust gases are carried off in the open air clear of the crew, gasoline tanks, or inflammable parts of the airplane.

(2) Clearance of at least 3 inches shall be provided between the exhaust manifold and wood or fabric parts. The open end of any exhaust pipe shall have a clearance of at least 5 inches in every direction from inflammable parts. The downwind clearance from the open end of any exhaust pipe measured along any direction of normal flight shall be at least 4 feet.

(3) Any exhaust piping not directly exposed to the air outside the cowling shall be cooled by water jacketing or by an air draft induced through a jacket surrounding the exhaust piping.

(e) *Fire extinguishers.*

(1) There shall be one pressure-type extinguisher for each engine.

(2) One hand fire extinguisher shall be provided for each member of the regular airplane crew.

(3) The fixed fire-extinguisher system includes all tanks, pumps, piping, nozzles, gauges, containers, controls, etc., which are used in the installation of the fire-extinguisher medium in the airplane and for its proper distribution in event of fire.

(4) The parts of the fire-extinguisher system shall be so mounted as to reduce the effects of vibration to a minimum.

(5) Piping for the fire-extinguisher system shall be securely supported at frequent intervals. At points where supported and at other points where chafing is likely to occur the piping shall be wrapped with tape or otherwise suitably protected.

(6) Pressure fire extinguishers have been fitted on all naval airplanes for several years.

(f) *Airplane lubricating and fuel systems.*

(1) The oil tank shall be located as near to the oil pump as possible. The bottom of the oil tank shall be above the level of the oil pump.

(The Bureau of Aeronautics is now calling for location of oil tanks forward of the firewall. This aids in oil cooling, and keeps the length of required oil piping a minimum.)

(2) Oil and fuel tanks shall be of approved design and material.

(3) It is considered desirable to reduce the number of openings in the tank to a minimum. Where possible, tank pipe-connections shall be grouped on removable plates provided with suitable gaskets.

(4) Oil tanks shall be designed to withstand a test pressure of 5 pounds per square inch without injury, and with not more than ~~1/8~~-inch distortion for each foot of length, or breadth, or depth of tank. ~~One tank of each new design shall be tested to destruction.~~

The same specification covers fuel tanks, ~~except that the maximum test pressure is 4 pounds per square inch.~~

(The Bureau of Aeronautics is now requiring that one of each fuel and oil tank design of the type to be installed in an airplane ~~withstand a vibration test of 25 hours without failure before the design is accepted.~~)

(5) The location of tank filler openings shall be ~~such as to permit of filling from the outside of the fuselage or engine cowling and without the use of a special type of funnel.~~ Furthermore, it shall be so located ~~that overflowing oil or fuel will not fall upon parts of the engine, electrical wiring, or structure of the airplane which will be damaged, or into inclosed parts of the airplane where an explosive mixture is liable to form.~~

(6) The Bureau of Aeronautics has for about a year required that all oil piping, and all fuel piping between fuel tank and carburetor be of copper.

(7) Insofar as possible, oil piping will be installed in two separate units. One unit shall be supported rigidly on the engine and considered as an integral part of the engine. The other unit shall be supported rigidly by the fuselage and considered as an integral part of the airplane structure. The two units should join at the engine bearers with an approved type of flexible connection.

(8) Piping shall be annealed after bending.

(9) Piping shall be supported at frequent intervals.

(10) Piping where supported, and at places where chafing is likely to occur, shall be protected by tape, or the equivalent, suitably applied.

(11) Piping should be supported near to and on either side of a connection or elbow.

(12) Except as specified above under "Installation" and unless specifically authorized by the Bureau of Aeronautics, solid connections shall be used throughout the lubricating and fuel systems. Where specific approval is given to use other than solid connections, an approved type of flexible connection or hose connection shall be used.

(13) All fuel tanks in the fuselage shall be to the rear of the fire bulkhead.

(14) All piping which from the nature of the design of the fuel system may or does carry fuel into the engine compartment shall be provided behind the fire wall with simple "on" and "off" cocks interconnected in such manner that they may be quickly and positively operated by the same control by the proper member of the crew in case of fire.

A Study of Precautions Against Fire on Board of Airplanes

By J. SABATIER

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The fear of fire certainly causes a good many of the great public to keep away from commercial aviation: the violence with which such fires break out, their immediate effects, the difficulty of rendering useful aid,—strike the imagination of those who are, or think they are, exposed to it.

Why does fire menace the airplane more than any other means of transportation? Because airplanes carry considerable quantities of gasoline; because this fuel when

in contact with the surrounding air forms explosive mixtures and on airplanes the chances of leakage and spilling are relatively high.

The Problem of Eliminating Gasoline

The idea which immediately presents itself as a remedy for this dangerous situation is to eliminate the gasoline and to substitute for it a fuel which is less dangerous when in contact with air. Numerous attempts have been made along this line of thought within the last five or six years; they followed two principal courses:

(a) to seek new fuels, less inflammable than gasoline, yet sufficiently allied to it, so that they might be utilized by engines presently used, without requiring profound changes in their construction;

(b) on the other hand, to turn to heavy fuels actually available to industry and to produce special engines capable of using them.

The first method involves not only the finding of a convenient "safe fuel" but also the adaptation of existing engines, notably their carburetors, to its use.

Many hopes have been raised, and several inventors thought they were able to obtain satisfactory products; in general they proposed either coal tar extracts or petroleum derivatives.

The coal derivatives, which were tried in France in recent years, offer good guarantees against fire; a burning match thrown into them, in open air, is extinguished by the liquid. On the other hand they present the following disadvantages:

They require an energetic reheating of the carburetors; and even with such reheating, the engines utilizing them pick up badly and start with difficulty; frequently they must be started with gasoline.

At temperatures below zero centigrade, the products tried become turbid and even disintegrate.

Finally their power yield is much less than what gasoline would give under identical conditions.

A certain reduction in power might be accepted, if necessary, at least for less exacting types of airplanes (tourist and training airplanes for example); but the difficulty of starting and picking up during flight condemn them; this explains why safe fuels derived from oil, which have been tested so far, have not yet been adopted in aviation practice.

Petroleum derivatives, which were experimented with in France, present defects of the same nature, but less accentuated, which leads to hope that they may be more easily remedied. These defects are: the necessity of special strongly reheated carburetors, irregularities of carburation, loss of power (comparatively slight, however). Finally, some of the proposed products oxidize the engine pistons quite intensely.

In short, the researches concerning new fuels, aside from safety, give no satisfactory results as yet. It will take time and renewed efforts to overcome the difficulties encountered; these difficulties are of both engineering and industrial character.

From the point of view of engineering, it will be well to remember that the designers of airplane engines have found, thanks to the development of automobile engines, abundant and precise data on the principal features which they have to give to their carburetors and their accessories.

Thanks to this assistance, they could devote their efforts almost exclusively to the solution of the special problems of the aircraft engine, notably the maintenance of good carburation under all circumstances and at all temperatures and pressures which the airplane may meet with in service. But when it comes to using, in aircraft engines, a new fuel, not gasoline, a fuel which is not used by other industrial engines, the problem is inevitably focussed on carburation.

When only a sensibly constant performance is specified for the engines using the new fuel, and for definite conditions of temperature and pressure, experience has proven that it is possible to find easily a proper adjustment for carburation. But as soon as circumstances vary, and moreover, when all the flight elements influencing carburation come into action, the difficulties increase. It is sufficient, in order to appreciate the situation, to reflect on the efforts which had to be expended to get over a similar stage in the development of the automobile engine.

Independently of this engineering problem, the invention of a new fuel also presents a delicate industrial problem: it is comparatively easy to produce several liters of a substance of a definite nature and composition but it is much more difficult to supply the same substance in large quantities; the industrial processes do not permit the making, under economic conditions, of products of uniform quality and invariably equal to the original specially fabricated product. But uniformity, possibly even more than quality is the essential requirement of fuels intended for use in aviation.

All these considerations explain why the second of the methods indicated above (which at first sight might have seemed more difficult and more expensive) has in practice stimulated more efforts than the preceding one; it consists in resorting to known fuels produced in industrial quantities (kerosene or crude oil, for example), and producing an extra light type of motor capable of utilizing them.

Researches made in most countries for several years demonstrate that such an engine to be of dependable performance, must employ very great compression; that is, to utilize a cycle which is more in a class with a Diesel or semi-Diesel than with the normal explosion cycle. The problem to solve, then, is both of thermodynamic and mechanical character.

The results of the work done along this line of thought, notably in Germany, in England and in France, have not been published,—still there is reason to believe that sufficient progress has been made and that a solution, perhaps incomplete yet acceptable, will soon see the day. It seems in particular that it may be possible to realize engines similar in their general features to existing aviation engines having weights of the order of two kilograms per horsepower, which will embody a solution of the problems of pressure feed, regulation of injection and mixture of fuel introduced in the cylinders.

It will remain to realize a device for speedy starting of the engine, without excessive addition to its weight. Devices of this sort already exist but their weight is prohibitive, for airplanes at any rate.

To sum up, the problem of eliminating gasoline and substituting a less inflammable fuel for it has not been solved yet; but the researches which have been undertaken should be continued, which applies equally to new fuels and to engines making use of thermal cycles which differ from those of existing engines.

Pending their conclusion, the airplane must get along with the illness—gasoline, which cannot yet be avoided. Let us first apply ourselves to a reduction of the dangers inherent to the presence of gasoline on board of airplanes.

Precautions Against Leakage of Gasoline and Back Firing

A combination of two circumstances is necessary for gasoline to catch fire:

The gasoline must be in contact with the surrounding air and evaporate into it. The air thus carburetted must, in its turn, be in contact with an ignited point which causes it to explode.

To reduce the risks of ignition, it is necessary to prevent each one of these causes, taken separately, from occurring; and in case one of them cannot be avoided, its concurrence with the other one must be precluded.

Along these lines, it will be proper to examine first the precautions for normal conditions of flight and then the precautions corresponding to a grave accident such as a violent crash.

In normal flight, mixtures of dangerous carburetted air are produced either by leaks from gasoline tanks or from the piping, or by poorly functioning carburetors.

When the tanks are carefully constructed and sufficiently protected from engine vibrations, there is but little danger of leakage; with reference to them the following precautions are to be taken: their fastenings to the body of the airplane should be strong enough to withstand not only the forces of inertia to which the airplane is subjected when in flight, but also those which may be brought about by violent landing or by upsetting. Their air inlet apertures should be designed with minimum cross section and to prevent all risk of spilling of gasoline in rough weather. The air inlets and the orifices for filling the tanks should lead freely outside of the airplane, so that in case some gasoline is accidentally spilled, as when refilling for example, none of it should enter the hood or the fuselage.

This last mentioned precaution is particularly important in the case of hydroplanes, whose tanks are placed in water tight compartments, as well as for tanks placed in the wings in confined atmosphere.

The specifications for gasoline pipes are, unfortunately, more difficult to satisfy. These pipes and their fittings must be sufficiently flexible to resist the engine expansions and vibrations. Most designers sought to achieve this result by making the pipes of rigid elements connected among themselves by a great number of flexible joints. These joints consist of rubber tubes reinforced with fabric (durit joints) and fastened to the piping by means of special collars.

This practice presents serious disadvantages: the rubber joints, if well set, as they should be to begin with, soon lose their flexibility and tightness; they become loose; the rubber is attacked by the gasoline, becomes hard, or crumbles; the crumbled particles obstruct the piping or the nozzles and are one of the most serious causes of interruption of operation during flight.

In any case, if only to reduce the leakage of gasoline, it would be necessary to avoid a random distribution of joints along the pipes and to reduce their number by all means. It is permissible to think that if the gasoline pipes were planned methodically and with care as is done for example on ships with steam piping, it might be possible to retain only a few flexible joints, indispensable either for disassembling purposes or for resisting the greatest vibrations and expansions.

Such a result would be particularly important in the case of multi-engine airplanes whose gasoline piping is rather extensive and stretches at times almost over the whole width of the wing span.

In spite of a careful design of the piping it will generally not be possible to entirely eliminate flexible joints; it will be necessary, then, to have them remain tight regardless of vibrations and aging.

A competition in design of joints, organized in France, for this purpose by the Committee on Aeronautic Propaganda, has demonstrated the progress which might be realized in that which concerns these important accessories.

The qualities demanded of the competing designs were as follows:

Flexibility and good performance with respect to vibrations—absolute gasoline-tightness.

Resistance to corrosion by gasoline and benzol—fire-proofness—convenience of keeping in stock.

Ease of disassembling and reassembling.

Lightness—moderate cost.

Several of the models presented have on the whole satisfied these requirements; the most interesting of them are of metal and retain as the flexible element a rubber fitting encased in metal to protect it against gasoline and against fire. Their weights and costs are reasonable.

It is particularly desirable that joints similar to these or others having analogous qualities, should take the place of durit joints which are still so much in use, in spite of all of their disadvantages which have been pointed out above.

The air drawn in by the engine, passes through the carburetor, is charged with gasoline vapor and enters the cylinders. On account of poor functioning, due to various causes (jammed valve, irregular feed, etc.), the mixture introduced into the cylinders finds itself in contact with the plug spark, at the instance when the admission valves are still open; it catches fire; the flames which it emits return in part of the carburetor chamber, set fire to the gasoline contained in it and flash out into the atmosphere through the air intakes. These flames threaten, then, to extend the fire even to the body of the airplane.

The best means of avoiding this danger is evidently to prevent the poor functioning of the engine which brings it about. But since complete success in this direction is not attainable, measures should be taken for stopping the flames before they reach the carburetor chamber, and then to render the flames, which nevertheless will have reached the atmosphere through the air intakes, comparatively harmless.

It is easy to obtain this last named result; it is sufficient to have the air inlets open outwards on the exterior of the fuselage or the hood, by means of an air-tight pipe which extends for quite a distance outside, so that the issuing flaming gases shall not encounter any combustible element of the airplane; it is often preferable to have the air inlets opening laterally outwards rather than in the lower part of the engine cradle, in such manner that discharges of gasoline due to accidental leaks, should not be directly in the way of returning gases.

It is absolutely necessary to make the air inlets end freely on the exterior of the fuselage or the hoods. This does not apply only to principal engines but also to the auxiliary ones which may be found on board (starting, electricity and wireless) which one may fail to think of in this connection.

The devices which have been proposed for preventing the flames issuing from the cylinders from reaching the carburetor chamber and the corresponding air inlet are quite varied.

One of them which was recently experimented with in France proposes the breaking up of carburation into two separate operations.

The first operation is made as in an ordinary carburetor; but measures are taken that a mixture issuing from the carburetor should contain a great excess of gasoline. This mixture passes through a relatively long pipe line at the end of which there is found an additional air inlet; this inlet regulates the final dosage of the carburated air, prior to its introduction into the cylinders.

Under these circumstances when the flames will accidentally break out through the admission valve, they will encounter above the additional air inlet, a gas column which had come out of the carburetor. This column being charged with an excess of gasoline, will not support combustion and the flames will become extinguished upon contact with it.

The preceding device is ingenious and quite effective against back firing; it also permits to remove the carburetor chamber from the engine, and thus protect it against accidents which breaking of the crank case or connecting rod generally entails.

On the other hand it is a delicate matter to adjust it precisely on account of gasoline condensation between carburetor and engine which it often gives rise to. Other devices based on entirely different principles were experimented with in France; one of them proposes to arrest the flames by means of an automatic flap valve, which stays open when the air travels from the outside into the cylinders, but shuts when the gas current inverts itself to return from the cylinders outwards; other methods consist in opposing cooling baffles to the flames.

The system of flap valves has not given conclusive results so far, because the conditions they have to satisfy are partly contradictory. These conditions are as follows:

To have very low inertia, to shut at the least return and to open in opposite direction when running normally.

To function at any position of the airplane in flight.

Not to get distorted under shocks and to remain shut and gas tight.

To reserve for the admitted air, a passage of sufficient cross-section so that the engine will not suffer any appreciable loss of power, and that in case of flapping of the valve irregularities of carburation should not occur.

In fact loss in power or the mediocre efficiency which the various models of flap valves experimented with so far have shown, was the reason for their not being more generally used.

The system of cooling baffles seems to be actually preferable to them; it consists in interposing a series of corrugated metal sheets of very large surface in the admission channel between the carburetor and the motor and parallel to the gas current; these sheets offer only slight resistance to the passage of the admitted air, and the loss in power which this entails is practically negligible. When the back fire flames come in contact with them they are cooled abruptly and are extinguished. Several devices of this sort which were recently tested in France have proven very efficient; their use therefore should be particularly recommended.

Precautions Against Sparks

We have seen above that it is necessary to avoid all emission of sparks and presence of heated metal which is liable to cause an explosion of the gasoline vapors which may form on board in spite of the precautions taken. The principal sources of sparks are ignition circuits of engines, wireless apparatus and electric wiring, for the distribution of light or power, with their accessories.

Precautions to be taken concerning these does not present any special difficulties; the principal ones are as follows:

The electric wires should not be placed under the gasoline or oil pipes and have their insulation gradually destroyed by accidental leakage. Terminals of different polarity should be separated and the connections must not get loosened by vibrations; commutators, magnetos and similar apparatus should be encased in metal as far as possible. When fusible circuit breakers are in use, no incandescent metal should be projecting to the exterior. The back surfaces of switchboards should be available for inspection. Wireless apparatus should be removed from the gasoline receptacles and should be protected as much as necessary by metallic gratings.

The ignition wires of the engines require special precautions as much for the reason of their important role as for their proximity to the engines and the gasoline tanks and pipes. It seems that the use of protective ramps, which group all the lighting wires throughout their common length and protect them against shocks, rubbing contact and leakage of gasoline or oil, are particularly interesting to consider. Of course the wire connections on the spark plugs must be of a type which will not unhook or become loose during flight.

Finally if there be storage batteries on board, it is necessary to insure them against the risks of short circuits and the spilling of acids.

The above set of precautions should, under normal conditions, prevent the formation of all dangerous sparking.

Sparks outside of the engine may be produced in spite of these precautions in the case of a severe accident to the airplane which may cause a dislocation of the arrangements and bring together, in contact, the torn strands of live wires of different polarity; such eventuality may occur but very rarely, at any rate it is difficult to foresee measures of a general character which might prevent it.

Exhaust Gas

The danger presented by exhaust gases of the engines, of valves and corresponding channels is much more immediate. It is not only that these gases are very hot

in themselves but they carry along flames, particles of incandescent carbon due to imperfect combustion of gasoline, and occasionally also rust particles due to oxidation of the piping. Flames and sparks appear whenever the regime of the engine is changed abruptly.

The idea which immediately presents itself for the avoidance of these inconveniences is to extend the exhaust pipes attached to the engines by means of expansion chambers wherein the gases will be detained and cooled sufficiently to be extinguished before getting to the exterior. It is also possible to place at the exit of the gases into the atmosphere a tight grillage which will filter the incandescent particles carried by the gases without stopping the gases themselves.

When the expansion chambers are properly arranged they deaden the noise of the engine exhaust and perform then the double role of silencer and fire screen.

To tell the truth the inventors have been more after the development of good silencers, because life on board of an airplane with direct exhaust engines soon becomes impossible. They concern themselves with security against fire only as an accessory reason.

Similarly they cared more about reducing the brilliance of flames issuing from the gasoline than about suppressing them completely. These flames are in effect very annoying in night flying, particularly in making a landing while it is fairly simple to reduce the brilliance of flames so that they do not dazzle the sight, it is much more difficult to achieve their complete suppression, especially when the regime of the engine changes very abruptly. The real test of the efficiency of the design considered against fire depends on this last condition. Particularly when an airplane is upset or a rough landing is made the engine may pass immediately from a regime of high speed to a complete stop, and it is very important then that there should not be any emission of dangerous flames at that time.

The circumstances which have just been analyzed and the difficulty of the problem, explain why the fire screens experimented with so far have not yet given any definite results from the point of view of fire protection; but once the problem is stated, it should be possible to solve it at the expenditure of some efforts and perseverance.

Granting that so little has been realized as to satisfactory fire screens, should their use be imposed in order to increase safety against fire? Several authors have expressed their doubts on this subject.

They called attention to the fact that by extending the exhaust pipes by means of channels or extension chambers, the valves and the adjacent metal plates are prevented from cooling as well and as fast as they would have, had they been in direct contact with the atmosphere. The warming up of the valves, if it be excessive, will bring about many serious defects in the functioning of the engine (wedging of shafts, breaking of the body of the valves, loosening, etc.).

The real danger is not there, but in the case of a faulty landing it becomes apparent.

If the shock of the airplane landing on the ground is sufficient to burst the tank or break a gasoline channel, the fuel flows out and saturates the air with its vapors. These gradually penetrate into the exhaust box, coming into contact with its hot parts; if the temperature of these is sufficiently high to inflame the carburated air, the explosion is immediate.

The experiments made in the United States with obsolete planes which were destroyed by crushing them against obstacles, are symptomatic in this respect; they prove the incendiary role which exhaust valves and insufficiently cooled metal plates may play in the case of landing accidents.

It is not sufficient, then, when experimenting with the fire screen to test whether it stops the super heated gases, it is also necessary to make sure that the *maximum temperature of its internal parts* remains low enough to preclude the explosion of the carburated air which may come in contact with them. This condition is partly

in opposition to the first, but it is essential from the point of view of fire safety in time of a rough landing; it should never be neglected.

It has been recently proposed in the United States to test its application in the following practical form: to run the engine provided with the fire screen which is being tested, in such a manner as to warm up the valves and the adjacent plates to the highest degree possible; then to stop the engine and inject gasoline or oil into the channels of the fire screen; test that no flame flashes out under such conditions. It would be interesting to know if this testing method is actually being used, and what results it has finally yielded. In any case, it has value only if the cooling conditions of the fire screen are like the ones encountered in flying. In fact, gasoline or oil projected upon a hot plate, catch fire spontaneously, when the temperature of this reaches about five hundred degrees centigrade. But it is difficult to affirm, even with regard to valves opening directly into the atmosphere, and which are so well ventilated, that they will never have a temperature of this order of magnitude.

On the other hand, one must not neglect two factors, which independently of the maximum temperature of the exhaust, exercise an important influence on the greater or lesser chance of a fire in case of gasoline leak. They are the speed with which the hottest parts of the fire screen and valves cool off both during flight and when the engine is at rest, and the time it takes the gasoline or oil to come in contact with them. The longer time interval the more of the calories accumulated at the exhaust can actually be dissipated into the atmosphere. It will be seen later what measures may be taken in order to bar as much as possible the path of the gasoline towards the engines; as to measures which concern the rapid cooling of the exhaust after the motor had stopped,—they are too delicate to indicate with precision in a general way and require methodical study in each case; in fact, it may be observed that these measures may vary not only with the type of fire screen but also with the type of engine. Thus, for example, a fire screen arranged within the V formed by the two rows of engine cylinders, may find itself sufficiently cooled while the breeze caused by the running persists, but it may stay hot for a long time after the engine has stopped, because the intense radiation of the organs surrounding it will act directly upon it. The same fire screen arranged on the side will guarantee a much more rapid and superior cooling. Similarly, a fire screen isolated from the exhaust valve chamber by means of a conduit provided with cooling blades, may give higher security than it would if it were directly connected to the engine.

All the above considerations indicate the complexity of the problem of protection against the danger due to engine exhaust. They also demonstrate the vital interest of close study, not only of the fire screen models but also of the special conditions for installing them on board of airplanes.

In conclusion it is possible to say that as long as the conditions of flight remain normal, the presence of a fire screen increases the safety against fire. On the other hand, when a wave of gasoline spreads out on account of a faulty landing, the situation is reversed and the presence of a *poorly constructed* fire screen threatens to greatly increase the danger which it is proposed to eliminate.

It is very desirable that systematic studies be undertaken for a better knowledge of the measures which will permit avoidance of this difficulty, which is one of the most serious encountered in the attempt to improve the security of airplanes.

It is self understood that besides qualities of principle which have been discussed, fire screens should satisfy the following conditions:

- Comparative lightness and low aerodynamic resistance;
- Low absorption of motive power;
- Insulation of their walls from the combustible parts of the airplane;
- Good performance in presence of vibrations, shocks and oxidation by gases at hot temperatures.

Before leaving the problem of exhaust, it will be convenient to add a few words concerning the *heating of carburetors*, which directly belongs here; on powerful engines, it is not unusual that the admission pipes be covered with frost even in calm weather; the phenomenon is particularly dangerous when it happens during flight, since it may entail misfiring, defective picking up and even abrupt stoppage of the engine. Trouble when taking off which is so often tragic in its results, is frequently imputed to this cause. It is generally sought to remedy this inconvenience by heating the carburetor chamber either with engine oil or with exhaust gases.

Warming with oil does not present any disadvantages from the point of view of fire; but it is not always capable of producing high enough temperature to be effective. Particularly when it is a question of taking off in cold weather or of resuming flight after the engine has stopped for some time, the water or oil are themselves cold, and cannot render the service demanded of them at the moment when it is most needed.

In this case, it becomes necessary to warm the carburetor with engine exhaust gases; but this introduces very grave fire hazards, if most minute precautions are not taken to avoid all accidental communication between the heating gases and the gasoline of the carburetor. This communication is not to be feared in normal time, if the installation has been properly designed; but it is not so when a landing shock dislocates the engine and its accessories. Experience shows that the designers do not always sufficiently visualize this possibility and quite often produce installations which are dangerous in this respect.

Two precautions which are comparatively simple to realize are, in the meantime, likely to give the necessary security.

To arrange the bracing of the pipes which will lead the exhaust gases to the carburetor, as a branch of the principal current, and throttle it down enough so that the temperature of the heating gases shall not exceed 200 deg. cent. for example. Under these circumstances, even the breaking of the bracing or an untimely emission of gas, either in the hood or even in the gasoline in the carburetor chamber, will not be dangerous.

In case there is difficulty in materializing the above mentioned arrangements, insert an anti-return device similar to the one whose principle has been indicated above, between the heating pipe and the carburetor casing; complete this precaution by placing the carburetor with its heating pipes in a space in the engine where it could not be damaged or dislocated, in case of landing shock, except after other vital parts, the cylinders for example, have been damaged first.

Precautions in Case of a Rough Landing

All these instructions just analyzed should suffice to suppress all possibility of fire in the air, as long as the engine does not suffer any serious accident and as long as the conditions of flight remain normal. Moreover, experience confirms their efficacy.

But unfortunately these instructions are not sufficient when the engine suffers a major accident, or the airplane lands under unfavorable conditions.

This last case is by far the most dangerous from the point of view of fire; the consequences which it entails produce, by aggravation, the conditions of an engine accident; it is, therefore, preferable to study fires produced by faulty landings.

The process involved in this phenomenon are well known. They can be summed up as follows:

The airplane comes down striking the ground; the shock dislocates the engine and its accessories; the pipe joints begin to leak or become disconnected; the pipes themselves break.

In most serious cases, the tank bursts, the carburetor chamber is battered in or torn out. Finally, the gasoline flows out and brings about the dreaded explosive atmosphere.

If the pilot does not have the time or the thought for cutting the ignition, the engine hits the obstacle while still running; the immediate-stop imposed upon it by the shock of hitting the ground, brings about exhaust flames and returns to the admission. A spark due to ignition circuits or to a broken electric distribution wire or a contact of the gasoline vapors with the hot portions of the exhaust may equally produce it. They are so many causes of ignition of the carbureted air which explodes; a general conflagration results, a conflagration which is so difficult to fight, because it is fed by the vapors that are spread all about.

If the gasoline tanks were not isolated from the focus of conflagration at the beginning of the accident, either by a stop cock or by setting in operation a blow-off device, and still more if the tanks be burst by the shock, they feed the fires and further intensify their violence by pouring out their contents.

The succession of phenomena just analyzed indicates the measures by which their development may be stopped or retarded.

The first and most classical, consists of allowing the pilot to cut the ignition as soon as violent contact with the ground becomes inevitable for him. In general, the cutting device is within the direct reach of the pilot's hand and its installation does not present any difficulties except in the case of multi-engine airplanes.

In this case the pilot should be able, in accordance with his choice and circumstances, to cut the individual ignition of any one of the engines, or to cut by one single operation, the ignition of *all his engines*; the safety which this arrangement will give him, will greatly compensate for the comparative complexity of the electric circuits which it involves.

Certain inventors, impressed by the accidents happening when the pilot does not cut at the right time, have proposed apparatus interrupting the ignition as soon as the airplane gets into trouble, for example, with the loss of speed. But the danger involved in the untimely functioning of such apparatus, has always, and justly so, discouraged their use.

Devices for the avoidance of return to the admission and the exhaust have been discussed above and it is unnecessary to return to them. It will only be remarked that in order to play their role, anti-return apparatus and fire screens should not be destroyed too soon when the engine hits an obstacle; on the contrary, it is of great advantage to place them in a portion of the hood where they may be relatively protected against violent destruction, and where they would be attacked only after the vital parts of the engine. In fact, exhaust boxes, admission inlets and carburetors are often arranged at the extreme front end of the engines, so that they may be the first accessories to be torn out or crushed when the ground is struck; the engine then risks to continue running for a few fractions of a second with the valves exhausting into the air, with the carburetor chamber broken, or with the admission re-entering. Nothing more is necessary to precipitate a conflagration, which might have been avoided, if the massive parts of the engine had been broken first, which would have entailed the stopping of the engine before the emission of dangerous flames had taken place.

It may be further asked if it would not be possible to generalize the preceding precaution and to protect the engine and its accessories against landing shocks in a better manner than has been usual heretofore. There are shock compartments in the bow of ships which destroy and deaden the effect of fouling before the vital parts are injured. Similarly buffer cars are placed at the head and the tail ends of passenger trains. But there is nothing of the kind on airplanes, on the contrary, on apparatus with the engine set on the axis it is the propeller shaft and the engine which are the first ones to take the shock and through them the destruction commences.

Moreover the engine, its crankshaft and its casing form one rigid, integral block, and they perform the role of a veritable hammer driving everything in the rear of itself.

It would seem possible, at least in some cases for example, for reduction gear engines where the distance between the propeller and the casing is greater than in the direct-connected engines, to protect the engine by surrounding its front with an armour of angle iron, strongly attached to the rest of the fuselage. This armour is intended to be destroyed by the shock before the engine itself and its principal accessories are injured in their turn.

Though admitting that this *protective cage* can destroy but a portion of the violent shocks and that it is not sufficient to preclude the dislocation of the engine, yet it will increase the time interval which will separate the stopping of the engine from the destruction of the gasoline piping and the organs of protection against fire. But to gain time in a case like this is of paramount importance.

At any rate this idea of armour deserves to be examined and put in practice, if possible.

Besides the landing shock there is also a rather frequently occurring case in which fire occurs from a return of the flame to the admission, even when the precautions indicated above have been taken; this happens when the breaking of a driving rod of the engine, which is adjacent to the carburetor, brings about the dislocation of the carburetor and the barring of the admission to the cylinders.

If the pilot cuts the gasoline feed pipes, as he should do, the quantity of fuel catching fire will be reduced to the gasoline contained in the carburetor chamber and the adjacent piping; intensity of the fire will not be so great as to preclude extinction if they have the necessary apparatus on board; it will, nevertheless, be wise to avoid risks of this nature by placing the anti-return devices most directly upon the cylinders and to encase the carburetor chambers within the zone where the rods project, in a manner compatible with the other general arrangements of the engine.

The measures for preventing, as much as possible, explosions of carbureted air which occur after a landing shock, have just been examined. It has been shown that it is necessary to increase the time interval which separates the shock from the moment when the gasoline pours out, evaporates and comes in contact with the still hot parts of the engine. Finally, it is evident, that the more the gasoline leaks will be confined, the easier it will be to fight a fire, if it breaks out.

How can these diverse results be obtained? First by reducing to a strict minimum all joints of gasoline and oil piping and by making them by means of metallic couplings. Couplings of a rubber base get loose or tear as a result of shock, and are destroyed by fire. Three reasons, besides the ones which have been given above, for which they should be eliminated.

Piping should also be designed so, that its flexibility may allow it to deflect with the shock without breaking. For this purpose, the fastenings of the pipes should be designed so as to fail before the pipes themselves have been torn out, even more, it will be preferable to use tubing of brass which is a metal less brittle than duralumin, for example.

Finally, the hoods, motor cradles and fuselages should be designed so as to evacuate most directly the discharges of gasoline or oil which they will receive in case of leakage.

Isolation of the Motor Compartment and the Reservoirs

It has been shown, that the motor compartment constitutes a hot chamber where the least incident may precipitate a fire. It is, therefore, necessary to reduce to a strict minimum all the combustible elements which it contains. It is also neces-

sary to isolate it from the rest of the airplane, so that a fire once started may not spread.

Everybody is in agreement as to the indispensability of installing a fireproof partition between the engine and the rest of the airplane: no gasoline or oil tank of appreciable capacity (carburetors expected), should be placed on the engine side of the partition. The principal gasoline and oil tanks, those of gasoline above all, should also be provided with facilities for the immediate isolation of channels crossing the partition and leading to the engine, by means of a sectioning with an instantaneous cut-off to be operated by the pilot; each sectioning should be placed as directly as possible on the tank which it protects.

If it is feared, that a sectioning with a rapid shut-off may not stay perfectly tight, at the expiration of a certain period, it will have to be supplemented with a slow-operation cock; the first will be used by the pilot only in cases of emergency; the second, on the other hand, will be operated under normal conditions of service.

The role of the fire-proof partition is double; it has to prevent the flames, which may originate in the engine compartment, from spreading through the body of the airplane; and it has to, in an opposite sense, prevent gasoline leaks which may appear outside of the motor compartment, from oozing into the latter.

To be able to stop the flames, the partition must be made of metal and have, if possible, a non-conducting lining; this is often made of one or two sheets of metal with asbestos cardboard interposed.

The fireproof partition should not be restricted to the cross section of the fuselage, but should be extended along the sides of this, in the direction of the motor compartment.

In fact, the flames arrested by the transverse partition proper will attempt to make their exit from the compartment along the sides of the fuselage. They will be deflected towards the body of the airplane by the breeze due to the motion of the airplane, if the fire occurs when in flight, or by the normal draft, if the fire takes place after a violent landing. In both cases, it will be difficult to completely prevent flames from flashing out laterally toward the hood, still it is necessary to remove it far enough from the partition if the protection of the body of the airplane is not to become merely illusory.

Similarly, it is also necessary to extend the partition away from the motor compartment. If it is not done, the gasoline poured upon the partition in time of a violent landing will flow by simple gravity, without encountering a single obstacle, towards the center of the fire, which it will reach quickly.

But by extending the fireproof partition in a direction opposite the engine compartment a veritable trough will be formed, from which the gasoline will escape only when filled by the leaking fluid, which will not happen immediately except in the case of a very severe accident to the tank.

The extension of the partition by means of metallic elements toward the engine compartment is generally practiced; but this is not true as to the extension towards the body of the airplane, of which the designers do not think very often, in spite of its importance. Great progress can therefore be realized in this direction.

It is well understood that the passages of conduits and control mechanisms which cross the fireproof partition from the body of the airplane to the engine must be fireproof and gasoline proof.

This specification does not raise any technical difficulty for careful designers, but it is not always followed; for this reason an aviator has recently been badly burned, when flying, by the flames which flashed out from his engine across the interstices and the passages through a poorly constructed fireproof partition.

The above considerations concern the case of an airplane having its engine on the axis of the fuselage and its main gasoline tank in the fuselage, back of the engine.

The specifications will be different in case the engines are placed on the sides, or if the gasoline tanks will be in the wings instead of in the fuselage. But the principles to follow will remain the same.

It has been assumed so far, that the fireproof partition will be intact at the time the fire begins to develop. It will be really efficient then, and the cases of fire during flight which have been stopped or retarded in their destructive effects are numerous.

Unfortunately in the case of a violent landing the fireproof partition is often dislocated and the check which it is to offer is not always assured.

In general, the engine when hitting the ground acts as a hammer upon the partition, which is broken through by it.

Sometimes also the tank whose fastenings fail under the shock of the landing, shatters, by force of inertia, the partition placed before it; if the fastenings do not all fail under the shock, it is the tank itself that becomes distorted and lets its contents flow out.

Finally, when the tank is on the axis of the engine and near the partition which separates them, the engine, after breaking through the partition, proceeds to burst the tank: a dangerous circumstance,—since it at once enables the gasoline to leak out and gives it access to the engine compartment.

A good designer will have no difficulty in producing tanks and fastenings capable of resisting the effects of inertia caused by landing shock, even by a violent one. The use of elastic suspension and of interior bulkheads can also reduce, in considerable proportion, the water-hammer produced by abrupt displacements of the gasoline. It may be advisable then, to figure out, after some systematic experiments, the value of the dynamic stresses which the tanks must withstand without distortion and without appreciable leakage.

Unfortunately, it is not so easy to find a way (at least in the case of airplanes with engine on the axis of the fuselage) of avoiding the hammering of the partition by the engine.

It is only possible to limit its destructive effects either by making use of a protective armour as sketched above, or by removing the engine from the partition (if the plan of the airplane permit this), or, finally, by reinforcing the partition itself.

It will be noticed with reference to the last remark that the fireproof partitions which actually exist in most airplanes, are not generally constructed to offer resistance to shocks, even to feeble ones. They are provided only for the checking of flames or leaks of gasoline. It will be easy then to reinforce them without adding much to their weight, at least in the lower portion back of the engine salient.

Finally, it is necessary to prevent, at all costs, the engine from attacking the reservoir and bursting it, after it had broken through the partition: the measures to be taken for this purpose depend too much upon local arrangements to allow to detail them in advance; they will be confined to the following:

(a) place the gasoline tanks inasmuch as possible at a certain distance from the fireproof partition, so that it might be considerably distorted before the tanks are reached (from 10 to 15 cm. would be desirable);

(b) not to place the tanks exactly on the axis of the engine.

It is generally possible to place them on either side of this axis and thus prevent the salient parts of the engine, which are first to hit the partition, from injuring them immediately after;

(c) to provide an elastic protection for the tanks, so that they might stay tight even after they are distorted or cracked. There are protections of this kind which are quite efficient against perforation by machine gun bullets; they can therefore be applied in this case; these protections, however, absorb gasoline in case of a leak from the tank, a leak which one risks not to realize in time, since the protection conceals the wall and their seams.

In this case the remedy may entail great disadvantages which may lead to its rejection.

In short, the best protection against the destruction of tanks by the engine is to remove them liberally from the engine; from this point of view, the placing of the gasoline tanks in the wings gives great security and must be recommended whenever the arrangement of the airplane permits its realization.

Finally certain authors have indicated that it may be important from the point of view of fire safety to be able to quickly empty or blow-off the gasoline tanks when in flight; the pilot could thus eliminate at his will the greater portion of his fuel and insomuch reduce the violence of the catastrophe. These devices which are logical on military airplanes threatened by incendiary bullets, are generally not obligatory on civilian airplanes; they will give them but little additional security and may give them no security whatever in the most dangerous case, which is a landing on the ground with loss of speed. On the contrary, an ill-timed emptying of the tanks when in flight, with insufficient precautions against the diffusion of the gasoline in the atmosphere, may be very dangerous; similarly, blowing off the tank is as dangerous to the one who blows it off, whose equilibrium it upsets, as for someone on land who might receive it on the head.

Extinguishers

If fire does break out in spite of all these numerous and various precautions which have just been studied, it must be reduced at all costs before it extended so far as to render a catastrophe inevitable.

The sooner the pilot becomes aware of the beginning of a fire, the more efficient his intervention will be.

A gain of several seconds may decide between salvation and destruction.

Extinguishers and fire alarms are intended to satisfy this double requirement.

Extinguishers of the fixed type are the most efficient; in France their use has permitted to extinguish two out of three fires, while in flight, or to retard their progress, to make possible a rescue operation.

They generally make use of a spray of carbon tetrachloride produced by compressed gas.

The vapors thus diffused are toxic in effect; of course it can be arranged that they should not trouble the occupants of the airplane, but it is best, in all respects, not to use them except with full knowledge; moreover it will be necessary to take some precautions against eventual leaks from the tetrachloride tanks. Furthermore, fixed extinguishers should be allowed only in the hands of pilots capable of using them properly. With this reservation, which will be abandoned the day when less toxic extinguishing products will be found, the use of fixed extinguishers must be strongly recommended, particularly on airplanes of public transportation.

The extinguishers should discharge into every engine compartment, in the vicinity of carburetors, which are the most vulnerable parts from the point of view of fire safety; it should be noticed, that the extinguishing vapors will work best if the compartments, which they are to fill, will be least in volume and the poorest ventilated; the use of hoodless engines, the advantages of which from the point of view of cooling and openness to inspection in flight are beyond discussion, raises serious objections in this respect.

It is also to be observed, that if the extinguishers are able to check an incipient fire, they generally attack both its effects and its original cause. As long as the cause persists, the fire which has been extinguished one time may threaten to break out again; such is the case of a fire caused by a jammed admission valve, or by a gasoline leak in the vicinity of the magneto spark plugs; it is necessary, therefore, that the extinguishing liquid at the disposal of an airplane should permit three or four successive extinctions in the course of one flying trip.

In principle, there should be one fixed extinguisher for each engine compartment. On large airplanes, hand extinguishers of one of the common types should be added at the rate of one for each important chamber of the fuselage.

Fixed extinguishers should be set in operation as immediately as possible in case of emergency. The compressed air should be controlled, therefore, by a quick-opening cock; if leaks through the cock are feared, a second slowly operating and tighter cock should be provided, this last one to be closed when on land, and to be always open when flying.

The use of fire alarms may advantageously reduce the time of setting the fixed extinguishers in operation; these apparatus are based on the use of materials which melt or burn out, as soon as the surrounding temperature attains a critical value, and release a signal which attracts the attention of the pilot to the threatening danger. They are simple and inexpensive; they should be preferred to the so-called automatic apparatus in which the alarm itself operates the extinguisher instead of being satisfied with informing the pilot. The automatic apparatus are complicated and delicate in construction; there is always the fear that they may function at the wrong time, or that they will create a panic, or that they will emit gases which may annoy the pilot and his crew.

General Resume and Conclusions

The whole of the study just made evidences the complexity of the problem of preventing and fighting of fires. The technical means on which this fight should be based are many and varied; none should be neglected.

Experience proves that *fires in time of flight* can be most frequently checked or avoided with the precautions presently adopted, which have been analyzed in detail.

Unfortunately this is not equally true of *fires following the crashing of the airplane to the ground*. The shock, by dislocating the apparatus or the frame work, too often interferes with the fire prevention measures not permitting them to have full effect. But, even if these measures result only in retarding the moment in which the fire breaks out and spreads to dangerous proportions, it would still be worth while to accept and develop them.

There is no doubt that great progress can still be made in fire protection after a violent landing. The difficulty encountered in realizing it is partly due to the variety of the required measures, a variety demanding an all-embracing view which many of the inventors, who may be very well informed on this or that detail, do not themselves always possess.

The principal points upon which technical researches should be directed are as follows:

(a) eliminate gasoline and substitute less dangerous fuels for it. This involves difficult and costly researches which cannot be completed in a short period; in spite of their extraordinary importance, they are here mentioned only as a matter of record;

(b) to initiate new studies for the improvement in quality and reduction in quantity of *joints of gasoline and oil piping*;

(c) develop the use of *anti-back-fire apparatus*; a competition which should excite the spirit of emulation of inventors; to encourage the perfectioning of these apparatus; it is of importance above all to attract the attention of the users to the security which these apparatus can give;

(d) proceed with systematic and complete researches for means of suppressing or reducing the projection of flames and of exhaust sparks.

So far it has been sought to produce silencers and fire screens, without caring sufficiently about security against fire, which they should offer. These securities are real when the apparatus is well worked out: they soon change into sources of great danger in the contrary case.

Great technical effort should be devoted to this line of thought. It could be advantageously encouraged by offering a prize for experimental researches in accordance with a program to be determined after the considerations which has been developed above.

(e) proceed with some experiments which will give a better knowledge of the conditions of shock resistance which gasoline tanks must satisfy, and of the protective devices corresponding to them;

(f) in a general way, when a new airplane appears, to proceed with a systematic examination of its arrangements from the point of view of fire in landing, and to oppose strongly those which are objectionable from this special point of view; reservoirs exposed to immediate onslaught by the engine; fireproof partitions, inadequate as to resistance of tightness; tanks placed too closely to the fireproof partition, etc.;

(g) to encourage researches on the use of extinguishing materials less toxic than those now in use.

One more important point has to be indicated. It is not sufficient that airplanes, to be protected against fire, should be provided with well executed installations and efficient apparatus; they must also be *very carefully maintained*. In the airports one may see only too often private airplanes and even airplanes for public transportation, belonging to great companies, with gasoline and oil leaking all over.

These highly combustible materials impregnate especially the engine chamber, the engine and its accessories; they create there an ever-present danger, particularly when there is wood or cloth fabric in proximity.

It is therefore not rare that fire breaks out on airplanes thus neglected, when they are on the ground, with the first back-fire produced by the starting of the engine.

A thorough campaign in favor of *meticulous cleanliness on airplanes* and of a merciless fight against gasoline and oil leaks can have, from this point of view, salutary effects; it may be of greater import than one may at first credit it with.

ADJOURNMENT

**SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL**



Airports and Airways

First National Aeronautical Safety Conference

Under Joint Auspices of

***The Daniel Guggenheim Fund for the
Promotion of Aeronautics and the
National Safety Council***

October 4 and 5, 1928

**LT. COL. H. C. PRATT, Chairman
Air Corps, U. S. Army**

The first session of the Division on Airports and Airways at the Seventeenth Annual Safety Congress was called to order at 10:30 o'clock by the chairman, Lt.-Col. H. C. Pratt, Air Corps, U. S. Army.

CHAIRMAN PRATT: It is a great pleasure and honor, gentlemen, to have the opportunity, at Mr. Guggenheim's invitation, to preside over this meeting this morning. I feel that you are unfortunate, however, in not having with you Major Young, of the Department of Commerce, who was to preside and whose place I am taking. Major Young, due to his intimate association with airports and airways could, I am sure, have given you from his own knowledge a great many facts and much assistance in this conference.

We are, however, fortunate in our speakers, and I am sure that the papers they are to present will prove of great interest.

It gives me great pleasure to introduce as the first speaker this morning Mr. Harry H. Blee, Chief of the Airport Section of the Department of Commerce. Mr. Blee has had great experience in the Department of Commerce in work in connection with the subject upon which he is to address you, and I am sure we will find his remarks most interesting and instructive.

Designing Safe and Adequate Airports

By HARRY H. BLEE

Chief of Airport Section, Department of Commerce, Washington, D. C.

The problems of achieving safety in transportation and of providing facilities essential to the realization of the greatest benefits from the development of transportation, are by no means new problems. They have faced man down through the ages,—from the time when he built his first ox-cart, and then found it necessary to widen his footpaths into roads.

Now that aviation has emerged from the experimental stage and is taking its place in the commercial and industrial life of the world, the civilized nations are beginning to avail themselves of this newest means of transportation and to provide the facilities necessary for its safe and successful utilization. As a result, a great network of airlines is spreading out to encompass the four corners of the globe, and progressive cities are realizing that they must provide themselves with suitable airports, if they are to have a place in this far-flung transportation system and reap the profits of the pioneer. We find in the United States, approximately one thousand cities organizing airport committees and studying available sites; and another thousand cities actually engaged in the development of airport facilities.

The airport is to air transportation what harbors and docks, and stations and yards, are to marine and to rail transportation. The design of suitable airports involves many problems analogous to those encountered in designing other transportation terminals. But some of the problems in airport design are unique, because the airport must facilitate and make safe the work of pilots, in effecting for their planes—while rapidly moving in an invisible medium, subject to currents flowing in any direction and varying through a wide range of velocities—the transition from a craft operating in three dimensions, to a surface vehicle operating in two dimensions; and likewise, vice versa.

In as much as practically every phase of airport design has to do directly or indirectly with safety in aviation, the author has endeavored in preparing this paper, briefly to set forth the outstanding problems presenting themselves to airport engineers, and to stress those problems in which the question of safety plays a large part. Although the airship (dirigible) bids fair to become an important factor in the air transportation system of the world, particularly in connection with scheduled transoceanic service, it may be some time before any considerable number of airports will be called upon to provide terminal facilities for this type of craft. Hence, this phase of airport design need not be discussed in this paper.

Selection of Airport Sites

A study of the present and probable future airport requirements of a district should be made before proceeding with the selection of airport sites, in order to obtain, so far as possible, a perspective of the conditions to be met, and in order to formulate a general plan for the development of adequate airport facilities for that district. These facilities may comprise a single airport, a series of airports, or a principal airport with one or more auxiliary ports so located as to insure safety and continuity of operations at times when the principal airport may be fog bound, or otherwise unavailable. It is impossible, of course, to predict the ultimate state of development of commercial aeronautics, and hence, to foretell the future requirements of any particular district; nevertheless, in the light of present-day requirements and with a knowledge of the trend of developments in aviation, an endeavor should be made to anticipate future requirements. A general plan having been formulated, the minimum requisites by which to measure available sites can then be determined.

In determining the suitability of any particular site, or in comparing the relative merits of several sites, there are a number of factors to be taken into consideration, many of which have a direct bearing on the safety of operations at the airport. These factors naturally divide themselves into several more or less distinct groups. One group of factors has to do with the physical aspects of a site; such as, size, shape, effective landing area (see *Figure 1*), possibility of expansion, elevation above sea level, and topography as affecting drainage and general adaptability; nature of soil as affecting drainage, growth of tough sod, and maintenance of landing area; aerial approaches; presence of open fields

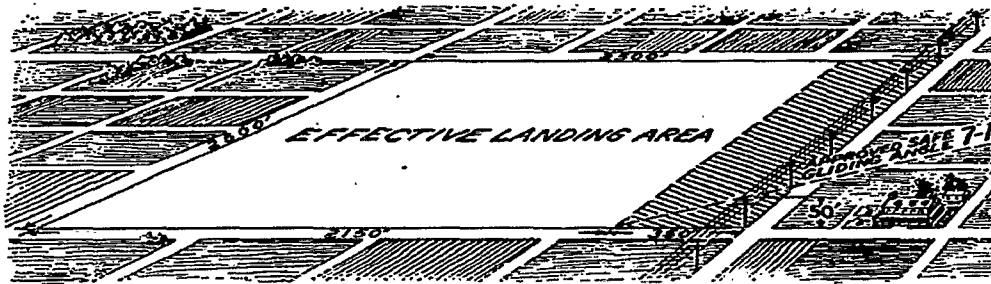


Figure 1. Reduction of effective landing area by obstacles.

or other landing areas in vicinity; suitability as determined by present or probable future development of surrounding terrain; and ease with which site can be located from the air.

Another group of factors deals with the prevailing meteorological conditions affecting airport operation. These factors embrace such considerations as the percentage of days on which the ceiling (height of the under surface of the lowest cloud layer) is less than 500 feet; the direction and velocity of prevailing winds, the orientation of the site with respect to these prevailing wind directions, and freedom from the necessity of taking off over densely built-up areas (as determined by prevailing wind directions); freedom from poor visibility due to fog or smoke, or both; freedom from objectionable air currents and eddies; and freedom from snowdrifts.

There are also several factors related to the location of a site; such as, accessibility with respect to the business and other centers of a community (a consideration of which involves, of course, a study of existing and probable future

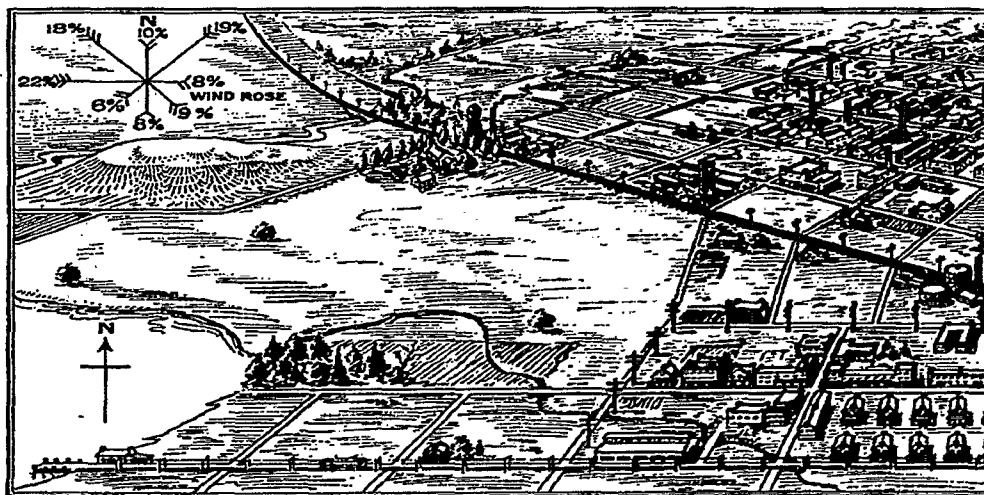


Figure 2. Sketch from aerial photograph of a proposed site presenting a number of typical problems.

transportation facilities); location from the standpoint of attracting the maximum volume of business; and location with respect to the direction of flow of air traffic.

In addition, there is a group of factors; such as, cost of property; clearing, grading, and leveling; drainage and flood protection, where necessary; preparation of landing surface; installation of light, power, water, sewer, gas, and telephone and telegraph lines; and connection of the site with existing highway and other transportation systems,—all of which may be directly reduced to a cost basis and grouped together to represent the combined cost of acquiring a certain property and of developing it, exclusive of buildings, drives, and equipment, the cost of which items varies but little regardless of the site selected.

The application of some of the foregoing factors may well be illustrated by a brief consideration of a typical example. The conventional sketch presented in *Figure 2* was made from an aerial photograph of a site considered by one of our American cities as a possible location for its municipal airport. This site, which was located northwest of the center of the city, and west and southwest of the principal industrial district, comprised some 520 acres of nearly level agricultural land, with good soil, excellent natural drainage, and entirely free from overflow. The local power company offered to move the pole line extending along the east side of the field and the railroad company consented to place underground the telephone and telegraph lines located on the right-of-way to the north.

After deducting the area rendered ineffective by the hill to the west and the several tall structures in the vicinity, there remained an effective landing area of about 360 acres, which was of sufficiently regular shape to permit the development of an all-way landing area, with effective landing lengths in all directions of at least 4,000 feet, and with the longest dimensions in the directions of the prevailing winds. (See wind rose in *Figure 2*.)

The site offered excellent surface transportation facilities. It was within 15 minutes of the business center of the city by either automobile, motor bus, or street car. Power, light, water, sewer, gas, telephone and telegraph service were at hand. The river bounding the property on the southwest afforded opportunity for the development of satisfactory seaplane facilities; and a bend in the river at this point, together with other landmarks, made it very easy to locate the site from the air. There were plenty of available industrial sites in the neighborhood of the tract; there were also a number of open fields, particularly to the west and northwest, on which emergency landings could be made.

It was found that this site could be bought at a reasonable figure, that the small stream crossing the southern portion of the property could be diverted and carried in an underground pipe line, and that the entire site could be cleared, graded, and put in shape for airport development at comparatively little expense. This site seemed to offer many advantages. But few sites are entirely free from disadvantages.

The normal direction of flow of air traffic for this city was east and southeast; hence, many planes approaching or leaving an airport developed on this site would be compelled to fly across the city.

A study of the meteorological conditions prevailing in the vicinity, showed that this rather low-lying tract along the river was subject to a great deal of fog,—one of the few remaining hazards besetting aviation and one of the worst enemies of scheduled air-transport service. To be more specific, it was found that dense fogs (fogs obscuring objects 1,000 feet away) of at least one hour's duration, occurred over this area twenty-nine days of the year, and that the area was often blanketed with ground mist, while higher areas were entirely clear, or nearly so. Furthermore, with 27 per cent of the wind blowing in over the industrial district to the east and northeast, the site was often shrouded in a dense cloud of smoke.

As 40 per cent of the wind, including the winds of highest velocity, blew from

the west and northwest, the sharp hill at that side of the field was at times instrumental in producing dangerous air currents over the landing area.

The tall isolated structures in the vicinity of the field, together with the hill to the west, constituted serious obstructions to the approaches and were particularly hazardous at times of poor visibility. The gas plant to the west of the field, though well under the 7 to 1 climbing and gliding angle, was a menace to planes taking off or approaching in that direction.

In spite of the advantages offered by this site, it was rejected in favor of one affording opportunity for the development of a much safer and an almost equally accessible airport.

When comparing available airport sites, it is very important that the several factors entering into the selection be carefully balanced and properly weighted in accordance with local conditions and requirements. No fixed set of rules can be expected to govern the selection of an airport site. Every problem is an individual one peculiar to its own locality and must be treated as such. Nevertheless, it will be found helpful, after having made a survey of the airport requirements of the community, to indicate the location and boundaries of the most promising sites on a map showing the various centers of the community, together with existing and probable future highways and transportation systems. A survey should be made of the meteorological conditions prevailing at these sites and each should be studied from on the ground and in the air. In each case, estimates covering the total cost of acquisition and development, exclusive of the cost of buildings and equipment, should be prepared. Complete data covering the several factors governing the suitability of each site should be tabulated and preliminary studies should be made of possible layouts as an aid in determining the suitability of each.

It will also be of assistance to prepare a rating schedule in which the relative suitability of each site is rated on the basis of the weights assigned to the determining factors. That done, a figure representing the cost per unit of suitability may then be determined for each site, by dividing the total cost figure by the figure representing the relative suitability. Each of these three figures is useful in making comparisons. It is important, however, that they be used only as an aid to independent judgment, and not as a substitute for judgment. The selection of airport sites cannot be reduced to a matter of mechanical routine; it necessitates the exercise of sound engineering and business judgment, coupled with a thorough understanding of the aeronautical problems involved.

Planning an Airport

It is important, in the development of an airport, to have a carefully prepared plan, not only covering the more or less immediate construction, but also providing for the ultimate development of the airport. In this way only, can a community be assured that the construction work on its airport will progress most advantageously in meeting the rapidly increasing demands of air commerce. Hence, after selecting a site, the preliminary layout studies should be continued with the idea of working out the best possible arrangement for the development of the site, from the standpoint of safety and efficiency of operation.

The general layout of the landing area, and the location and arrangement of buildings, should be determined first. This should be done only after a careful consideration of such factors as prevailing wind directions and velocities, aerial approaches, existing and probable future transportation facilities, and topography of the site and adjoining terrain. This layout should be so planned as to permit handling a maximum volume of air traffic with a minimum amount of congestion. It is also well, particularly in the case of major

airports that are likely to be called upon to handle a wide variety of activities and a large volume of traffic, to plan the airport so as to permit the ultimate, if not the immediate, segregation of scheduled air transport from aerial service and private flying operations.

After determining this general layout, a comprehensive plan covering the ultimate development of the airport should be prepared, special attention being given to the proper coordination of all activities on the airport, to suitable architectural treatment, and to appropriate landscaping. There are many points to be taken into consideration in preparing this plan. Although some of them are indirectly connected with flying activities, they play an important part in the successful operation of the airport. These include such items as fire protection, service systems (water, light, power, heat, etc.), space for various concessions, railroad sidings and spurs, driveways for vehicular traffic, automobile parking areas and service station, provisions for the safety and comfort of the public.

In planning the airport, the fact should be borne in mind that it is a terminal in what is destined to become one of our great transportation systems and that it merits the same well organized appearance of dignity and permanence as a railroad terminal. Such a port will naturally carry with it an atmosphere of assurance to the traveling public and will tend to bring about a higher standard of operation.

The Landing Area

The landing area should have clear approaches in all directions; should present a firm, smooth, well-drained surface free from all obstructions; and should be approximately level, the mean slope not to exceed two per cent in any direction.

It is highly desirable that the entire landing area be available for landing and taking off at all times and that it be of regular shape and of such proportions as to afford opportunity for the development of an all-way field that will not only permit landing and taking off in all directions, but that will also permit a number of landings and take-offs to be made simultaneously, regardless of the wind direction.

The size of the landing area will depend, of course, upon the type of planes to be operated on the field, the volume of traffic to be handled, and the elevation of the airport above sea level. Where conditions permit, provision should be made for the development of at least a 2,500-foot all-way landing area. It must be borne in mind, however, that areas limited to this size will not necessarily be large enough to take care of the needs of every city. In view of the tendency toward the building of larger and larger transport planes requiring comparatively long runways to insure maximum safety of operation, provision should be made at the major airports, for the ultimate development of runways of 3,500 to 5,000 feet, or more, as conditions may dictate. For fields located at altitudes above sea level, the effective landing lengths and the allowable safe climbing ratio (7 to 1) for sea-level conditions, should be increased according to the percentages given in *Figure 3*, which are in accordance with the requirements of the Airport Rating Regulations of the Department of Commerce. (At altitudes above sea-level, airplanes land and take off at higher speeds and climb at flatter angles than at sea-level).

Where soil conditions are favorable; where drainage, either natural or artificial, is good; and where a tough sod can be maintained on the surface of the landing area, it will often be possible to handle the traffic for some time without the construction of artificial runways, particularly in localities where there is little or no freezing. It may be found necessary, however, to stabilize the soil, before seeding,

by the admixture of several inches of granular material, such as crushed stone. Nevertheless, with increasing traffic and the building of heavier transport planes, the demand for hard-surfaced runways will be imperative in many cases. Furthermore, the traveling public will demand smooth landings and take-offs. From a safety standpoint, the runways will be necessary in order that heavy planes may take the air with the shortest possible run and thus attain a safe altitude before passing over the opposite boundary of the field.

The principles governing the design and construction of runways and taxi-ways, are, for the most part, the same as those governing the design and construction of highways. Hence, it is necessary that the same careful consideration be given to such matters as preparation of sub-grade and shoulders, adequate surface and

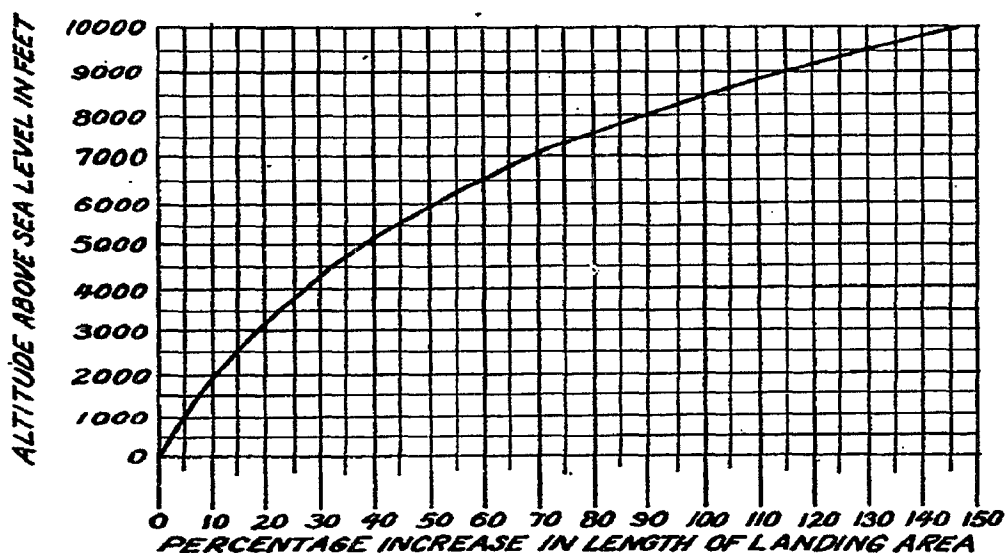


Figure 3. Required increase in length of landing area at altitudes above sea level.

subsurface drainage (see Figure 4), and to the necessity of designing the runway to meet the service for which it is intended, without excessive maintenance cost. In designing runways, it may be assumed that the landing load will vary from about three times the weight of the plane, for planes weighing 5,000 pounds, to about twice the weight of the plane, for planes weighing from 20,000 to 30,000 pounds.

Runways may be constructed of gravel, crushed stone, crushed slag, or other granular wear-resisting material, each used with a suitable binder. There are several types of construction; such as, bituminous macadam, bituminous concrete and Portland cement concrete, that are well adapted to airport requirements. It is highly desirable that the widths of runways be at least 100 feet, and, preferably more. The runway surface may be given a crown of from four to six inches per 100 feet of width, where necessary, to facilitate drainage. In order that planes may land and take off across the runways, the edges of the runways must be flush with the adjacent surfaces of the field and should be constructed with shoulders of crushed stone or other granular material.

The construction of double runways permitting simultaneous landings and take-offs, has been suggested as a means of facilitating the handling of traffic. Another suggestion to this end has been the construction of a taxiway around the outside of the landing area.

In order to assist pilots in locating the airport, the landing area should be marked with the conventional 100-foot circle, set flush with the surface, and with suitable boundary markers. (See Figure 5.) If desired, the name of the city may be placed near the circle but should not be placed inside it. The effective landing areas and the aerial approaches of airports should be protected against the encroachment of high buildings, or other structures, by local ordinances. Poles, water towers, and like obstructions in the vicinity, should be painted with alternate horizontal bands of black and chrome yellow, with a chrome yellow band at the top.

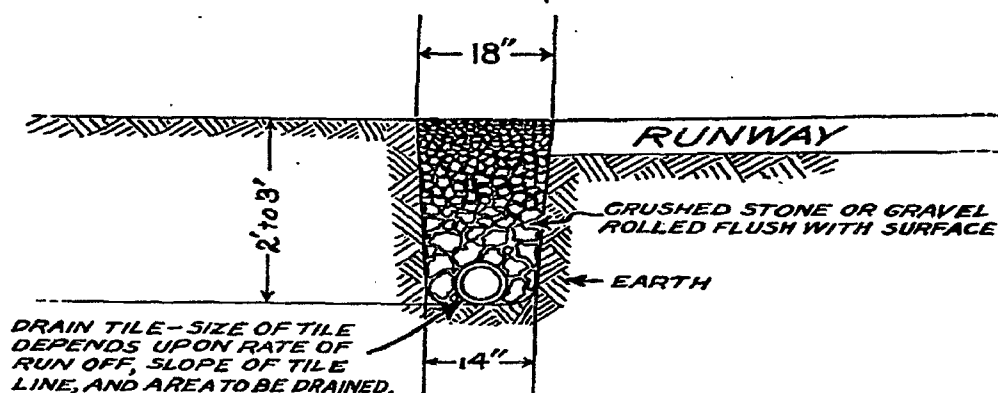


Figure 4. Tile drain for sub-draining and handling surface run-off.

Buildings and Related Facilities

The buildings and related facilities for the airport should, of course, be designed to meet the specific requirements incident to airport operations. Special consideration should be given to such matters as, provision of barriers and fences for the protection of the public, and suitable guards for the protection of airport personnel working in the shops and at motor-test stands; lighting, heating, and ventilating systems; exterior painting to give maximum visibility; fire prevention and protection, including fireproof construction, proper provision for operations involving fire-hazard, storage and handling of gasoline and other flammable liquids, and special fire-fighting equipment.

The terminal building, or group of buildings, as the case may be, should provide the same facilities for serving passengers, shippers, and the general public, as are found in other terminals, not necessarily on an extensive scale to begin with, but of at least the same degree of excellence. Such buildings may well include: administration offices, with an operations office so located as to command an unobstructed view of the entire landing area; a meteorological office and bulletin-board; ticket, telegraph, and information office; comfortable waiting-rooms overlooking the landing area; rest-rooms; restaurant; baggage, express, mail, and check room; public telephone booths; and concession stands.

In connection with the terminal building, it is important that provision be made for concrete loading areas—preferably under cover, or at least connected with the terminal building by a covered passage-way—for the convenient handling of passengers and goods; and that guards be installed to protect

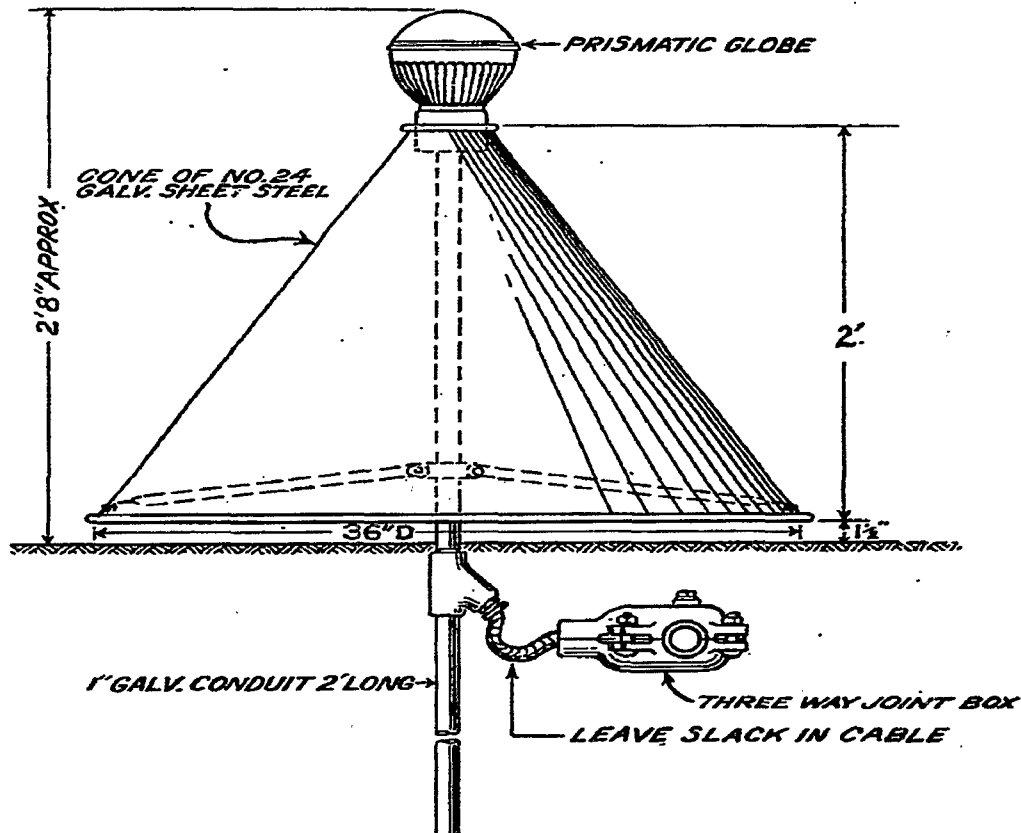


Figure 5. Typical boundary light installation with painted cone for day marking.

passengers, when boarding or leaving planes, from coming in contact with whirling propellers.

In designing hangars and shops, the important considerations, in addition to the special considerations above, include: location and area of windows; construction and drainage of floors; provision of suitable concrete aprons; location and protection of fuel-burning appliances; construction and ventilation of paint, varnish, lacquer, and dope rooms; and construction and operation of main doors. Hangars with full-width door openings on either or both sides will be found to add greatly to the ease and convenience of handling planes.

Careful consideration should be given to the provision of suitable facilities for the servicing of planes at convenient points on the airport.

The indications are that sooner or later, many of the airports will be equipped with low-power, two-way, radio-telephone stations for communicating with planes flying in the immediate vicinity. It is highly desirable however, that a visual signal system, suitable for day and night use, be provided for the benefit of planes not equipped with radio, to give the pilots information regarding landing conditions and weather conditions on the airway.

A compass circle, or platform (preferably of the turntable type) located on a portion of the field well away from stray magnetic influences, and constructed with care and accuracy, should be provided to facilitate the work of checking and swinging compasses in planes using the airport.

Night Lighting Equipment

The proper lighting of an airport for night operations has a very important bearing on the subject of safety in aviation. This lighting equipment involves a number of distinctive features and may well be considered under the following headings: (a) the airport beacon, (b) the illuminated wind-direction indicator, (c) boundary lights, (d) obstruction lights, (e) floodlighting of hangars and roof-markings, (f) the ceiling projector, (g) the landing-area floodlighting system.

The requirements for a satisfactory aeronautical beacon light for airports are: adequate candle power, not less than 100,000 for long range visibility, proper distribution of light in the vertical plane to make the beacon visible all around the horizon and to the zenith, or nearly so, for altitudes of from 500 to 2,000 feet; distinctiveness for identification; flashes of not less than one-tenth second duration; luminous period of not less than 10 per cent; and eclipse periods of not more than 10 seconds' duration. Apparatus having characteristics differing from these, but of equivalent effectiveness owing to greater luminous periods and shorter eclipse periods, to greater candle power, or to color effect, will be found satisfactory. In no case however, should the beam candlepower be less than 15,000; nor the luminous period, greater than 60 per cent. For beacons of 30,000 candlepower or less, the luminous period should be at least 35 per cent; beacons of less than 20,000 candlepower should have a distinctive color characteristic.

It is highly desirable that all flashing beacons have a definite Morse code characteristic and that they be operated by flashing mechanisms so designed as not to interfere with radio reception; and also, that beacons having a single light source be provided with automatic lamp-changers for bringing spare lamps into the focal position. A green, flashing, double light source, auxiliary beacon of at least 5,000 candlepower mounted directly above the main beacon, makes an excellent installation; particularly in view of the fact that on our National Airway System, flashing, red, course-lights are used at beacons where no landing fields are located, and flashing, yellow, course-lights are used at beacons where intermediate fields have been established. The uniform use of red, yellow, and green auxiliary beacon lights to indicate landing conditions, would add materially to the safety of night flying.

The wind-direction indicator—either a wind cone or a wind tee—should be illuminated so as to make it visible at night from a distance of at least 1,000 feet in any direction, and located so as to give a true indication of the direction of the wind on the landing area, and be readily visible to aircraft approaching from any direction.

The borders of the landing area should be outlined by a series of boundary

lights, spaced not more than 300 feet apart and served by an underground distribution system. (See Figure 5.) Either white or yellow lights should be used for this purpose, except where the entire field is not available for landing in all directions at all times; in which case, green lights should be placed so as to indicate clearly the ranges of the landing strips or runways; and red lights, installed at points where an approach is particularly hazardous. The lamps used for the boundary lights should be not less than 25 watts for white lights, and not less than 30 watts for yellow, red, and green lights. Diffusing globes or frosted lamps for all white lights are effective in obviating glare.

It is very important that all obstructions, on and in the vicinity of the airport, be marked with red lights of the same brilliancy as the lights used in the boundary circuit. These lights should, in each case, be mounted above the highest point of obstruction or on poles of corresponding height, placed along the side thereof. In marking tall, isolated structures; such as, transmission towers, radio towers, chimneys, etc., four red lights should be used. Two of these should be placed directly above the obstruction; a third, at two-thirds the height; and the fourth, at one-third the height.

The exterior surfaces of one or more of the hangars should be flood-lighted to an average intensity of at least $2\frac{1}{2}$ foot-candles, in order that these buildings may stand out in perspective to assist the pilot in judging his elevation above the field when landing. Roof-markings on the airport may be illuminated either by flood-lighting or by outlining the markings with exposed lamps.

A projector concentrating a narrow beam of light and mounted at a fixed angle of elevation is generally used to determine the height of the ceiling above the airport at night. The value of this apparatus will be greatly augmented, if the light be installed in conjunction with a graduated alidade, in such manner as to permit direct readings of the ceiling height.

There are two general systems in use for floodlighting airport landing areas: the centralized system, which consists of one or more light sources located at or near a single point; and the distributed system, which consists of a number of light sources spaced at more or less equal intervals along the borders of the area. Whichever system is used, it should be so designed as to provide an even distribution of illumination (free from abrupt changes in intensity and free from shadow areas) over the entire usable portion of the landing area. There should be sufficient intensity of illumination to reveal the details of the surface and to make depth perception readily possible from a minimum altitude of 30 feet, in the center of the lighted area. It is highly desirable that the minimum, vertical-plane intensity of illumination for the usable portion of the landing area, be not less than 0.15 foot-candle. The floodlight system should be available for immediate use, through the operation of controls located at a convenient point on the airport, and should be sufficiently elaborate or flexible to permit landing under all conditions of wind direction, and under no necessity of landing directly toward the light source.

It is of utmost importance that the floodlight system be so designed and installed as to eliminate glare and the consequent blinding of pilots. Each unit should be mounted as low as possible—consistent with the contour of the landing area—and project a beam with a small vertical divergence and a sharp cut-off at the top. The top of the beam should be as nearly parallel with, and as close to, the surface of the landing area as is practicable. In case the floodlighting is accomplished from a single light source, it is highly desirable, from a safety point of view, to provide an automatic lamp-changer to bring a new lamp immediately into the focal position in case of lamp failure.

Airports for Seaplanes

The general requirements governing the location and development of airports for seaplanes are similar in many respects to those pertaining to landplane airports. There are, however, a number of fundamental differences. These have to do primarily with the landing area and facilities for handling the planes.

Seaplane airports should be situated on, or directly connected with, a body of water having a minimum depth of not less than 6 feet at any time; calm enough for operations in ordinary weather; free from reefs, shoals, sand-bars, etc.; sufficiently large to permit landing and taking off of seaplanes and flying-boats without hazard; and with approaches permitting an unobstructed climb after taking off. In case the airport is not located directly on the edge of the landing area, it should be connected thereto by a canal, or other stream of water, wide enough to permit taxiing of planes without difficulty, and not more than one-quarter of a mile in length.

The size of the landing area required will depend, of course, upon the operations to be conducted at the port. If possible, this area should be of such size as to afford at least 3,000-foot runs in all directions. However, 4,000- to 5,000-foot runs are to be desired, particularly in major airports.

The equipment and facilities required for seaplane airports, differing from those required for landplane airports, include such items as, mooring facilities; motor boat to act as tender; means for hauling planes out of the water; dollies, cradles, and other apparatus for moving planes between hangars and ramps. In this connection it should be noted that, as a general rule, the overhead clearance necessary in hangars for seaplanes and flying-boats is somewhat greater than that for landplanes.

Night lighting equipment for landplane airports is, for the most part, applicable to the lighting of seaplane airports. Nevertheless, the lighting of seaplane airports should be treated as a separate problem in every case, on account of its possible interference with river, ocean, or harbor traffic.

In Conclusion

Aviation is becoming a vital factor in our business and social life; and before we hardly realize it, swift aerial carriers will be bearing their cargoes to every corner of the land, with a degree of safety and reliability rivaling the best of our surface carriers. The establishment of carefully-designed, well-located airports throughout the country will hasten the development of this new means of transportation and play an important part in bringing about the high standard of safety essential to its complete success.

CHAIRMAN PRATT: I am sure I am expressing the opinion of all in thanking Mr. Blee for his most excellently prepared and well delivered address.

The purpose of this conference is not only to have an opportunity to hear the papers read by certain selected individuals but to offer to those most interested an opportunity to discuss these papers and present their views thereon. Before proceeding to this discussion, it gives me pleasure to read a communication from a gentleman to whom a copy of Mr. Blee's address was presented prior to its delivery.

ARTHUR HALSTED (Associate Electrical Engineer, Bureau of Standards, Department of Commerce, Washington, D. C.): Mr. Blee has dealt with his subject so thoroughly and analyzed it in such good proportion that discussion seems limited to the amplification of details. One point in particular seems to me worthy of em-

phasis. The paper mentions a principal airport with one or more auxiliary ports so located as to insure safety and continuity of operations at times when the principal port may be fog bound.

Many of our cities have found it advantageous to locate their commercial airport on low land, often near a body of water. Such land may be subject to ground mists in the early morning or evening, that may form earlier or persist sometime after higher land, not far away has cleared. The early morning and early evening hours are assuming greater and greater importance in dispatch aviation.

It will be found that well within reach of the city whose airport is on low land, there is a knoll from 300 to 600 feet higher that could serve as an auxiliary field when the lower lands are covered with ground mist. Such an auxiliary field will facilitate scheduled arrivals and departures and other urgent flying.

Large area will not be so necessary to an auxiliary landing field on the crest of high land. The elevation above the surrounding country does in some respects compensate for area for landing and taking off. A good usable area as small as 1800 by 1800 feet with no surrounding obstacles, that can be approached flying low, will serve well for such an auxiliary field. It seems to me probable that the question of a field, auxiliary to the city airport, on the highest nearby land will face some cities soon.

CHAIRMAN PRATT: The main value of this assembly is to give to others such views as you may have. I would be very glad therefore to open the conference to discussion.

To inaugurate this, gentlemen, I am going to call on Lt. Donald Duke, of the Boston Airport. Lieutenant Duke for a long period was in the office of the Chief of Air Corps, associated with the Airway Section, at a time when the Department of Commerce had not as yet taken over the supervision of airports and airways. I think Lieutenant Duke can probably give us a few comments as a result of his experience that may prove interesting.

Discussion of Adequate Airports

By **LT. DONALD DUKE**
Boston Airport, Boston, Mass.

It has been my privilege to grow up with the airport business from the cow pasture landing field days, and it has been my privilege also to visit practically all of the recognized airports throughout the United States; to land on them and more or less inspect them, and to see the changes that have taken place in those airports, in the construction of buildings, to keep up with the advancing stage of commercial aviation.

I particularly want to stress at this time the comments of Mr. Blee on modernizing our airport. In the August issue of *Air Travel News* I had an article on that subject, and it goes into detail. Perhaps some of you would like to refer back to it. It has certain sketches and photographs are therein reproduced.

It is my contention that we have reached the point now in commercial aviation where we have got to give the people who support the airports, that is, the commercial operator, a better break for his money, comparable to the first-class store in our larger cities. If Marshall Field, in Chicago, didn't provide more conveniences for their customers, provide rest rooms and comfort rooms and libraries, and so forth, all of the conveniences that people may expect, they wouldn't be in business very long. Neither can the airport operator of today

expect to put up an old, rickety shed for a hangar, have no office facilities, and have those other things absent that modern people expect today.

The commercial airport of today may be compared to a business street in that the airport is the business street and the hangars are the stores along that street. In the course of a business block we will have several rival competitors for the business along that street, and the same way with the airport. Each operator there is competing with the man in the hangar next to him. Therefore the more facilities and the more conveniences he provides for the people who come to that airport, the better pleased they will be and the more patronage he will get and the more money he will make.

I venture to say that more than 60 per cent of the hangars in the United States are obsolete now. You can't get a modern large passenger plane in but very few hangars in the country. All hangars should have an overhead clearance of at least twenty feet. Most of them are around eight and nine or twelve, and less than that.

Our hangars should be modernized as well as the other buildings on the airport, and they should be situated in a different manner. If you go to the average commercial airport today, in the first place, as you approach the airport, you usually pass a dump heap or a sewage disposal plant or a gas plant or a swamp or something else. There are not enough highways to get to the airport. Every airport, as we know from Lindbergh's visit, should have ample highway facilities for traffic both in and out, so that traffic can be routed one way and not use the same street for two-way traffic.

Every airport should have a very substantial fence to keep the people away from the planes and to keep people off of the airport who do not belong there. There are very few airports in the United States that have control over the throngs of people that visit those airports when a prominent flyer comes in, and for that reason most mothers and fathers are afraid to let their children go out there, and they are the very people that are going to support aviation in the next few years. These youngsters are all curious and interested and eager to get near an airplane, and they should not be deprived of that privilege which is inherent and natural with them. They are the people we are looking to in the next ten years to buy commercial planes and to support airport traffic.

I think hangars should be turned around. I think the front of the hangar should face the flying field and not the side of it, as it does now. Turn the hangar around. Put your office in the front of the hangar. Up above the office, in the second story, put a roof garden with an awning over it so that people can come out there in the summer time; those people who are flying with you as an operator and are going to buy one of your planes should be given the privilege of having a place to rest and to see what is going on without getting their eyes full of dirt and clay and cinders.

Fix it up like a little roof garden on top. Put a loud speaker there, have somebody announce who is coming in and who is going out. People are interested in those things. Refreshments could be served there. Also in connection with this hangar there should be a little classroom to teach pupils the fundamentals of the ground school course.

I am speaking now of the average commercial operator who is trying to make a living on a commercial airport. He also may be running an air mail line, but all of these activities are related to the commercial operator's bread and butter.

On back of the rear of this office comes the hangar, with doors down both sides. It doesn't have to be a cantilever hangar, because those cantilever hangars are very expensive in construction, but have folding doors so that the plane can go in one side of the hangar, under its own power.

This thing of having four or five men lift up the tail of an airplane and put it on a dolly and then wiggle it into a hangar, perhaps moving half a dozen

planes and bumping propellers and wing tips is passé. The planes have plenty of power, our larger planes, to pull them into a hangar, just the same as our automobiles drive into a garage. We don't stop our automobile out in front of our garage and push it in. Neither should we stop our planes out on the dead line and push them in the hangar on a dolly or pull them in with a tractor.

The next morning when you are ready to start your activities, your plane goes out the other side of the hangar. On both sides of that hangar are concrete aprons 50 or 100 feet wide. That is where the plane should do its warming up. That is where all the tinkering should be done, so that there is no dirt and very little noise. Then your plane, when it is ready to start activities for the day, either on local hops or student work or on distant cross-country flights, pulls up to the front of the hangar, which is the office, takes in its load, goes out on the field and takes off without bothering anybody or without inconveniencing anybody.

That gives you protection over the people that are entering that plane. They are shielded and protected from the propellers because they stop right at your office door.

Every airport, as Mr. Blee has said, should have a central administrative control building because an airport manager is just like the captain on the bridge of a battleship; he must have every activity within reach. When things happen on an airport they happen quickly. He must be able to get his weather man right here, his radio man there, his fire marshal, his guard. They must all be within immediate call. That is the system used at Croydon and Tempelhof, and it is working out very well.

Also in that office, as Mr. Blee has said, we must have facilities provided for storage of baggage, ticket sales, contracting for flights, a customs office and immigration office, because most of our larger airports must necessarily become ports of entry. Foreign planes might not want to stop at one airport and enter, so they will come to the next one. Provision must be made for that.

Going farther with my thought on modernizing our airports, the tendency in the United States now for municipal airports is to build the airport itself and light it, but not put up hangars for somebody else to use. I don't think any city should spend money to erect hangars on a municipal airport. I think that system is wrong, and I think we have outgrown it.

We are planning that now at Boston. The city has taken over the Boston Airport and is going to make it one of the best, probably the outstanding airport in the United States and possibly in the world. It is going to be modernized. The city is going to build the airport and light it and provide highways and all facilities that visiting personnel may expect, all the comforts will be provided for them. But the hangars will be erected by the people who are coming in there to enter that business. It is up to them to put up their establishment, but the city will specify a type of hangar to which their design must conform. Boston will have an airport with its hangars uniform in construction. They will have brick fronts just like an office building downtown. In front of the hangar will be a little plot of grass, flower beds, hedged around, because the airplane doesn't come out of the front of the hangar; it comes out of the side. The airport is going to be beautified, and I think that if you will watch the construction of the Boston airport, you will find that this will be the turning point in airport construction in the United States. I think we are going to give the rest of the country something to shoot at up there in Boston, and it is going to be very interesting.

There are one or two points in Mr. Blee's statement that I would like to discuss, and that is the use of multicolored lights for night lighting or for boundary lights. I have been doing quite a little night flying lately, and I find

no trouble at all in following the lighted airways. But just the minute you come into a city like Chicago or New York or Boston, there is a great sense of confusion by all of the glimmering and the billboard lights blinking at you and maybe a half dozen beacons in one town; all these beacons flashing from all over town don't mean anything except that somebody is getting advertising out of it. But it is confusing the pilot when he sees a beacon here and one up there and one over there, and he doesn't know which beacon is which. There should be one main beacon on the airport. That is where the pilot wants to get and all these other lights are just so much confusion.

As far as boundary lights are concerned, there too you have confusion by having two or more colors. I contend the proper colored globe for boundary lights depends on the surrounding lights in that city. As I have said before, there are no two airports alike, and no two operated alike. We must analyze local conditions, diagnose the case, and provide the equipment that will best meet the need. So that if you have your airport close into town like it is in Boston, which is just adjacent to the business district, and all these lights flashing everywhere, we should have a distinctive boundary light, preferably chrome yellow or something distinctive, so that it cannot possibly be confused with a park which also has white boundary lights around it.

Then if you want to use another colored light, use a green light to show the pilot where his best approach is, depending on the wind. The pilot then spirals around his boundary lights until he sees the green light burning, and he comes in over the green light which has been turned on by the man in the control tower. Every runway or every angle of approach has a green light around the periphery of your boundary lights which the man in the control tower can turn on, but there will only be one green light burning; and I believe that is the best solution to boundary lights in landing at night, together with the other equipment which has been referred to.

There is one more point that I want to take time to discuss here, and that is of general interest to everybody and is more or less propaganda or more or less offsetting propaganda.

Occasionally you see articles in the papers stating that big airports are no longer needed somebody is building a helicopter or an autogyro or something else so that you can land in the back yard. It has caused many erroneous impressions to go throughout the country that large airports are no longer needed, which is not the case. Airports should become larger, and those cities today which are figuring on airports should provide not only the land for their present needs but land for expansion rather than buying a back yard and expecting to make an airport out of it for the planes that are not yet proven practical.

I think the paper by Mr. Blee is a very wonderful piece of work and will do a lot of good if circulated throughout the country.

CHAIRMAN PRATT: This subject naturally divides itself into the selection of airports from a safety point of view, which I wish to stress, and their preparation for operation after their selection.

We have with us Colonel Stedman Hanks, who is connected with an organization that has done considerable work in the selection of airports. He has made a trip recently which should give him much information, and I am going to ask him if he will be kind enough to give us a few minutes, bringing out the result of his experience in this connection.

COL. STEDMAN HANKS (President, American Airports Corporation): I really feel quite honored to speak to such a distinguished group of men. It is quite unexpected.

Of the few things I was able to learn abroad, two stand out in my mind above all others. I shall mention those very briefly.

I do want first, though, to publicly state what a great help the Department of Commerce was to me when I went abroad. Through the commercial attachés in the various countries, they were able to collect a lot of information and were of invaluable assistance. I also got a great deal of help from the War Department, and if it wasn't for the military attachés it would have been very difficult to see all that I did see. Also Mr. Guggenheim very kindly suggested that I might call on some of their representatives. They are the highest type of men in Europe and are in touch with all phases of development in aviation, not only airports.

Mr. Blee in his paper has shown extremely good judgment. He has not confused the issue. I think when we talk about airports we are apt to be too definite. We are apt to lay down the law and say this is so, and this cannot be done. This whole game is so new, no matter how much experience one may have, it is growing so fast, that I was impressed particularly abroad with the mere fact that the Italians didn't know very much of what the Germans were doing or the Germans were going so fast that they felt it wasn't necessary to see what the French were doing and the Dutch were doing, and the same with the British. They were all interested in knowing what the other nations were doing but they weren't exchanging their ideas. So I feel in this matter of designing airports, of building airports, it is just now a very, very early stage. I think very few of us know where we are going, and in Mr. Blee's paper he has produced so many different phases without being too definite. And the point I want to make is this, that we must get the people's confidence. We all want to talk the same language. We don't want to confuse the issue so that engineers will say, "Well, why does one person do this and why does the other person say this cannot be done?"

Without question, abroad the outstanding phases of airport development are these—first, the hangars over there are large. They are making larger and bigger hangars, and many of the officials there told me that all hangars built today will be amply large to take care of all the airplanes or the increasing size of airplanes. That point was of course brought out by Mr. Duke in his very able remarks just a few minutes ago.

Secondly, the hangars and the laying out of airports abroad go over a far greater area in that taxiing is required to a far greater extent than we want to taxi an airplane in this country. I think such a situation as you find abroad is perfectly logical because if you remember the airport and the air transportation company are very largely controlled by the same group of officials, so that the air transportation company can't go to the airport manager and say that he does not want to taxi halfway around the field or want to taxi around behind the control tower because it is bad for his airplane.

Abroad, the air transportation companies and airport corporations are working hand in hand, so that the primal thought there is the thought of the comfort of the passengers, the best way to impress the public, and to make the airport a part of the community.

I hope that point is clear because I think it is very important, and I think it will continue to be more important in this country because the air transportation companies are always going to try to look after their own interests, which they should rightly do, and they should have every possible help, but the airport manager is looking out for the interests of his community.

In conclusion, I would like to say, if my opinion is of any use in connection with sea-planes, that the development of the flying boat or the sea-plane abroad is perfectly appalling. I feel that it is a phase of aviation which we must give much more consideration to.

CHAIRMAN PRATT: Gentlemen, we have another paper to hear later which

deals with more of the safety of operation of airports. If, however, after these remarks there are other gentlemen who would be good enough to give us their opinions, I should be very glad indeed if they would take this opportunity to do so.

There are one or two points in Mr. Blee's paper which I remarked and which I would like to comment upon very briefly. I think the matter of the influence of future design on airports will have to be given consideration, as Mr. Blee brought out, to a very great extent. We can compare it with the development of the railroads. An airport which is satisfactory now may not be so a few years hence. However, we have to establish these airports based on what we have at present and what we know at present. The difficulty is a railroad station which is not large enough or properly situated at present can be very much more readily moved than an airport which is incorrectly chosen in the first place.

I think all those interested in the organization of new airports should bend every effort to secure proper assistance from the neighboring communities. It is comparatively easy to mark and lay out your own airports. It is exceedingly difficult in many instances to get the neighboring communities to assist you in marking and lighting which would be of benefit to the operators from your airport, particularly if it costs them money.

I think there is sometimes considerable advantage in holding back on the development of airports. I am afraid in many instances airports are being placed where they eventually will be of no value to the development of real commercial aviation. Of course we have to distinguish between airports for operating organizations and little airports that are erected for schools and individual operation. But I think those of you who are called in in consultation in this connection, it is a fair thing to do if somebody is desirous of establishing an airport and you can see no value for it, to tell him so even though at that time he may not appreciate it.

Our next paper, gentlemen, deals with the other phase, the operating, and it gives me great pleasure to present to you Major John Berry, the manager of the Cleveland Airport, of Cleveland, Ohio, who will address you.

MAJOR JOHN BERRY: This paper is not presented to you as authoritative. It is simply my reaction, after fifty-seven thousand ship movements through the Cleveland Airport. The things suggested as needed aren't yet installed in the Cleveland Airport. We haven't the best airport in the world. We have a busy port. We are still in the process of construction and will be for quite some time, and if you will bear with me, I will read this to you.

Airport Operation from a Safety Point of View

By MAJOR JOHN BERRY
Manager Cleveland Airport, Cleveland, Ohio

The phenomenal growth of commercial aviation and the diversified types of service, coupled with the countless student flying activities, presents today an operating problem for the airport executive to weigh carefully. Despite the care and thought given to the preparation of laws for navigation, and particularly to those that apply to airport flying, by the Aeronautics Division of the Department of Commerce, casualties continue to multiply in a greater ratio.

The great diversification in types of fields has necessarily superinduced many rules for the governing of local conditions. Flying traffic regulation is covered in its activity by the air commerce regulations, yet lack of standardization in airport construction gives leeway to the individual flier.

Take-offs and landings shall be made upwind, when practicable. The basic principles of airport design should make it possible for the elimination of the

word practical. Airports built with run-ways when sufficient area is available for the construction of the all-way field are inviting casualties.

On the terminal ports today, with ships landing and taking off every few minutes, it is essential that a control station with unobstructed visibility be the point from which all departures are controlled. The inability of the pilot, in certain types of cabin planes, to see the air from all angles has frequently led him to take off just ahead of a ship landing and thus jeopardized the lives of the passengers in both planes.

The law giving the incoming ship the right of way automatically safeguards the entire traffic if control is exercised from a tower and signals used designating the area that is to take the air. The advancement of the art of navigation, as practiced by the pilots of the New York-Cleveland leg of the N. A. T. service, namely, that of flying blind and solely dependent upon instruments, makes it extremely necessary that precautions be taken to protect the incoming flier, not only from collision but also from over-shooting his landing area.

A four way field with the perimeter outlined with boundary lights gives a sense of security to a pilot in bad weather if the entire area inside the lights is safe for a landing. This is particularly true in winter, when snow covers run-ways and the losing of the run-way means nosing up, with resultant damage to ship and delay to ship's cargo.

A far greater source of worry than all the flying activities is the absolute lack of precaution taken by the average spectator on an airport. Whether it is because of his interest in things strange and unfamiliar or whether he is merely exercising his inalienable rights as an American citizen, it seems impossible to impress the thought of caution and the necessity for care into the sightseer at an airport.

The whirling propeller seems to be a natural attraction and the average spectator is drawn into danger by a lack of knowledge of this hazard. Naturally you ask, why not a fence? Primarily our first reaction is that a fence high enough for the purpose will automatically become a hazard.

The average port today is municipally owned and dependent for some years to come upon the taxpayer for the money with which to operate. A complete exclusion from the port means a lack of support when funds are needed for further development and added necessities. The enclosed area at Tempelhofer Field seems from the airport manager's point of view an ideal set up, yet with eight to ten companies competing for the traffic and the removal of the few from the center of operations we would at once encounter the cry of favoritism and also encounter stubborn resistance from the public.

Sufficient mounted police patrolling along a dead line have proven quite satisfactory as far as the sightseer is concerned, but once the sightseer buys a ticket and becomes a prospective passenger it is impossible to hold him on the line. He is in the hands of the operator, who with limited personnel and the ever present necessity of selling another prospect seems to feel only a negative responsibility.

On single motored biplanes the wing acts as a guard for the passenger entering and leaving, but the ever present hazard of the starboard motor on tri-motored monoplanes constitutes what is probably the greatest hazard to the user of air travel. A rope fastened to the fuselage prior to the loading or unloading of passengers would in a simple, inexpensive manner reduce this hazard to a minimum.

In the life of every airport certain construction work is necessary. This in itself is a hazard and must be so marked that the pilot unfamiliar with the port may know at a glance that the area is closed and unfit for service. The painting of tractors, trenchers and graders with the standard black and chrome tector striping of the Department of Commerce sets out clearly these obstacles, and the complete surrounding of the area with a series of flags similarly marked and spaced about 20 feet apart guarantees protection during the daylight hours.

It is exceedingly desirable and should be the practice of airport executives to see that all obstructions are removed before dark, but if the area itself is unsafe red electric lights, not lanterns, should replace the flags at the same spacing. The insisting of the Aeronautics Division upon fire extinguishers in every ship has been an education for most operators. When a mechanic wheels a ship on the line it should be an inviolable rule that two hand fire extinguishers be mounted in a carrier and accompany him and be available for immediate use in case of back fire.

Every hangar should have spaced about the walls extinguishers that are ready for emergencies. These should be inspected at least once a week and care should be taken to see that they are immediately refilled after having been used. The hand extinguisher should be supplemented by a forty or fifty gallon tank of the foam type, for further protection. The field itself must have an efficient fire department that is motorized and equipped with chemicals, pumps, hose and first aid equipment. In addition to this equipment it is the duty of the airport executive to supervise general conditions and, when carelessness and neglect are noticeable, to exercise his authority and eliminate the cause of both.

The duties and responsibilities of the airport manager are so many and of such wide variance that to attempt to cover the entire field would tax a super-man. The supervision of flying is a minor incident in the day's work. The fact that the average pilot is a man of sound brain and approximate physical perfection guarantees to the manager strict compliance with the air code. This, of course, applies only to the experienced pilot. Student flying and the period after solo requires more attention.

Printed rules mean little; constant contact by the airport manager with the courses of instruction given by the various schools will educate the student in what is required of him on the particular port, both as to the hours of flying and the priority of flight and the necessity to conform himself strictly to straight flying.

The care of the layman is, as I have previously stated, a paramount worry. At Cleveland a week-end average crowd is about 75,000 people. There are about twenty to twenty-four ships in the air from daylight to dark. Each delay in loading and unloading lessens the day's receipts. The reputation of the port rests with the manager and it is his duty to insure safety to spectator and passenger alike.

The constant supervision of equipment and close contact with the aircraft inspector is necessary in order that no ship not inspected and licensed may leave the ground. The service rendered to transients is bound to react on the reputation of the port. Strange pilots must be accorded every courtesy possible and the quality of the gas and oil must be unquestionable.

Mechanics that are not licensed are frequently the cause of forced landings, due entirely to their lack of experience, and it should be an inviolable rule that at least one member of each servicing crew be an experienced man and licensed by the Department of Commerce.

The information as to routes, weather, available fields belongs primarily to the manager's duties. This information or lack of it is a determining factor in the progress of the port.

Where aids to navigation are provided by the Government, it little behooves any field manager to remain in ignorance of all conditions that pertain to flying within a two-hundred-mile radius.

Finally, the base of all his work—the bedrock from which he builds—it is the prime duty of every airport manager to know every hour in the day the exact condition of the entire flying area. During fair weather and foul the air traffic depends entirely for its very existence upon the airport. If a port is good it must be watched and maintained daily to keep it good. If it is ever to be good, only a thorough knowledge of its faults and a concentration of work on those faults will

make it better. No port stays in shape no matter how well built unless it receives daily attention.

This close inspection should not be delegated to other than trained men, for upon this more than any one factor does the port prosper or fall into disuse and for the resultant reputation so fluctuates the efforts of the airport and the airport manager.

CHAIRMAN PRATT: Major Berry's remarks are certainly full of meat, and I am sure those of you who are interested in the operation of the airports will benefit exceedingly therefrom.

I remember that during the war we had the opposite extremes in the control of flying from the airdromes in the army. I recall one field from which no plane was allowed to take off until that plane's number was flashed. I recall another field where aircraft were allowed to take off in any direction and at any time they preferred, the basis of the latter being the idea that a pilot must be at all times wide awake and alert, that if he were taught flying under any other conditions he would soon become a flyer of a character where his operations would be mechanical and controlled by outside sources.

The happy medium is, I believe, what we are after. In the case of the Cleveland Airport, it seems to me, from Major Beery's remarks, that they are endeavoring to reach that happy medium by controlling to a certain extent, but at the same time not limiting, the initiative of the pilots.

My heart goes out to him with reference to the crowds. I happen at the present time to be at Mitchel Field, and every time anyone says that an aviator is coming across the Atlantic I think a large part of New York thinks he is going to land at Mitchel, and they all come out there.

So far, the only means that has been at the disposal of the authorities at Mitchel Field to handle these crowds are policemen and guards. However, we are erecting a fence along the border of the field, and I believe that the combination is the proper solution. Gentlemen, I am very glad now to open this paper for discussion, and I am sure there are some present who have some comments upon it.

Mr. Shaw, this is a little out of your line, but I am sure you have had sufficient experience to enlighten us a little.

B. RUSSELL SHAW (B. Russell Shaw Co., St. Louis): I am going to disagree with you for just a moment in that it is not out of my line because I don't think that it is out of anybody's line who is in the airport business. I think that our experience in the operation of air lines has convinced us that the things that the major has just said are of paramount importance; at least those were the important things that it was my pleasure to learn during my affiliation with the National Aeronautic Association and the air races that we ran insofar as the control of air traffic and spectators is concerned; also in the operation of air lines for the Ford Motor Company and Stout Air Service.

I am thoroughly convinced that we need airports with runways. I am not differing from Major Berry in the slightest degree. If hard-surfaced runways are not provided, then theoretical or fictitious runways must be marked with a view to absolutely controlling the operations from the airport and the landings to it. If we are to allow airplanes to take off and land promiscuously, we are inviting dangers, and therefore some definite system of runways should be established, whether they are physical things or not, at least they should be designated so that incoming pilots and pilots taking off may know where they are supposed to land and where they are supposed to take off.

As for the accommodation of the public and the use of fences, I think that is also of great importance. One thing that I would like to stress and which I think

we are getting off on the wrong foot on, is that we are calling the majority of landing fields airports.

I believe there are three distinct phases. One is the landing field, the other an airport, and the next an air terminal. At a flying field we will perhaps have several individual operators, the equipment will not be so elaborate, and perhaps the field will not be night lighted. At the airport, we will have night-lighting facilities, hangars, and shops, and perhaps air mail operators from it, even air line operators. At the air terminal, we will have, in addition to this, proper terminal facilities for taking care of passengers on our large air lines and the servicing of our big ships.

We have in air transportation what we are pleased to call the highest class of transportation. We are charging more for it, we are catering to the best of the traveling public. Yet at the average air terminal or airport in the United States, our passengers are being taken out to board the planes in bad weather, under borrowed umbrellas and slickers, and the ladies are walking out perhaps in slush or at least in the rain to get on board one of our modern \$50,000 or better ships.

We must provide terminal facilities that are at least equal to rail facilities in so far as the traveling public is concerned. If we are going to charge for this service and we hold out to the public the fact that it is the highest class of transportation, then that same public has a right to demand similar conveniences as are accorded our rail passengers.

We are planning on several of the airports we now have under construction air terminal facilities, by which planes may take on and discharge passengers under cover. The first of these will be erected at Tulsa, Okla., and the next at Philadelphia. We believe that this will mark a decided advance in the handling of our passengers.

Major Berry's statement concerning the upkeep on an airport is absolutely right. The field surface is of the greatest importance, and it does require constant attention. I know that in the operation of Stout Air Service Lines, I used to put equipment off of the airport every afternoon after our regular lines had stopped operation in order to bring that field up to perfect condition for the next day's flying, and I think all of our airports should do that.

As to runways and what they are to be constructed of, we don't know. We have a lot of ideas, and we are trying to learn. Concrete runways have been installed at Ford Airport, combinations of this and macadam are being placed on the other field, and they are bringing up certain conditions that we must think about. One is the drainage along the side of the runways which I think can be very easily met, and the other is the surface and its reaction to the tire making contact with it.

One difficulty that has been brought out with a hardsurfaced runway such as concrete is overcoming the inertia of one of these large wheels, preventing the tires from being shredded as they make contact at 60 miles an hour or thereabouts. That can be very easily overcome. All we need to do is to turn the wheel before we land, and if our wheels are in motion, then we can land on that kind of a surface without any damage to the tire. That can be accomplished by putting small rubber fins or modifications of the cup on the sides of the tire. You say, they fill up with mud. That is all right. They turn the wheel just the same.

There is a thought we should give some attention to because an airplane, after all, is nothing but another vehicle, a ground vehicle of similar weight, until that weight is being taken on to wings, and until that time it should be moved around over a surface sufficiently hard to accommodate it without rutting, even under conditions of rain and when frost is coming out of the ground. The answer seems to be hard surface.

Whether hard surface will extend over the entire area, that is, from one side

to the other throughout the length of the runway is something that we don't know yet. We think we are learning. Our taxi strips certainly must be of hard surface.

The lighting equipment that is now available I believe is to a great extent a makeshift. I believe that through the future design of airports within the next few years and the possible application of hard surface runways, we will see an entire change in our method of illuminating the port.

I make the statement that at present we are all wrong on the method of illuminating and that within the next four or five years we will see a decided change. I made that statement at the Detroit Aero Show before some of the representatives of the various lighting companies, and I am happy to say they agreed with it.

We have been illuminating railroad yards with certain types of flood lights. When we attempt to illuminate an airport, therefore, we attempt to use that flood light in the airport with certain modifications. It is true enough there have been certain units that have been developed particularly for this type of lighting, but after all is said and done, they all use the same system, and I think that system will be greatly changed, not necessarily with the sod field, but certainly as we learn more about and instal hard-surfaced runs.

CHAIRMAN PRATT: I was asked to present this thought to you, that there may be an advantage in the provision of mats, which we may call safety mats, which can be placed upon the ground and so marked that visitors will not walk on them and thus be kept away from propellers or from dangerous areas on a flying field.

Is Mr. Cooper here? I wonder if Mr. Ray Cooper would favor us with some remarks as to his experiences in Detroit.

RAY COOPER (Board of Commerce, Detroit, Mich.): I would prefer not to say anything about the recent experiences in Detroit. There is some prospect of an airport in the immediate future, as Mr. Shaw will tell you, but it is not the airport that either Mr. Shaw or many of the rest of us thought was the preferable one.

We are probably in the kindergarten class at the present time. We hope to get out of it some of these days before long, but our airport situation, with the exception of the privately owned airport belonging to the Ford organization, is rather a deplorable one.

I did listen with a great deal of pleasure to Major Berry's paper, and I am anxious to compliment him both on his paper and on the excellent manner in which his airport is operated. Having been on a number of them recently, I am very friendly to the service that we can get there.

I had another experience in a city not quite as big as Cleveland but a very prominent city in the United States within the last week in which we found a total of 32 gallons of gas on the entire port, and probably 100 ships out on the line.

I hope that within the coming year we will be able to say something about airports in Detroit that will be interesting.

CHAIRMAN PRATT: Is there anybody now who would be kind enough to submit any further remarks in connection with this subject.

P. T. COOLECAN (Asst. Deputy Postmaster General, Ottawa, Canada): I am sorry I didn't hear the last paper, but I was very much interested in the safety of airports and the matter of hard-surfaced landing. I wonder if the last speaker or the one before the last would give me some idea of whether he has had any experience on that. We of course in certain parts of our country lack a good many of the conditions which you have here, so far as climate is concerned. I am thinking now of the eastern end of Canada on the north shore of the St. Lawrence. You possibly may remember the Bremen affair. The assistance that went to the Bremen and reached it as rapidly as it did, was due to the experience that one of the Canadian companies had had in flying the mail on the north shore

of the St. Lawrence under conditions that were extreme, to say the least—snow storms, low temperatures, taking off from the ice and landing on water, and so on. Airport design and airport safety under such conditions as I have mentioned call for considerations in design somewhat out of the line which we were discussing here this morning.

Personally, I have never had any experience with any airport except what you have here in the United States. We in Canada have not yet developed to the extent that you have, either airport design or the management of the flying, although we are well on our way, and it is just as well to start right.

I was wondering if I could get any idea here as to how to work for safety in airports under winter conditions. Hard-surfaced runways are not possible in the country that I have mentioned for a considerable time of the year, say the first four months of the year, January to April.

I represent the Canadian Post Office Department. We ran the mail to Magdalene Islands. Magdalene Islands never had a mail during the winter before last year. We ran seven trips. We had to take off on the ice and land on the water, covering about seventy-five miles of sea. Naturally, expensive airports could hardly be put up except by the government in a place like the Magdalene Islands; neither could expensive airports be established in such places as we take off.

R. A. RIDDELL (Standard Oil Co., New Orleans): I would like to inquire what the consensus of opinion is regarding safe fueling and safe handling of fuel for the planes in the larger ports, or what the general practice is. We are just getting into it down there.

Cooperation on the Part of the Oil Companies

COL. STEDMAN HANKS (President, American Airports Corporation): We felt very strongly, in connection with fueling of gas in airports, that the different oil companies should give that a great deal of thought and that we should cooperate with the oil companies. That can be handled in many different ways. It depends on whether it is municipally owned or privately owned. If it is municipally owned, it is a question of legislation, just how that oil concession can best be given. If it is privately owned, you can go jointly with the oil company, or the oil company can pay you for the concession.

It seems in an airport where a great deal of fueling is necessary, it is much better to have all your fueling placed under ground with proper outlets away from your hangars at the end of your concrete apron.

There are two ways of doing that. One is by having your gasoline tanks come on your motor trucks and make an arrangement with the gasoline company as you need the oil, or to have the gasoline company put in a large tank in the beginning.

I think in this country probably it is better, while these airports are just going through their early stages of development, to use the gasoline company with the gasoline oil tanks, as I don't think that we have yet determined which is the best place at which to put the outlet on the field. I think we must go into this matter of underground piping rather slowly on account of the expense, and I think that very shortly, with the movability of the plane and the control of the airports through the airport manager, you will be able to save a great deal of wear and tear on the plane.

I am afraid I am very conservative on some of these matters, because I think the matters are so important that it is a question really of cooperating with the oil company.

R. A. RIDDELL (Standard Oil Co., New Orleans): My idea was to get any information that was possible. We have just completed the installation of an under-

ground storage and fueling system at Pine Bluff, Arkansas, and of course we were interested to know whether we were headed on the right line or whether there may be some development brought up that might lead to radical change from the way we are doing it.

COL. STEDMAN HANKS: I am sure your work will be of great interest to our people, and it is just that kind of work that makes it possible to improve.

ADJOURNMENT

Airports and Airways (Continued)

DR. W. F. DURAND, Chairman

Professor Emeritus of Mechanical Engineering, Leland Stanford University, California

The second session was called to order at two-fifteen o'clock by the chairman, Dr. W. F. Durand, Professor Emeritus of Mechanical Engineering, Leland Stanford University, California.

CHAIRMAN DURAND: I want to say first that I appreciate very much the pleasure and honor of presiding at this meeting. If there is any one feature of the development of aviation which has especially impressed me, as the years have gone by—and I have been watching it for a good many years—it is the advancing importance in significance of the work on the ground.

It isn't alone sufficient that we should be able to design a plane and build a plane and fly a plane; but we have to have a whole program of operation and investment on the ground, in order that this plane may be made commercially significant. There must be an airport from which a plane may rise and another one in which it may safely descend and there must be lighted airways and all that sort of thing.

As we know, in many types of operation, the investment and the expense on the ground may well be more than in the air. All of that only emphasizes the particular significance of the work that goes on on the ground, taking in the whole domain of engineering in its general sense—civil, mechanical, electrical,—and involving large expenditures of money and of vital importance in order that the plane may serve its significance in fitting in as a factor in commercial use.

This afternoon session is simply a continuation of a similar session this forenoon, and the first paper is by Harold Pitcairn, President of the Pitcairn Aviation, Inc., Philadelphia.

Unfortunately Mr. Pitcairn is not able to be with us this afternoon, and his paper will be read by Mr. W. L. Le Page, who is associated, I believe, with him.

Airway Selection from a Safety Point of View

By HAROLD F. PITCAIRN

President, Pitcairn Aviation, Inc., Philadelphia, Pa.

Safety is the watchword of commercial air transportation. Without a reasonable degree of safety, air transportation would have no future, were it even to have a present. In organizing for air transport operation, therefore, this most important factor calls for a broad consideration in its relation to the many other problems involved.

In view of the subject assigned to me I think it important to point out that the demand for air transportation is the reason for establishing an airway. It is the demand which is the primary consideration in the selection of any particular route, for where the demand exists, there the airway will lie. From the standpoint of selection only, therefore, safety becomes a secondary consideration which must be secured wherever and however possible, and usually has little influence upon the choice of an airway. We

ourselves, for instance, had very little choice in the selection of the route for the New York-Atlanta airway. There existed a demand for air mail service between New York and Atlanta, touching at Philadelphia, Washington, Richmond, Greensboro and Spartanburg, and our only choice lay in undertaking the job or not.

Therefore, in this discussion I am going to take the liberty of treating the subject of airway selection in a broader manner than the title would seem to permit, for a strict adherence to the title allotted to me would involve wholly theoretical considerations many of which would instantly break down in the light of practical application.

In the initial survey of an air route, it is a good plan to fly over the route thoroughly and take many oblique photographs. In the preliminary survey of our route we followed this practice, and the photographs that we secured threw very definite light on some of the problems of this route. The pictures demonstrated unmistakably for instance the necessity for a greater number of intermediate landing fields along the southern stretches of the route, where the characteristic terracing of all unwooded land makes it virtually impossible for a pilot to locate a suitable field in which to land in case of need. Without this preliminary survey, it is improbable that we would have realized this need until actual operations were under way.

Although there is little opportunity for selection of an airway from a safety point of view, there is opportunity in the choice of Equipment, Personnel and Policies. Too much emphasis cannot be laid upon the importance of proper selection as applied to meeting the problems coming under these three heads.

The Equipment

The selection of equipment involves choice of aircraft based upon certain required characteristics, and their maintenance on the ground. The outstanding elements in the choosing of aircraft from a safety point of view are stability, sturdiness of construction, speed and cruising range.

The problems involved in blind flying present one of the greatest handicaps to safety in the operation of an airway, and it must be remembered that in night flying sometimes a pilot is caught by a sudden change in the weather and is compelled to fly blind although this was not his intention when he left the ground. For this reason, it is vital to select aircraft with good flying characteristics. Rather recently, it has become generally recognized that almost all pilots lose their sense of balance after flying blind for an extended period. It is obvious that a pilot who has lost his sense of balance while flying blind will be very greatly assisted in maintaining direction and proper flying attitude by means of his instruments, if his machine is inherently stable. At least one instance has come to my attention where the pilot regained control of the machine by actually releasing the controls until the machine assumed level flight.

Regardless of the steps taken to insure safety, it should be recognized that accidents will occur occasionally, particularly in the operation of a night mail line in territory frequented by low clouds and fog, under present operating conditions. Therefore careful consideration should be given to the protection of the pilot in case of crash.

In this connection we had occasion recently to see the importance of sturdiness in the construction of our aircraft. John Kytte, one of the pilots on the Southern division of our line, has twice flown into a mountain side, owing to abnormal weather conditions. In both cases his speed was in excess of 100 miles per hour when he hit the mountain, since in neither case did he have any warning that he was going to hit. His escape with minor

injuries in both cases can be explained only by good luck plus a pilots' cockpit capable of withstanding tremendous shocks.

Of course, good flying equipment without provision for its maintenance when not in the air would be a one-sided proposition. Consequently, we attach very great importance to the equipment which we maintain at our stations for the over-haul of aircraft, engines, instruments and parachutes. In the interests of safety and reliability an airplane operating on a regular air line requires a thorough inspection every day or after each complete trip. Movement of ships must, therefore, be so arranged that they will be at points where provision and equipment exist for such inspection at stated intervals.

Under the general heading of equipment I also desire to stress the importance of ground communication. For a successful and safe operation, it is imperative that before taking off the pilot be fully informed of weather conditions prevailing along the route over which he is to fly as well as conditions at his destination and even beyond. Because of the rapidity with which the weather changes it is also important that he be constantly informed by wireless during flight of any changes which may occur.

Our safety and reliability are seriously handicapped at the present time because there can be no direct communication between the pilot and the ground personnel, and it is earnestly hoped that the experiments now being conducted along these lines by the Department of Commerce will shortly be sufficiently perfected to be of practical value.

Speed also has its bearing on safety, for the faster a machine flies the less it is affected by adverse winds which results in less flying at nearly full throttle, and this reduces probable engine failure. Also bad weather areas between stations are crossed more quickly, which is particularly important on a line like ours where the weather changes so rapidly that frequently when the pilot arrives at his next destination the weather is very different from what it was when he left the ground. Cruising range is also of great importance because when caught blind, a long cruising range will give opportunity to fly around until a hole is found in the weather before running out of gas.

The Personnel

Another opportunity for selection is personnel. Of probably more importance than the selection of equipment, the selection of personnel can spell success or failure. Setting aside at this time the undoubted and obvious need for a progressive executive staff, the selection of the operations personnel is of vital importance. Every one knows that only pilots of proved experience are eligible for carrying the U. S. mail, or passengers. But I want to emphasize the importance of something more than experience among flying personnel. I have in mind that somewhat intangible yet very apparent factor in life called "character." Certainly in the flying business, character, sharp wit, and resourcefulness play a leading role. A pilot may have a vast knowledge of technical flying but lack that force of character which pulls him through some gruelling experience. Also a pilot's decision whether or not to go through, should not be influenced by what he thinks the other pilots will think if he does not get through. This quality almost always is lacking in young pilots, but it is always to be fostered, and only a man of strong character can attain it.

Perhaps a recent experience of one of our men will illustrate my point of the value of sharp wit. It was a dark but clear night when Ambrose Banks was flying on his regular schedule south from Hadley Field at an altitude of about 2,000 feet. He was directly on the airway and had nothing to do but keep a normal watch as he flew serenely along his course. Suddenly ahead of him what appeared to be an enormous gray monster loomed up of such

proportions and shape as to completely baffle his senses as to what the nature of this obstacle might be. His reaction, however, lagged not for an instant as he quickly pulled the stick far back and zoomed high over this nebulous mass which passed out of sight as quickly as it had come.

Being genuinely baffled and wishing to prove to himself that he was not not merely the victim of a hallucination, and that this obstacle was something more than a mere cloud bank, the pilot circled back, carefully retracing his path. A few moments later the powerful headlights of his plane revealed in the darkness the enormous bulk of the U. S. Airship Los Angeles. Quick wit saved what might have been a disaster.

Nor is this phase of the personnel problem confined solely to pilots. The choice of the ground personnel is equally important in its relation to the entire problem. Again, experience is of necessity a prime requisite, but a deep sense of confidence must be created and maintained between those responsible for the flying and those having to handle the maintenance and overhaul of the ships. Furthermore, the public usually comes in closer contact with the ground staff and a high grade of personnel will aid materially in instilling confidence in the organization on the part of the public.

Policies Another Field

And now I want to refer briefly to the matter of policies, which is a most fruitful field for selection, and one in which there is ample room for success or failure.

The only basis upon which an air transport organization can be built is one of service. Service must, therefore, be the basic policy to be followed and all activities of the organization must be brought into harmony with this fundamental. Without the unqualified determination to provide a service in every sense of the word, the air transport organization is courting failure.

However, no organization can live entirely by itself. Far less, an air transport organization at this stage. The cooperation of other organizations, governmental, civic and commercial, is essential and must be sought, and when secured, cherished, for it is a much prized possession. No air transport operator can build up a sound air transport business without help direct or indirect from the Department of Commerce, the Post Office Department and local post offices and civic groups. This help and cooperation must be earned by sincere effort and thoughtful consideration of all concerned in the interests of air commerce.

In conclusion, let me sum up two basic points that I want to leave with you in connection with this subject. One is that since the selection of an airway is based almost entirely upon the demand—the problem of the operator is to get all the facts that will work against the safety of that particular route and then find ways and means of overcoming those factors.

The second point is the effect of weather upon the safe operation of regular flying along the eastern seaboard where our route lies. Weather is by far the most severe obstacle we have to overcome from the standpoint of safety, as well as of service.

Part of the solution to this problem lies in constant communication with the pilot by means of wireless, so that he may be supplied at all times with accurate information as to the changing conditions of the weather along his route and at his destination. The equipment and personnel required for this purpose calls for resources greater perhaps than any operator can afford to undertake. The most he can do is to cooperate in every way possible with other agencies that are working towards a solution to this problem.

Without governmental aids that have already been installed, it would be impossible to run a night air line here in the east with any degree of safety or reliability. But there is still much to be done, and it is most gratifying to know that the method of attacking this problem by the government is one that should in time remove most of the hazards that now confront our pilots on every trip they take at night. For no matter how perfect the weather at the take off, the pilot is always likely to encounter fog, low clouds or storm before he reaches his destination—at least on our route.

In addition to the Government's effort to solve this problem, I understand that the Guggenheim Fund for the Promotion of Aeronautics has attacked this problem in a very serious manner. Recently while on the Pacific Coast, I was impressed by two things; one that except for definitely confined areas of ground fog around San Francisco, and a few other spots, flying weather is almost ideal the greater part of the time between San Francisco and Los Angeles.

The other thing that impressed me was that in spite of these conditions the Guggenheim Fund had effected a weather reporting system which must be of great value to the operators of scheduled air routes up and down the Pacific Coast.

I also understand that the Guggenheim Fund is going to undertake a serious study of the problem of blind flying. Therefore, in view of the work they are doing, I hope it will not be out of place for me to make a plea that their energies and attention be directed to the problem of flying in the east, where conditions to my knowledge, are, taken the year round, worse than any other part of the United States. I am convinced that the regularity of our service will always be disappointing to us until the pilot can, with a reasonable degree of safety, take off with the deliberate intention of flying blind most of the way and then land blind if the necessity arises. I believe our line is confronted with greater difficulties in relation to blind flying than any other in the country, and therefore it is my earnest hope that the Guggenheim Fund will attack the problem on our line where the solution is sorely needed.

CHAIRMAN DURAND: The author of the paper referred, among other things, to the lack of dependence which can be placed on those instruments which have been developed in the inside of our heads during an evolutionary period, which goes back, I suppose, to the old "Flying Lizzard." We have various things that tell us when we are right side up and when we are not. But it appears that when we ourselves are subjected to accelerating movement, these indications become wholly unreliable.

Of course, I am not telling you anything new. The fact has been known for some little time. But it is important in connection with blind flying, and perhaps has only recently come to be fully realized.

I want to illustrate this with a little incident which came to my attention a short time ago, in connection with one of the pilots on the Pacific Coast. He ran into some fog or thick flying, and after going on a bit, he realized from the behavior of his instruments that he was in a spin. He knew that he was in a spin, and yet he, as far as the indications or feelings in his head were concerned, felt he was all right.

He knew by looking at the instruments on his board what he ought to do in order to get out of that spin. They gave him some indication. He had a demonstration in an ocular way that he was in a spin. And he knew what he ought to do, but he simply couldn't overcome the inhibition, and he kept on until finally he came out below the clouds, was able to see the ground, get some idea of really what he was doing, and found the earth spinning around under him. Then he

was able to overcome this inhibition and do the correct things, and he was fortunately at a sufficient altitude so he got out of his trouble and things were all right.

That illustrates the significance of this particular condition which renders the instrument we have inside our heads wholly unreliable under conditions of that sort, and impresses upon us the importance of learning to depend on instrumental indications.

Now, gentlemen, this paper is open for discussion. It is a most important and interesting one. Who will ask a question or make some comment that may be of interest?

H. W. HENDRICKS (Travelers Insurance Co., Hartford, Conn.): I was very much interested in the speaker's reference to the necessity for an inspection and perhaps of an overhaul of (I assume) the engine and the craft after a flight. I would naturally assume that the reference to overhaul was not the dismantling of the engine after the flight.

I would like to have the speaker, if he will, indicate to what extent, or rather how complete, perhaps, the inspection should be, or the overhaul, after each flight.

Second, in regard to the complete overhaul, is it the thought of the operators and the owners of the aircraft at the present time that flying a certain number of hours constitutes a limit or period at the end of which a complete overhaul should be made in the interests of safe navigation?

CHAIRMAN DURAND: We might have all the questions and the discussion, and have these various matters answered at the end.

Are there any other questions or comments?

Major Blee, you have had a lot of experience in connection with airports. Can't you ask some question of the author of this paper?

H. H. BLEE (Senior Business Specialist, Aeronautics Division, Department of Commerce, Washington, D. C.): I think the author has gone into that subject very thoroughly and has made it very clear. I know the points he has brought out have been those that have impressed me as being very vital from the standpoint of successful operation of scheduled service over the airlines.

This is a paper to which anyone may profitably refer who may be contemplating entering that field of activity.

LT. DONALD DUKE (U. S. Army, Boston Airport, East Boston, Mass.): There were two pilots killed on the Southern Air Mail Route near Richmond, Va. I wonder if that was attributed to some certain thing, and what would make it safer? This is not a criticism but I would like to bring out any action that was taken to prevent that.

CHAIRMAN DURAND: You might answer those questions now.

W. L. LE PAGE: The gentleman mentioned Mr. Pitcairn's reference to the necessity for overhauling ships and engines at regular periods during operation.

The extent to which an airship—I am speaking, of course, of our own operations entirely—or engine is overhauled after a scheduled flight depends entirely upon the report which the pilot makes at the conclusion of the flight, as to whether or not he feels the ship and engine are in good operating order.

However, the New York-Atlanta line is divided for the purposes of maintenance, into two sections at Richmond. And no airplane flies out of Richmond either north or south without a general, complete overhaul, and by overhaul I mean inspection.

If that airplane as a result of that inspection, or if its engine as a result of that inspection, or as a result of the report of the pilot, is found to be not in the best condition, there are other planes maintained at Richmond for replacing the defective ship. And the schedule and the position of each ship during the operation of the line each night is such that at no time would it be impossible to find a reserve ship convenient to replace a defective one.

The question of the number of hours that we permit an airplane or its engine to fly before a complete overhaul, including dismantling, is a subject on which we feel there is not enough definite information at this time to permit us to run the risk of laying down any definite ruling. We feel that rules, unless they are established because of an unqualified realization of what they mean and their necessity, can be snags in an operation.

At present we are going on the principle of providing more complete overhauls than we believe to be necessary, in order that we can build up an experience which will at a later time permit us to economize, we will say, in overhauls on a definite and certain basis.

Does that answer your question?

MR. HENDRICKS: Yes, it does answer it perhaps as well as it can be answered. I would like, however, if it were possible, to get some general idea as to whether you still think perhaps an overestimate or maximum 500 hours is a proper thing to follow until you have obtained that experience. Perhaps it is impossible to say. I think it, however, has been mentioned, and I was very much interested in some sort of maximum.

MR. LE PAGE: The time that any airline operator, the period that he stipulates between the overhauls of his equipment, particularly his engine, varies with each different operation. What may be all right for our line may be entirely too much or too little for a line operating in the West Coast.

I should say that in our own experience we have found that we have been compelled to overhaul an engine long before it really needed overhauling, because of some major breakage which occurred, either in flight or during testing, and which necessitated the complete dismantling of the engine. That applies only to engines. Airplanes don't suffer from anything like the small ills that aircraft engines do.

In reply to Lt. Duke's question on the fatalities which occurred unfortunately on our line, in May, I can say at this time, in brief, that we learned considerable from those experiences and were able to incorporate definite changes in operating policy and in operating arrangement as a result of lessons learned.

The unfortunate death of Pilot Maurice, who was the first to go, was undoubtedly the result of just what Dr. Durand was talking about after I finished reading Mr. Pitcairn's paper, namely that the pilot lost all sense of what he was doing, of his altitude in flight, and in his endeavor to correct what he thought was an incorrect altitude, each time he overcorrected, and he unfortunately had not got sufficient altitude to right himself and regain mental equilibrium as opposed to the equilibrium of the ship before the ship hit the ground, and he dived into the ground at a very steep angle at top speed. He had only taken off a few minutes before and was still at a low altitude.

We are not in such a fortunate position I would say in regard to the reasons for the accident which resulted in the loss of Pilot Reeve, who apparently attempted to make a perfectly normal, forced landing without visibility. He, too, was flying in dense fog and was the victim of unfortunate circumstances in that his ship ran over the edge of an embankment.

However, both of those accidents brought to our realization very definitely that with the present aids to navigation which exist on our line—and we have as many and as efficient aids as all of the other regular Department of Commerce Airways of the country—that those aids were not yet such that we could fly under all conditions. Our pilot personnel was keyed up to a keen sense of duty, that their job was to deliver the mail.

As a result of those two accidents, we definitely put into force a policy of safety first, and since that time we have trained the air mail, as a result of conditions which our operating personnel realized might very well result in a repetition of the Maurice and Reeve catastrophes.

But as a result of putting this policy into effect, our pilots have been able to fly with a keener and surer sense of safety and of performance of duty, with the result that since that moment when the new policy of operating went into effect, we have been maintaining a higher percentage of completed trips on a progressive basis.

CHAIRMAN DURAND: Is there any further discussion on this paper?

Our second paper is entitled, "Marking of Airways," and will be delivered by Mr. Woody Hockaday, Aeronautics Division, Department of Commerce, Washington, D. C.

MR. HOCKADAY: Mr. Chairman, Ladies and Gentlemen: Before I read the paper I have prepared, I would like to say that my paper as printed by the Fund mentioned the fact that I was with the Department of Commerce. I wish to state that, while I am not directly connected with the Department, I am working in connection with the Department of Commerce and the Army and Navy in trying to bring about a uniform system of air marking.

And I would further state that in this paper, the credit is more due to the committee than to myself personally.

I would also like to take this occasion to compliment Mr. Harry Guggenheim on bringing about this National Convention on Safety in Aviation, which will mean the saving of many thousands of lives in the future years to come.

Marking of the Airway

By WOODY HOCKADAY

Aeronautics Division, Department of Commerce, Washington, D. C.

The subject of air marking divides into two rather distinct parts: first, the methods employed in marking the regularly constituted federal airways designated, equipped and maintained by the government through the Department of Commerce; second, all other airmarking of cities, towns, villages and airports whether on or off the constituted airways apart from the federal markings at airway intermediate fields and beacon sites, a vast field and a factor of tremendous importance to the safety of air navigation. As the marking of airports is being covered in another paper to be presented before this Congress, it is not proposed to treat of this phase of air marking in this paper.

The federal airways which link up terminal municipal airports with a chain of lighted intermediate landing fields approximately every thirty miles and beacon lights every ten miles, have been marked according to a standard practice determined by the Department of Commerce.

Beacon sites and intermediate fields are numbered on the basis of mileage starting from either the south or west terminals and working north or east, as the case may be. With beacons approximately ten miles apart, it is readily possible for a pilot to ascertain his distance from a southern or western terminal by adding a zero to the beacon number; thus beacon number twelve is approximately one hundred and twenty miles from the starting point.

Routes are designated by using the first letters of the names of the terminal cities, with the south or west designation preceding. In this manner A-N Y refers to the Atlanta-New York Airway.

At each beacon site is found a fifty-six foot chrome yellow concrete arrow with the power house for the beacon equipment forming the feather end. The beacon straddles the center part of the arrow which points along the course to the next northerly or easterly beacon. Located on the two sides of the pitched roof is found the route and site designation, on the left the route and on the right the site.

For example, there would be found A-N Y on one side and the figure sixteen on the other, which informs the pilot he is located at site number sixteen on the New York-Atlanta Airway, one hundred and sixty miles north of Atlanta. Both the arrow and roof of the power house are floodlighted for night visibility. In cases where commercial power is available and power houses are not erected at the site in question, the site designations appear on the feather end of the arrow.

The second field of air markings embraces all markings established by private individuals, corporations, civic organizations and others. These agencies have marked some three thousand cities and towns throughout the country with various types of markings, a splendid work but somewhat offset because of the lack of a universal system.

Interest in air marking was brought to a head last spring when the Wichita Chamber of Commerce sponsored an air marking conference awarding suitable prizes for the best designs submitted. Several thousand markings were received and interest in the contest far exceeded the most optimistic predictions.

After the conference it was felt that before definite standards were recommended for national use, the designs be carefully studied and that the most effective be erected and observed under varying service conditions.

It was at this juncture that the Hon. William P. MacCracken, Assistant Secretary of Commerce for Aeronautics, stepped into the breach and made the suggestion that a committee be formed in Washington and charged with the duty of working out a system of air markings, later to publish literature and specifications that, it was hoped, would result in the adoption of their recommendations.

This committee is made up of representatives of the Army Air Corps, the Bureau of Aeronautics of the Navy, the Department of Commerce and myself, as a representative of the original National Airway Marking Association of Wichita.

At the initial meeting of the committee a decision was reached as to the information that air markings should convey. The pilot should be able to ascertain the name of the town, the direction and distance to the nearest airport, the type of airport together with the facilities provided, and true north.

It is also conceivable that it may be found desirable to give information as to distances and directions to other cities. It will be valuable to so mark farm buildings that a pilot who may have become lost can readily orient himself through the medium of some farmer's barn that will give him the distance and direction to a nearby city or town.

The designation of a small town is not as difficult a matter as is the marking of a large city. However, the need for marking the small town seems to be as great, in that they are hard to recognize, whereas a large city is much easier to identify. The smaller town in most cases, provides only a few surfaces that lend themselves readily to air marking and the approaching pilot quickly picks out the outstanding structures and will alter his course to fly over them.

In the case of larger towns and cities such a procedure cannot be followed owing to the number of roofs that are adaptable for use. It has been thought that, owing to the fact that flyers in a majority of instances, follow railroads, markings should be placed along the various railroads leading into town and in the outskirts of the town itself. There are many surfaces in such districts, such as warehouses, factories, elevators and other structures that lend themselves readily to air markings. By adopting such a universal system, pilots and the flying public would know exactly where to go to look for these signs. Such a system would not, of course, preclude the markings of buildings within the city, but such other markings would become a very valuable adjunct.

Numerous studies have established the fact, that chrome yellow, white and dead black are the best colors to be employed in the actual painting of air markings. The white and chrome yellow reflect the light and the dead black provides an

excellent contrasting background. These colors have been decided upon only after experimentation by the Army, Navy, Department of Commerce, and private agencies, and are so well substantiated as the most efficient that we may consider them as definitely approved.

There has been brought up, in reference to the studies being made of air marking, the extent that advertising signs will interfere with regular guidance indicators. It has been felt that industry will quickly take up this new means of putting their products and organizations before the public. In order to counteract any confusion that might arise, it has been deemed advisable to install some sort of insignia that will identify markings as official. Such an emblem, if distinctive, would quickly segregate official markings and advertising matter, and might do much to influence advertisers to incorporate in the markings, information that would be of value to the flying public. If such a course should be followed, an organization properly authorized could pass on all markings and award official emblems to those meeting requirements. The emblem is then installed on the roof and the marking effected is obviously official and true information is guaranteed the flying public.

As to the actual physical make-up of the markings, it is felt that the name of the town or city is of primary importance. Such a marking should be of sufficient size as to be visible from an altitude of between two to five thousand feet under good visibility conditions. Naturally, fog or ground haze will not allow the same degree of legibility, and thus it will be well to make requirements rather severe.

The second most important requisite for an adequate air marker is the direction, distance and type of the nearest airport. A tentative system which has been tested satisfactorily by the Committee in Washington is to erect an arrow pointing in the direction of the airport with the mileage thereto in front of the arrow. At the feather end of the arrow the type of airport available is carried. It has been thought that the Department of Commerce ratings could be incorporated in this marking. Thus, an A 1 A preceding an arrow with the Arabic figure three succeeding would identify the airport in question as an A 1 A rated airport situated three miles from the markings in the direction the arrow points. Suitable symbols could be used to designate Army, Navy, Department of Commerce and Auxiliary fields and unrated airports.

The meridian or north marker should consist of an arrow, broken approximately one-third of the distance from the head by the letter "N." This arrow should have an unusually long shank in order that there should be no confusion between it and the arrow designating the direction to the airport.

There has now been covered the factors which should be incorporated into an adequate air marking. Any additional markings such as distances to neighboring cities or points of interest will naturally vary greatly according to the information that is to be conveyed. However, a rule that if followed in all markings will lead to success, is particularly applicable to these cases. That rule is to, as simply as possible, convey the minimum amount of information necessary in a manner that leaves no doubt as to the meaning. For example, a rural marking endeavoring to show the direction and distance to Pittsburgh, should carry an arrow preceded by the distance with the words either below or above the arrow, "To Pittsburgh."

Any airmarking will become doubly effective if illumination is provided. There are two general methods for lighting such signs, namely by a system of floodlights and reflectors or by outlining the legends with lamps. There are a few isolated instances of night lighting of air markings in the country and lighting engineers are now at work to determine methods and intensities of illumination required to satisfactorily illuminate markings.

The Air Marking Committee is planning to use various lighting systems in conjunction with its markings in Washington and will fly over them and observe them under varying service conditions. Several lighting engineers are working

with the Committee in this problem and it is expected that some definite information and recommendations will be forthcoming when the experimentation is completed.

In order that the committee's findings will be followed, it will be found advisable that aviation organizations appeal to the nation to provide air markings. Undoubtedly the Department of Commerce will write specifications and distribute them as far as possible. It will be impossible, however, for the Department of Commerce to wage as an intensive campaign as could an organization of private individuals functioning without profit where the expenses are met through public subscriptions. Such organizations could prevail upon civil organizations, corporations, private individuals, organizations, and others to mark their various holdings throughout the country. Specifications could be circulated giving definite tables and figures regarding size and spacing of letters, symbols and legends that have been approved, color charts, approved methods of illumination and other factors that would serve to make the actual work of air marking merely a matter of following simple and comprehensive directions.

Large corporations such as railroads, oil companies, mercantile concerns and the like that have warehouses and holdings scattered throughout the nation, might become interested in marking on a national scope. In any event, proper organization and dissemination of air marking propaganda will do much to interest the public in this most important aeronautical development.

With the increase of air travel and the fact that specialized air navigation maps are available for only an exceedingly small portion of the country, it is readily seen that an adequately air marked nation will greatly enhance the value of the airplane as a dependable means of transportation. If adequate airmarking is effected, delays due to becoming lost will be minimized, the circling of towns in search of an airport will become a thing of the past, as will the low flying over railroad stations to ascertain the name of the town.

It is sincerely hoped that a universal system will be adopted in the near future that will do much to make air marking the simple proposition that it should become.

The members of the Committee in Washington are sparing neither time nor effort to bring to a speedy and satisfactory conclusion the studies now being made and would appreciate any constructive criticisms that may be forthcoming from any interested parties.

In closing it is my sincere opinion that the subject of air marking is of prime importance and that ultimately it will take its place as one of the most potent factors in the bringing about of increased safety in air transportation.

CHAIRMAN DURAND: You have heard the paper. Are there any questions or comments? It is an interesting and significant subject.

It seems to me of the greatest importance naturally that a pilot flying along should wish to know just where he is, how long it is to the next point he is likely to meet. The more complete information that can be conveyed to the pilot, the more comfortable he will be, and all these conditions, of course, will be conducive to safety, regularity, reliability, and efficiency of operation. This is simply one of the agencies of conveying information to him.

We are hearing in other sections, of course, with regard to the methods by radio, conveying information to the pilot while flying. But there are various things which can just as well be conveyed by visual means, at least under ordinary conditions, and the author of this paper has discussed these admirably and it seems to be a very complete way.

Some of you, however, must have some comment or question which will serve to bring out some of the points.

MR. LE PAGE: I wonder whether Mr. Hockaday has any opinion to express on the advantages of indirect illumination of markers, or what I might call direct

illumination, namely the actual lighting of the marker by, as you mentioned, the outlining with vacuum tubes or electric bulbs?

In that connection, it occurs to me that at times, when I have looked down, while flying at night, at an illuminated sign, a letter like for instance the letter "N," which would come in your meridian hour, might appear, if it were actually illuminated with electric lights, as though it were a square block of light, whereas if it were a painted letter, illuminated by reflected light to form a beam, the sign would be visible and distinct to a pilot at perhaps a far greater distance or under far more adverse conditions.

That is a question I would like to ask.

Regarding the comment which Mr. Durand, our chairman, made just now, expressing the necessity for visual markers, in spite of our interest and experimental work in the development of radio markers, my own feeling is that that point is extremely important, since we have to look into the future to more than the operating of regular transport lines and to the flight-by-night of air taxis. I mean that there will be, I feel, a great demand for air commerce on special charter, and those ships may not always be equipped with radio. It is perhaps presuming too much to suppose that every airplane that is in the future going to fly at night or in bad weather is going to be equipped with radio, unless it is one of the fleet operating upon regular schedule.

MR. HOCKADAY: The first question you asked—about the lighting—that is something that our committee in Washington hasn't tried out. That is, we haven't tried out the lighting of these markers. We have been trying out the painted system, painting them.

In this connection, the committee is going to do a lot of night flying under various conditions, and we are going to outline, just as I say, or we are going to floodlight some of them and some of them we will outline the legend. For instance, the ends will be outlined with lamps, and then we will floodlight the others. Then we will go up a mile and make a record, starting up say 6,000 feet or such a matter, and coming down. We will make a record of the different altitudes as to what we can make out.

The different members of the committee will do this, and also the Army and Navy flyers. The flyers in the Navy are instructed to make reports on these markings and how they show up, and make records of them at the different altitudes.

There are a lot of different phases to air marking, and it is just something that takes time. We would be glad to have any criticism or any ideas from anyone else, so that we can try them out. In fact, this original contest we had brought out a lot of various ideas, and the committee has studied those various ideas. Some of them were good and some of them weren't any good.

As far as the lighting is concerned, we will soon have that pretty well tested out.

However, we want to keep closely in touch with those interested in the beacon proposition so they will be able to help us and we will be able to help them. We haven't tried out all the experiments in connection with the marking that we expect to in the future.

The committee expects to get out specifications and tell of our findings. Those will possibly be mailed out to the pilots all over the country and to the various aviation magazines and through the press so that the public may have a chance to criticize or approve these different systems.

It is very necessary that that be done, as we will eliminate a lot of trouble they have in highway marking or had years ago, by figuring out a practical system, because if every town was marked with a different kind of system, it would cause the Chamber of Commerce men and the public to spend millions of dollars on

unnecessary marking that instead of being a help would be a hindrance to the flyer.

When the flyer is in the air and gets lost and doesn't know where he is, he can't stop and ask somebody how to go, as he could in an automobile.

LAYMAN ANDREWS (Portland Cement Association, New York City): I would like to ask what dimensions you have in mind for these markers. About how long and how wide should they be?

MR. HOCKADAY: The minimum size we have at Washington is about 30 inches. It is 30 inches wide and about 30 feet long. That is, with the end about two-thirds from the end of the arrow. The arrow we are trying out is a slim shaft; that is, it has a small head and a long shaft without any large feather end at all, just a straight bar with small head to it, and back here a little ways from the head is a great, large end that extends out on each side of this bar so you won't mistake it for any other kind of marker.

After a pilot gets accustomed to that, he will know instantly without scrutinizing the marker that it is a north signal; and we are always trying out various emblems to work in connection with the arrow, so that an aviator from long distance will know it is an airplane sign, and will know where the arrow is situated from the emblem, the direction of the airport. So if he should run short of gasoline or anything should go wrong with his plane, he can almost instantly look out without scrutinizing various signs, and pick out the airplane sign and find his way to a landing.

CHAIRMAN DURAND: Are there any further questions?

If there is nothing further on this paper we will pass to the third and last paper of the afternoon's session, which is a paper on a most interesting subject, "Operation of Aerodrome from Point of View of Safety."

If there is any one place where experience should have been gathered in connection with this subject, it is in Croydon, England. This paper has been prepared by Major L. F. Richard, Croydon Aerodrome, London, England. We are all very sorry that Major Richard is not here. It was too much, perhaps, to expect him to come across to present this paper, but I am sure we would all like to see him and talk to him and have a chance to ask him some questions.

In the absence of Major Richard, Lieutenant Donald Duke has been kind enough to offer to present his paper for him.

Operation of Aerodrome from Safety Point of View

By MAJOR L. F. RICHARD

Croydon Aerodrome, London, England

I consider that it is essential for the control of flying operations to be vested in thoroughly qualified officers, one of whom is on duty during all flying hours, and who is also available immediately at night, even if no flying is anticipated. These officers should be experienced pilots, preferably with experience of air line work, and also qualified aerial navigators. This point is particularly stressed in the interest of safety, as it is felt that only such a man is competent to control aircraft on the ground and direct and assist aircraft while in flight.

I believe that the system of control used at Croydon is more complete than at any other aerodrome, so I propose to describe it in detail.

This control is carried out from a Control Room, 30 feet square and about 50 feet above the ground. In it, while any flying is in progress, are the Duty Officer and two wireless operators, who communicate by Radio Telephony

on 900 meters with machines in flight. A look-out is stationed on the balcony outside.

The Duty Officer is in close touch with the following other services, which are essential to his efficient working:—

Meteorological Office

This office is situated immediately below the Control Room. Weather reports are received hourly from stations on the various routes. These reports are despatched immediately on receipt by pneumatic tube to the Control Room for the information of the Duty Officer and for transmission, as necessary, to the pilots of aircraft in flight. In addition to these reports, special intermediate reports are received when sudden changes in the conditions, which are likely to affect aircraft, occur at any station. These reports are passed without delay to any aircraft likely to be affected. Weather forecasts are also available, and advice as to existing and probable weather conditions along the air routes is given personally to pilots by the Meteorologist i/c. Pilots are encouraged to make the fullest possible use of the Meteorological Office.

Route Traffic Wireless Room

In this room all messages to and from other ground stations are transmitted and received by Radio Telegraphy on 1,400 meters.

Communications Office

In this office all messages intended for transmission to other ground stations are coded and despatched to the Route Traffic Wireless Room by means of pneumatic tube for transmission. Incoming messages are de-coded and passed to the Control Room, also by pneumatic tube.

It is very important that all messages regarding the movements of aircraft be notified to the Duty Officer as early as possible. Cases have occurred when only five minutes have elapsed between the transmission of a message from a Station on the Continent and its actual reception in the Control Room.

Control of Aircraft Departure

When an aircraft is observed by the look-out to be ready to depart from the arrival and departure paved area, he reports the fact to the Duty Officer and if the latter agrees, a disc is displayed on which are the initials of the company concerned. This gives the aircraft permission to taxi out on to the Aerodrome preparatory to taking off. When the look-out observes that the machine is turning into wind preparatory to taking off he reports again to the Duty Officer, and if the latter considers that it is safe for the aircraft to take off a small searchlight is directed on the machine. If this signal is withheld the aircraft must not leave. It has been found at Croydon that an orange screen used with this light gives the best general effect under all conditions of weather.

The Duty Officer must at all times know the position of all aircraft on the various routes from Croydon. These positions are plotted on a special steel map and small magnetic symbols, about an inch long, are used to represent a machine. There is a symbol with the registration markings painted on it for every aircraft which is known ever to fly on the routes. Different colored symbols are used for the various operating companies. The positions are plotted at short intervals by the Duty Officer, using his knowledge of the

cruising speed of the various machines and the force and direction of the wind. This plotting is, of course, checked up by positions given by pilots from their machines by wireless, and by those taken by direction finding apparatus.

During bad weather conditions accurate plotting is very necessary. The Duty Officer will inform pilots of their proximity to other machines and, if necessary, direct them to fly at different heights. He will also give advice, when asked, as to the best direction from which to approach the aerodrome. The Duty Officer should never, except under most exceptional circumstances, direct a machine to land. This question must be left to the pilot's discretion.

To assist pilots in locating the aerodrome in misty weather, the Duty Officer will direct the firing of pyrotechnics. Various types of pyrotechnics have been tried out at Croydon, but it is considered that the best type is one which will give an intense light from the moment of leaving the ground and should go to a height of approximately 1,000 feet, when it should be entirely consumed in order that no residue may fall on the Aerodrome.

When aircraft are approaching the aerodrome in misty weather, the Duty Officer goes out on to the balcony with a Wireless Operator, who can plug in his head set at various points; if the aircraft is observed, the pilot will be told in which direction to fly to reach the aerodrome.

Forced Landing in the English Channel

If a pilot of an aircraft considers that there is any chance of his having to descend in the Channel, he will immediately give the distress call "MAYDAY," when all stations working on 900 meters stop working so that Croydon, in conjunction with another W/T station, can get the position of the aircraft by direction finding apparatus.

A third W/T station near the coast endeavors to get any message which the pilot may send. Immediately a distress call is received by Croydon, the Duty Officer, who has special facilities, telephones to the appropriate coastal wireless station. If the machine has to land in the water this station is instructed to issue immediately the S. O. S. broadcast to all shipping. A tug is always available with steam up at Dover, and can be sent immediately out to the aircraft. The French authorities also have similar arrangements.

Calm Signal

When it is calm (the wind less than 2 m.p.h.) a calm signal consisting of a white disc is displayed on the ground. It is considered that this method to indicate calm is preferable to that of hoisting a ball on a tower, as this is difficult to see from the air unless the machine is very low. When this signal is displayed all machines must land and take off approximately on a certain bearing.

Regulations

The Air Navigation Regulations and local regulations are all framed from the safety point of view. These must be carefully enforced, and any infringement should be immediately reported to the Officer i/c of the Aerodrome. For instance, both in the interests of safety and of the comfort of passengers, climbing turns straight from the ground are definitely prohibited.

The regulations to the effect that all aircraft must make at least one circuit of the aerodrome before landing is a good one and I understand is in force at many other aerodromes.

A very rigid regulation is the one which requires all aircraft when turning in the vicinity of the aerodrome to do so in a left handed direction.

Aerodrome Lighting

At Croydon a Neon lighthouse has been erected, this consists of sixteen 20-foot Neon tubes placed nearly vertically in the form of a square. This light is operated by a switch in the Control Room by relay mechanism. The normal range is about 40 miles.

Surface Lighting

It is considered very advisable that the surface of the aerodrome should be thoroughly illuminated at night.

A special form of floodlight, projecting a flat beam over an arc of 180 degrees, is used at Croydon. It is mounted on a special chassis having caterpillar driving tracks, and, accordingly, can be moved easily to any part of the aerodrome however bad the surface may be. It can also be used as a second location light, as it can be pointed up to an angle of 45 degrees and then rotated by means of a small electric motor. In conditions of poor visibility some pilots have stated that this light can be picked up sooner than the Neon light. Its operations are directed from the Control Room by visual signalling with a powerful lamp.

Obstruction Lights

All buildings and other obstructions on the aerodrome must be clearly defined by means of obstruction lights. These are also controlled directly, in the case of Croydon, from the Control Room.

Boundary Lights

The outline of the safe landing area must be indicated by some form of lights. This is done most effectively at Berlin Aerodrome by means of a very large number of Neon tubes.

Indication of Wind Direction at Night

The direction of the wind must be clearly indicated.

The simplest method is by a revolving illuminated T or arrow. Care should be exercised in locating it so as to obtain a fair reading of the direction of wind on the actual landing area.

It should be frequently examined to ascertain whether it is rotating freely.

At present the Duty Officer at Croydon by means of a simple revolving switch, can put in operation a series of electric lights sunk in the landing area. These appear in the form of two L's back to back. The switch is so operated that the long arm of the L indicates the wind direction and the short arm the end of the run of the machine. If a change in direction of wind occurs, the switch is immediately moved accordingly. This is, of course, a preferable method to having to move flares by hand.

Fire

A fully equipped fire tender should be available immediately in case of fire. As much "Fire Snow" should be carried as possible on this vehicle.

Many cases of fire in aircraft on the ground have been extinguished, but

this has only been possible on account of immediate action being taken before the flames could spread. If a machine once gets thoroughly on fire I do not know of any method which is of the slightest avail.

A complete system of water hydrants should be installed round all buildings and personnel should be instructed carefully in fire drill. A large number of chemical fire extinguishers should be available in the hangars.

A really powerful fire alarm signalling apparatus should be installed, and alarm points connected to it should be easily and quickly available.

Surface of Aerodrome

Any bad part of the surface should receive immediate attention and at least one man can be continuously employed on this work. This is particularly necessary round the arrival and departure area, where tail skids of heavy machines cut the ground very badly. These tracks, if left unattended, are a danger to light aircraft.

Compass Swinging

In order to encourage compass swinging an efficient compass swinging base should be available. Machines should be able to run on to it and be rotated with very little effort so that they can be placed quickly on the various compass points and not have to be manoeuvred laboriously by hand.

CHAIRMAN DURAND: As I said a moment ago, we are very sorry that Major Richard is not here so we may have a chance to ask questions of him. I am sure many of you will be in position to make some comment or give some suggestion out of your own experience in connection with some of these problems.

But before throwing the paper open for general discussion, I will read a short discussion which has been received in written form from Arthur Halsted, Associated Electrical Engineer of the Department of Commerce.

Discussion of "Operation of Airdrome from Safety Point of View"

By ARTHUR HALSTED

Associate Electrical Engineer, Department of Commerce, Washington, D. C.

Major Richard has succeeded remarkably in illuminating in brief scope the outstanding points in the operation of important airdromes from a safety point of view. Because of its bearing on airport custom in the United States it may be well to emphasize what has been referred to as the "calm signal."

It is a decided safety precaution for two or more airplanes, using the airport at about the same time, to land or take-off, all in the same direction. When the wind is blowing this direction is determined by the wind. When no wind is blowing the landing and take-off direction is not so determinate.

There is usually at any landing field, a most convenient and safe direction to land and take-off, all things but wind considered. It would be advantageous to demark this direction as the one to be used in calm. Some three years ago an authoritative committee gave this matter much study and has suggested that the "no wind landing direction" be included in the permanent surface marking at the field. A white circle is generally accepted as the marking for the center of the landing area. A small radial line outside of and near this circle could indicate the "no wind landing" and take-off direction. Accordingly when the

landing direction is not fixed by the wind; landings should be made toward the circle along the radial indicator. This direction is easily remembered if the circle is thought of as representing the front end and wings of an airplane and the radial indicator its fuselage and tail. At the present it is not uncommon to see airplanes landing or taking off in diverging or converging directions even at important airports.

The regulation to the effect that all aircraft must make at least one circuit of the airdrome before landing is mentioned. This rule has been given considerable study and there is not unanimity as to its value for universal application. There is some exposure to hazard involved in keeping an airplane in the air in the vicinity of an airport. If the landing and take-off direction is known, there is much to be said in favor of the airplane approaching the field for a landing without much turning from a considerable distance away. From a practical standpoint the minute or two often unnecessarily consumed in a circuit of the airport will be objectionable to air mail and other despatch commercial flying. It has been thought that possibly some other routine, equally effective from the safety standpoint, could be worked out, that would permit straight approach for a landing when this is possible with safety.

The subject of fire protection at airdromes is very important. The reference to a fire truck charged with "fire snow," that is interpreted to signify carbon dioxide snow, at Croydon, is very interesting. High hopes are entertained for carbon dioxide snow as a fire-extinguishing material. Its effectiveness is not diminished at the coldest weather temperatures, it is suitable for use in confined spaces since it does not generate large volumes of poisonous gases when thrown on a fire, its chilling action is calculated to stop the generation of inflammable vapors from the surfaces of volatile liquids such as gasoline, among other promising advantages. Its comparative value, however, as a material suitable for charging vehicular fire apparatus for airdromes with reference to other fire-extinguishing materials such as the foam materials, cannot be considered to be thoroughly determined as yet, especially if it is possible to protect the vehicle during standby periods from temperatures below 40°F.

LIEUT. DUKE: We have had some trouble in the military service with foamite extinguishers in cold weather. In Boston our foamite extinguishers froze up. They are liable to explode after they have been frozen. That is the only objection I know to foamite. It is very effective in extinguishing flames, especially gasoline fire. It is more effective than anything else we have found. The only disadvantage is the freezing of the extinguisher.

MR. HALSTED: I think the Bureau of Standards has performed a good many tests on fire extinguishers in connection with another activity of the Government, and it might be interesting here to tell you that foam materials have the disadvantage that they are affected by cold weather, when they are not quite down to freezing. That is, when it is even warmer than freezing. The material might be there, but the chemical reaction seems to be very greatly slowed up as the freezing point is reached. So your standby foam material would be very effective if it could be kept in a hangar that is somewhat warm. In that way, by warming in a hangar, you are protecting it from temperatures below, say, 40 degrees Fahrenheit.

CHAIRMAN DURAND: Are there any further comments? So far the comments have run to the matter of fire extinguishers. Can't we have something else?

Of course, we haven't anything in this country approximate to Croydon. We are making some small approach in various parts of the country toward passenger-carrying and toward the development of those conditions which the author of this paper writes about.

I don't know whether there is anyone here who has had personal experience of that sort. If there is, I wish he would rise and tell us something about it.

MR. LE PAGE: Is there anyone here from Buffalo Airport or from Oakland Airport?

CHAIRMAN DURAND: Not to my knowledge. I was looking about to see if by any chance I could see anyone from my own state of California, where we are, perhaps, doing as much of that kind of flying as anywhere at this time.

Major Blee, has your experience taken you into anything which is parallel to the matters discussed in that paper?

MAJOR H. H. BLEE (Department of Commerce, Washington): I can't help but be impressed with the very practical points that the author has brought out. All the points he mentioned have a very direct and material bearing upon the safety of operation of airports. If one attempted to go through and reiterate or stress the important points it would really necessitate a rereading of the paper. I can only say, "Amen," to what has been said already.

MR. LE PAGE: In thinking over, just during the past two or three minutes, the import of Major Richard's paper and what it indicates as the future trend in the operation of our major air terminals, it occurs to me that considerable thought will have to be given as to how we are to secure ordinary material necessary for safety in the operation of minor airports where any such equipment as Major Richard outlines in his paper as being in use at Croydon would be entirely out of the question.

Just how one is to secure a degree of safety in the regular daily arrivals and departures from an airport, which is not a major terminal, on an air route over which there is considerable traffic, just how we should acquire that necessary safety, is something which to my mind has not been touched upon as yet and which must undoubtedly be given consideration in the very immediate future.

Allowing one's thoughts to become somewhat imaginative, I recall that I recently read of experiments being made with an automatic form of traffic signal for our highways. By way of adding perhaps a little imaginative thought in a lighter vein in this discussion, it seems to me that there is just a vague possibility that some form of automatic signal operation which might come into effect in the operation, through perhaps the impulses of the ignition on an airplane engine or as a result of sound impulse set out in the air by the airplane propeller, or a number of other possibilities, that perhaps that is a future means of acquiring some form of orderliness in the operation of the many flying fields which are extremely busy and yet which do not have any such equipment as Major Richard has outlined as being in force at Croydon.

B. RUSSELL SHAW (B. Russell Shaw, Inc., St. Louis, Mo.): I would like to bring out the fact that in connection with these large airports and terminals, we are endeavoring to lay out now a system of traffic control by which planes can be given signals for landing and taking off, first in the indication to the incoming pilot by means of submerged lights at the end of the proper runways, and these interconnected with suitable stop and go signals, placed at the same ends of that particular runway referred to so that any plane taxiing for position for takeoff would automatically get the stop signal until the planes going in had landed, and their landing would indicate the flashing on of this indicator at the end of the runway.

As soon as that is cut off, the stop signal that has been holding up the pilot from taking off automatically turns to "Go," and he is able to clear.

Other planes in the air, not seeing any visual means of indicating the proper runway for them to land on, would remain in the air until that plane had cleared.

We have worked out a rather elaborate system which probably would not be installed except on the very largest and busiest air terminals.

DR. DUKE: On the general subject of airports, there are two points I want to bring up. One is, I think something should be done by the Federal Government

or by other agencies to prevent the naming of a landing field, an airport. In other words, a mere landing field should not be dignified by the title of airport.

I know of four or five cases now in the United States where there are dangerous landing fields, what I would call an emergency or intermediate landing field, and all those places have been called airports and classified extensively as airports. Yet there are hazards there which have not been removed and the people who promoted those airports were ignorant as to what an airport should be.

Another thing is that throughout the United States attempts have been made to establish good first-class airports, and there have arisen political actions to the extent that instead of having one good airport, properly located, properly organized, where they could control air traffic and control the maintenance and inspection of aircraft under overhead, they have through their difference of opinion established three or four small landing fields, none of which is suitable or safe.

In my opinion, an airport can only be rated in one way. It is either a safe airport or an unsafe airport, and it should not be dignified by the title of airport unless it is safe, regardless of the rating it gets.

Therefore, the rating of an airport should be either safe or unsafe, because the flying public has a right to expect safety in air travel just the same as they have when they go up in an elevator or ride in a railroad train, bus, or street car. They are not assured of that safety now, and measures should be stressed to bring that about.

MR. SHAW: I would like to back up what Lieutenant Duke just said, because in going around over the country I run into the same problems.

CHAIRMAN DURAND: We might very well at this point throw open the further discussion on the subject generally. It is all one subject, so far as the afternoon is concerned, considered under three particular heads. Are there any further comments or suggestions regarding the general subject of airports?

MR. HALSTED: I might make a comment on that line. One of the troubles in getting what Mr. Duke is advocating has been a great amount of heterogeneous expert advice. Everybody is not unanimous in their opinion as to what constitutes safe airports, and it seems to me that it would assist greatly in getting what Mr. Duke has just mentioned as so desirable, if some organization—it might be the Department of Commerce or the Guggenheim Fund, or the Aeronautical Chamber of Commerce—could give authority as to what constitutes a safe airport by working out a system on co-operative lines and have some general understanding.

The Department of Commerce is doing that now, but I think it probably would be better carried out if the leadership were vested in the industry rather than in an agency, with authority to enforce regulations.

If there are some authoritative, general criteria of what a safe airport is, I feel that many of the cities now contemplating the design of airports would be very much benefited.

CHAIRMAN DURAND: Is there anything further?

In the opening session, I spoke of the significance of the work on the ground. In bringing the session to a close, I just want to say a word with regard to the broader significance of our participation in this general Safety Conference, our participation as an aeronautical unit.

In speaking with one of the head officers of the National Safety Council this afternoon, he told me we were starting in on this present occasion with our four-ring circus—Shall I call it?—going on for a couple of days with a larger membership than the entire Safety Council started in with some few years ago. And all of that is a most impressive indication of the extent to which the aeronautic field has arrived in the estimation of the public at large and of those who are connected with it as an important and significant factor in our present-day civilization.

Most of us remember 25 years ago, when the conquest of air was first achieved,

and as I have watched the developments of the airplane, it seems to me it has been marked out by three very clearly identified divisions or phases.

For the first eight or ten years it was largely a toy or a matter of demonstration. So far as practical use was concerned, there was none, of course. It had some significance as an agency whereby the attendance at the county fair could perhaps be stimulated, and that was about all.

A certain degree of interest was developed by the discovery of the possible stunts which could be performed by an airman in the air.

But that sort of thing characterized the development during the first few years. Then along came 1914, and the years following, when the entire effort was concentrated on the development of aircraft as an agency of war, without any particular reference to its significance as a factor in commercial air transports.

Then, since the war, of course, as we all know, the study has been concentrated on development along the line of commercial application as well as, of course, the application in warfare, and the degree to which this has arrived is, of course, well known to you all. I don't need to dilate on that point.

But it is very interesting and significant that we are here in 1928, twenty-five years after the first demonstration of the possibility of flight in heavier-than-air machines, as a full-fledged unit in this great conference of the National Safety Council, and as I said just a moment ago, with a larger membership in our division than the entire Council comprised at its start a few years ago.

All that is certainly very gratifying and very significant, but it also indicates a very great responsibility which rests on our shoulders. It is for us to work out the great problems of the advancement of the application of aircraft as a really dependable factor in the advance of our civilization. And it has been stressed so often this afternoon, not only in this session, but I am sure in other sessions as well, that the primary condition for such advancement is further improvement of these elements which contribute toward safety.

I don't need again to dilate on that, because that is the reason we are all here. And if we can make use of all of these conditions which modern science and engineering are holding out for our service, we may well hope that in the course of a few years we may bring the conditions which affect safety in air transport to a condition comparable with those which now prevail in other lines.

ADJOURNMENT

**SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL**



Aids to Navigation

First National Aeronautical Safety Conference

Under Joint Auspices of

***The Daniel Guggenheim Fund for the
Promotion of Aeronautics and the
National Safety Council***

October 4 and 5, 1928

DR. J. C. HUNSAKER, Chairman

**Assistant to the Vice-President, Bell Telephone Laboratories,
New York City**

The first session dealing with Aids to Navigation at the Seventeenth Annual Safety Congress, was called to order at ten-fifteen o'clock by the chairman, Dr. J. C. Hunsaker, Assistant Vice-President, Bell Telephone Laboratories, New York City.

CHAIRMAN HUNSAKER: Gentlemen, I have been honored by an invitation to sit at the grand table as Chairman. I have no more to say than that we will listen to two papers bearing on Aids to Navigation, the first by Captain C. F. Hingsburg. That includes the lighting features involved in the safety of flight. The title of Captain Hingsburg's paper is, "Aeronautical Lighting as an Aid to Safety."

I think we are fortunate in having that whole subject reviewed by a man of Captain Hingsburg's experience, as he has worked more than fifteen years with the lighthouse service of the United States, through all the problems and griefs they have encountered, and has brought that experience over into the development of our airways. He is the Chief of Airways. Captain Hingsburg is well known to us and it is foolish of me to make any further introductory remarks. Captain Hingsburg, will you let us have your paper?

Aeronautical Lighting As An Aid To Safety

By F. C. HINGSBURG

Chief Engineer, Airways Division, U. S. Department of Commerce

Night flying is essential for successful air transportation operations in the United States, as the basic source of revenue is the transportation of air mail and express. The Civil Airways are established under present policies to serve the requirements of the air mail routes and schedules. The economics of present air transportation require the gathering of mail at the close of the business day and transporting it to remote destinations for early delivery

on the next or successive business day. *Figure 1* shows the routes established on which night flying takes place.

Airway lights have been installed on more than 7,500 miles of airways and 4,000 additional miles are being lighted during the fiscal year ending June 30, 1929. The present program includes the completion of the transcontinental lighting system from Salt Lake City to San Francisco. Upon the completion of the lighting a double mail schedule will be established. Mail collected at the close of the business day on the Pacific Coast will be delivered on the Atlantic Seaboard in the first mail delivery on the second day after posting, the mail having traveled two nights and one day on its journey from coast to coast. Close connections with feeder routes will make this service available

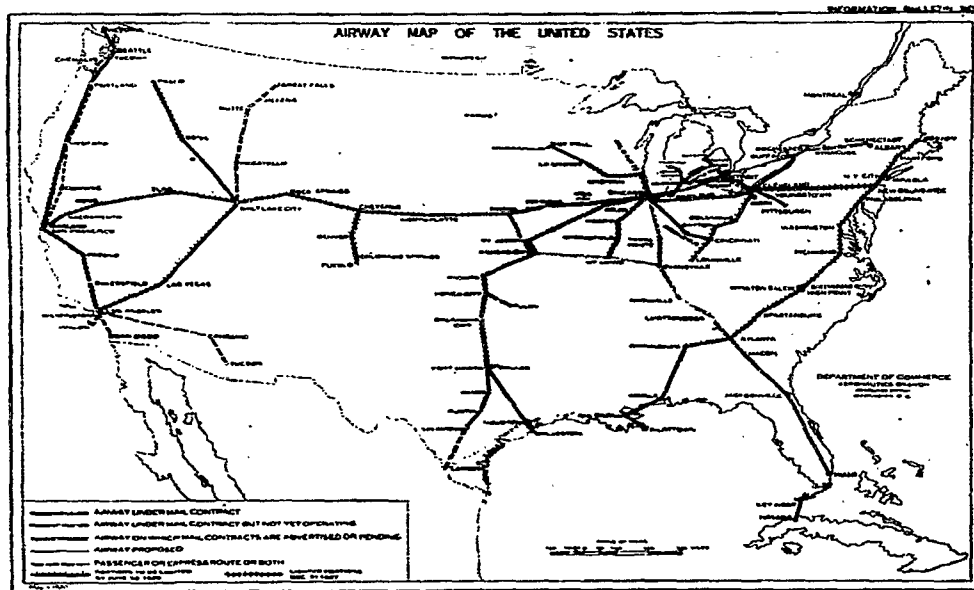


Figure No. 1. The American Airways.

to sixty-nine million people through 109 air mail stops at commercial centers. This fast transportation system will be an important factor in the exchange of ideas, enlargement of the scope of business activity, and in the creation of a better understanding of our national problems.

Night Flying Requirements

Night flying, although it has been carried on successfully by air transport companies, is more hazardous than day flying. This is due to poor visibility, imperfect observation of weather conditions by the pilot and difficulty with which the extent and severity of storms may be determined, and the prevalence and rapid formation of fog and change of weather conditions at night. To reduce these hazards, the Air Commerce Act authorized the establishment of airways equipped with air navigation facilities. The airways are selected

to follow the route offering the best flying conditions between the designated airports and are provided with intermediate landing fields approximately 30 miles apart to provide safe landing places under conditions of stress of weather or mechanical troubles.

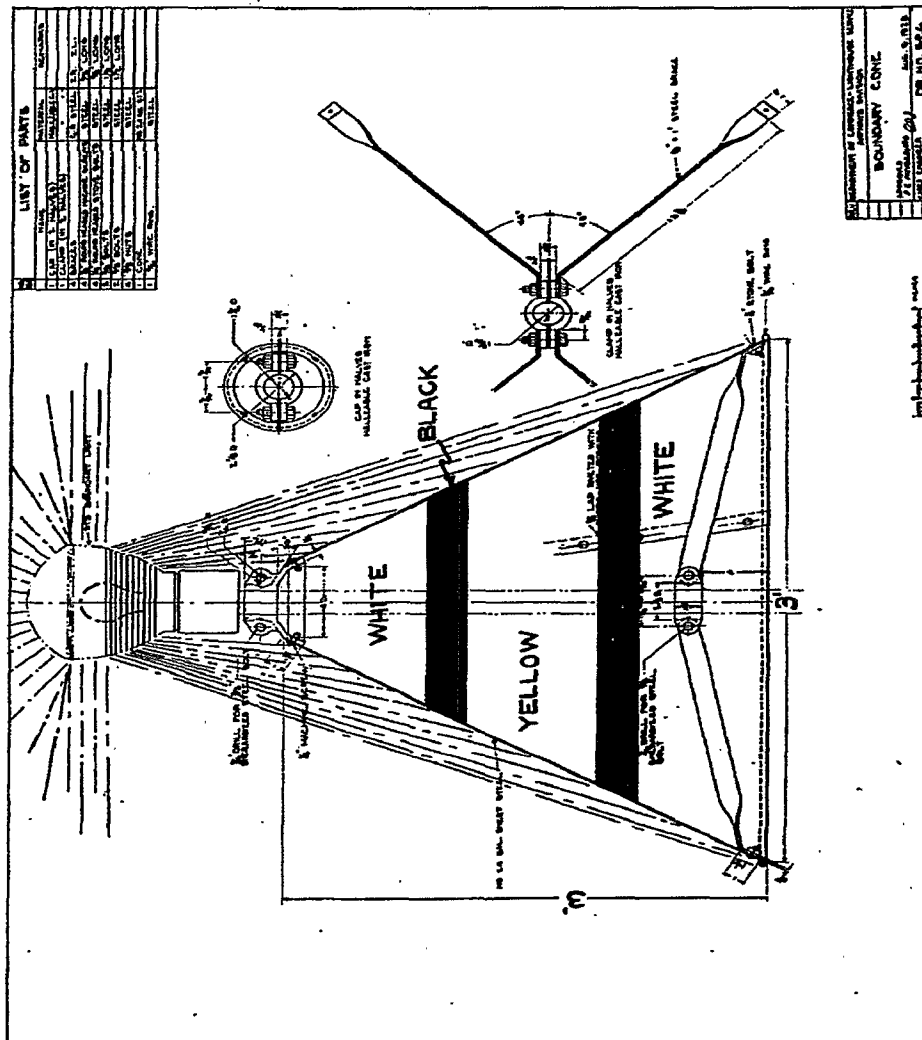


Figure No. 2. Proposed boundary cone and light for airports.

One company flying 1,500,000 miles had 420 forced landings due to adverse weather and 55 due to mechanical and other difficulties. A forced landing due to impossible flying weather was made for every 1,350 miles of flight and a

forced landing due to mechanical or other reasons for every 27,000 miles of flight.

The air navigation facilities consist of route markers and landing field markers for day flying, an airway lighting system for night flying, a weather reporting and forecast system under the Weather Bureau, a communications system for the exchange of weather and other information over the airway, radio direction for the guidance of airplanes over the lighted airway and radio telephone communications to aircraft in flight. A high percentage of night flying efficiency coupled with safety will require the combined use of all these facilities, properly coordinated.

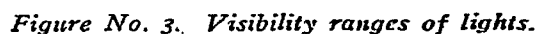
Airport Lighting

The establishment, maintenance and operation of airports and terminal fields are the responsibilities of the municipality or commercial operator, in accordance with the Air Commerce Act, but the Department of Commerce is charged with the duty of fostering and sponsoring air commerce and rating such facilities. The Airport Construction Bulletin and Airport Rating Regulations, issued by the Department of Commerce, set forth the requirements for safe airports. The rating of an airport certifies its adequacy and proper maintenance. The lighting required at an airport under the rating regulations consists of an airport beacon, to locate and identify the airport at long range, a boundary lighting system to outline the landing areas, red obstruction lights, green range lights on the safe approaches, a lighted wind indicator to show the direction and velocity of the wind, floodlighted hangars and buildings for perspective marking, a floodlight system illuminating the landing area to the proper brilliancy without glare, a ceiling light and height indicator. The lighting system prescribed in the airport rating regulations is adequate and meets the requirements for safe night landings under ordinary conditions. Safe landing under conditions of fog is not yet an assured accomplishment. Fog penetrating lights have often been mentioned but are not yet available.

The use of colored lights as an indication of landing conditions is recommended. The use of red course lights at airway beacons where there is no lighted landing field and yellow lights at intermediate landing fields has already been initiated. The use of a flashing green code light as an auxiliary airport beacon completes a rational system of indicating available landing places by colored lights. The code characteristic serves to identify the airport. It is also suggested that boundary cone markers three feet in diameter, three feet high, painted in alternate bands of chrome yellow and white, separated by a narrow black band, be used in connection with the boundary lighting system and floodlighted to show perspective. The proposed arrangement is shown in *Figure 2*.

Considerable research work remains to be done before landing at airports under conditions of fog will be practicable and safe. Fog dispersion appears to be a solution if a practical method is devised. In this connection the immense volume of fog drifting across a landing field in a very short period of time must be considered. Blind landing by aid of leader cables, or radio direction and instrument landing may have possibilities using inherently stable airplanes, but there always will be a hazard in connection with such landings. It is questioned whether fog piercing lights will be available within the near future. Until the fog problem is solved it is the plan and purpose of the Department of Commerce to aid airplanes in flight by a system of weather reports and radio telephone communications to aircraft.

Before departing, the pilot will be advised of weather conditions at his destination and, if impossible landing conditions exist, alternate landing fields



may be chosen for the destination, or the trip delayed. After departure the pilot will be periodically advised as to landing conditions and weather conditions by radio telephone and, if landing at the chosen destination appears hazardous, the pilot will be advised regarding alternate landing fields at which a safe landing can be made. Pertinent information, such as ceiling heights, barometric pressure, elevation of the landing field, arrangements made

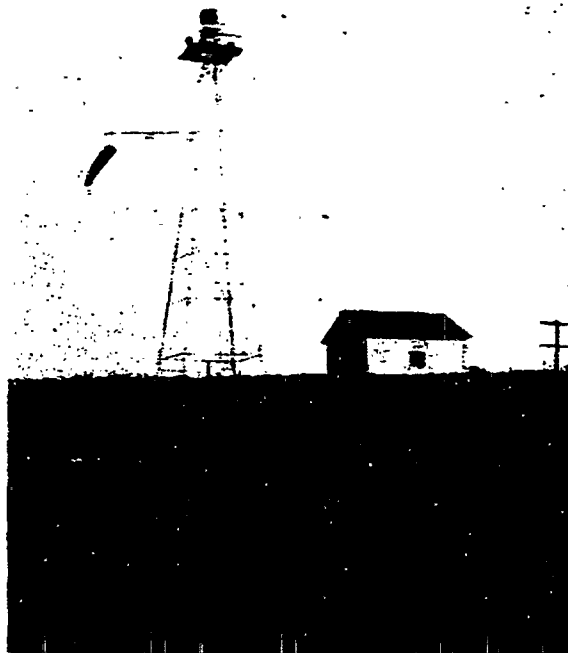


Figure No. 5. Standard airways beacon on Atlanta-New York airway.

for transportation of mail, express and passengers, and orders from the transport company, will be given to the pilot en route.

Airway Lighting

The establishment of a lighting system for clear weather visibility is comparatively simple. Under such conditions the patterns of city lights and stray lights are beacons of the first magnitude, but under adverse weather conditions the stray lights lose their characteristics and become confusing, competitive lights. The airway lighting system should be designed for poor visibility flying. The beacon light should have an optical design that utilizes

the greatest percentage of light flux from the light source, concentrating the light into a high intensity beam of candlepower in excess of competitive or stray lights, and project the beam into the sectors most useful to the pilot. The light should have a distinctive characteristic so as to be recognized instantly among the stray lights as a light of aeronautical character and should have individuality so as to be recognized as a landmark of known geographic location. The durations of flashes should be sufficiently great to develop the maximum luminous value on the retina of the eye and the luminous period and frequency of flashes should be proper to fix the location on the horizon. The lights should be spaced as close as availability of funds permits.

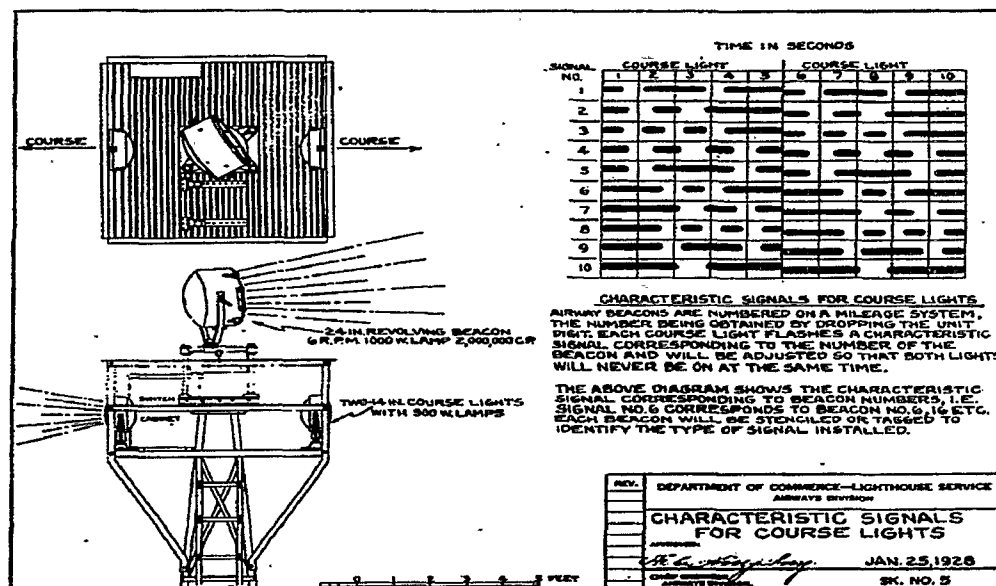


Figure No. 6. Twenty-four inch revolving beacon and course light characteristics for identifying mileage numbers of beacons.

The determination of the proper light intensity, power input, and spacing of lights is a complicated economic and scientific problem. One of the factors involved is the penetration of lights through the atmosphere under varying degrees of poor visibility. Figure 3 is an interesting study of comparison of light penetration on the several coasts and corresponds to 90 per cent visibility under ideal conditions of relative darkness. A thirty-five mile light on the East Indian Archipelago is reduced to a six mile light in Dover Straits. It is interesting to note how the curves coincide for short ranges and the relatively low candlepowers required for two mile visibility. Reduced to the needs of air transportation having a flying efficiency of 96 to 98 per cent, much higher candlepowers would be required to meet the conditions under which air navigation takes place and the competition of stray lights of high candlepower in thickly populated regions. This was demonstrated by the inadequacy of the three mile spacing of low candlepowered acetylene lights installed by the

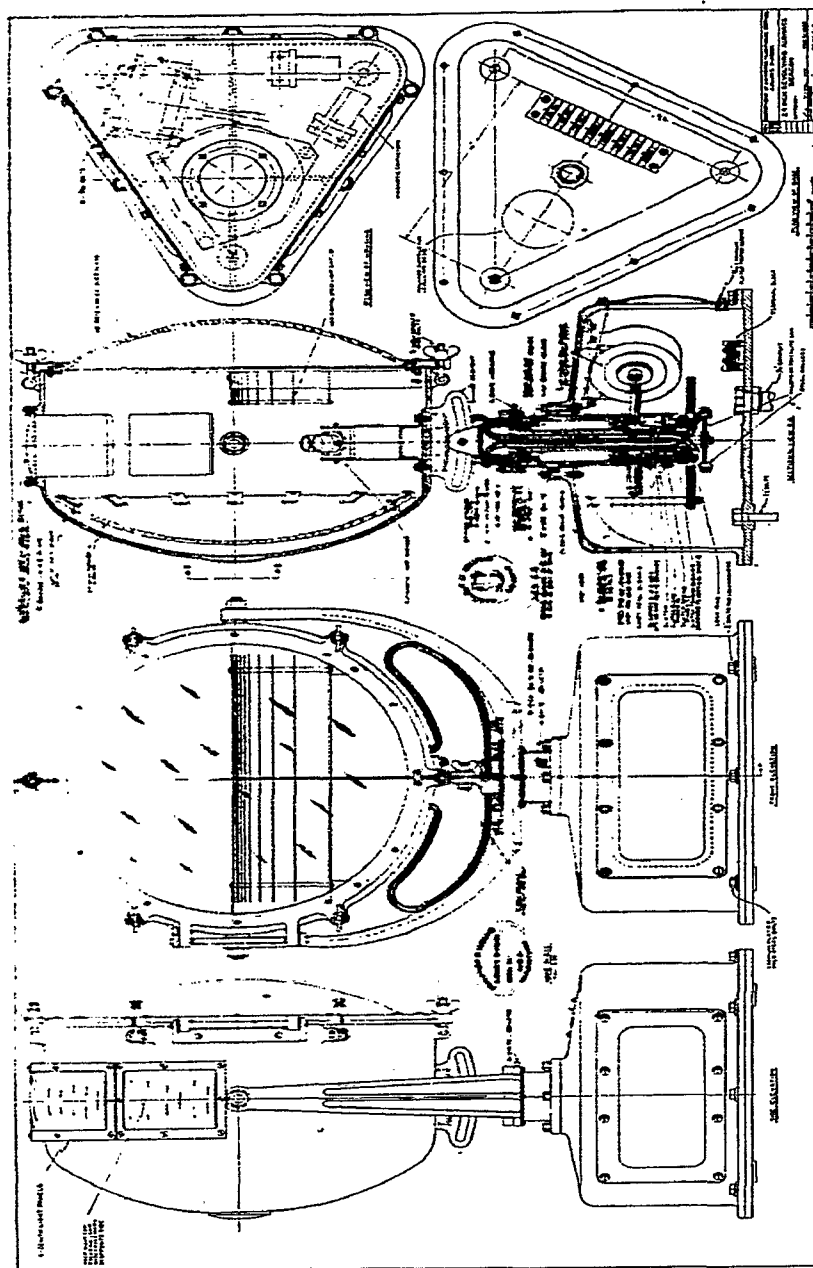


Figure No. 7. Details of twenty-four inch revolving beacon with zenith lights.

Post Office Department. The 200 m/m unit with one foot burner developed about 120 candlepower. Aeronautical lights should have candlepowers in excess of 1,000 but the close spacing was correct in principle. An interesting chart of equation of ranges is shown in *Figure 4*, and is reproduced from the Hydrographic Review. This chart is useful in comparing candlepowers and relative ranges for equivalent flying efficiency under identical conditions.

Based on the results of economic studies it was determined that the best average results were obtained by using a 24 inch revolving beacon of two million candlepower with identifying course lights spaced ten miles apart along the airway as shown in *Figure 5*. The lights are mounted on a skeleton tower, as shown in *Figure 6*. Commercial power is used where available, but

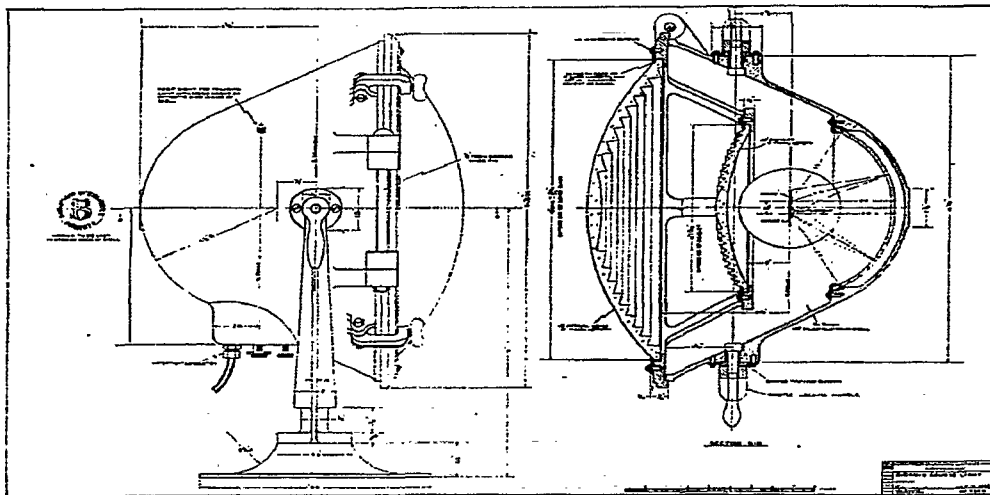


Figure No. 8. Detail of eighteen inch light with doublet lens and spread light mirror.

otherwise duplicate gasoline driven generating plants of 2 KW capacity furnish the current.

Ten lights of this character are established to each block of one hundred miles and code numbers are flashed on the course light projectors giving the mileage location along the airway. Red course lights are used at beacons where no landing fields are located; yellow course lights are used at beacons on intermediate landing fields. The lights are elevated to show the greatest candlepower to the pilot when he is flying above the adjacent beacon at a height of 500 to 1,500 feet.

The latest design of 24 inch revolving beacon is shown in *Figure 7*. The light from a 1,000 watt, 110 volt, T-20, airway lamp is concentrated by a parabolic mirror into a beam of two million candlepower having a 4 degree beam spread. The front cover glass has prisms on the inside surface which deflect some of the light upward from 0 to 25 degrees, so that the pilot will not miss the beam by flying too far above it as he approaches over the airway. A half drum lens is mounted as a saddle on the drum, gathering the light, otherwise lost, into a fan shaped beam of light showing from horizon to horizon perpen-

dicular to the axis of the main beam. As the beacon rotates, secondary flashes of 12,000 candlepower are shown two and half seconds before and after the principal flash and are decidedly advantageous at close range, especially in thick weather.

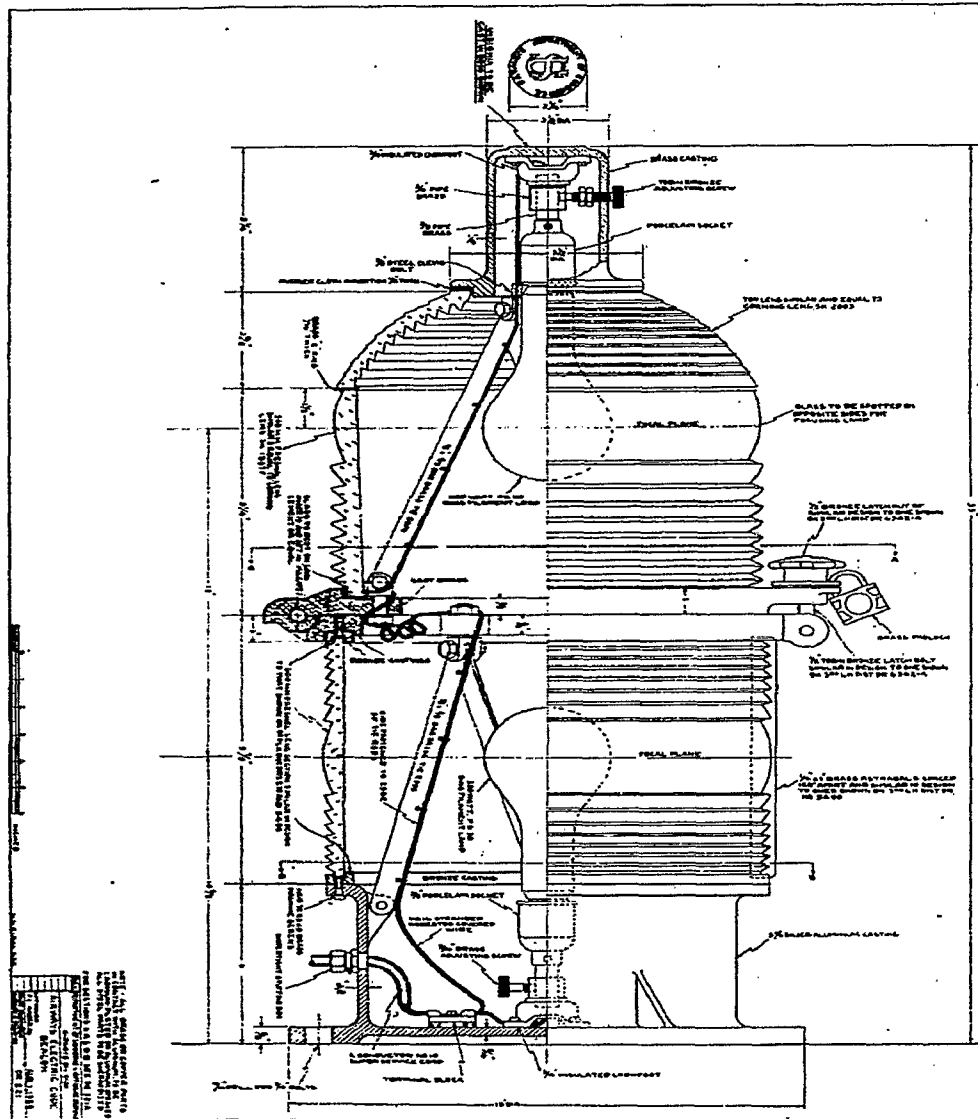


Figure No. 9. Electric code beacon.

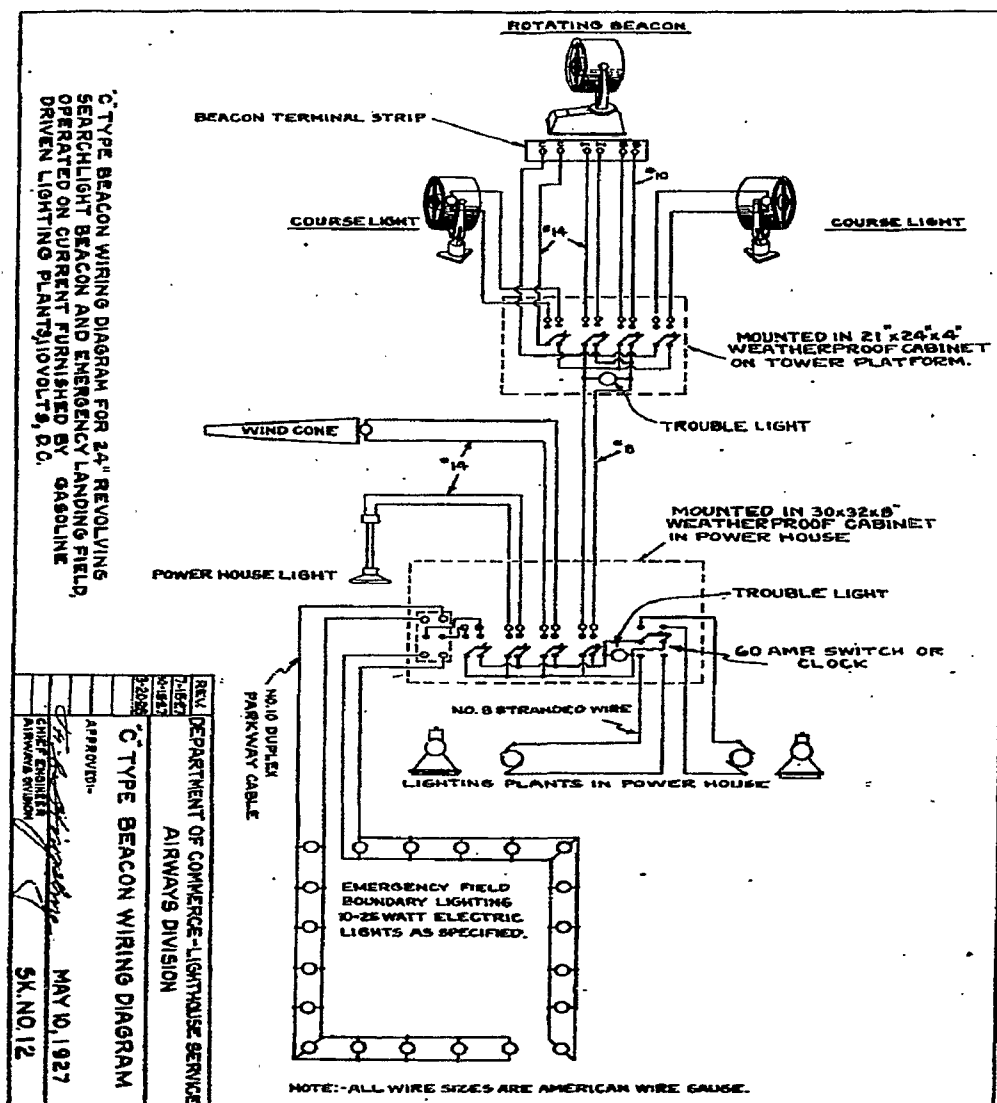


Figure No. 10. Wiring diagram of twenty-four inch revolving beacon, course lights, wind cone, and landing field.

A course light of entirely new design using doublet lenses and horizontal spread light mirror is shown in Figure 8. The lamp used in this unit is a 500 watt, G 40, 110 volt monoplane filament lamp of 800 hours life, and develops 165,000 candlepower with 15 degree beam spread.

Another new addition to the list of optical apparatus of the Airways Division is a flashing code beacon shown in *Figure 9*. The lantern is a 300 m/m double unit with two light sources using 200 watt, P S 30, ring filament lamp of 1,000 hours life, both lamps burning simultaneously. The flashing code beacon is used for marking major obstructions along airways, and also for intermediate airway lights, where power is available, and for marking intermediate landing fields located off the airway, in a valley or obstructed from view of adjacent beacons, in which case an airway beacon is located on high ground and has yellow course lights to show the availability of the landing field.

Intermediate landing fields are marked by an airway beacon with yellow course lights and the landing area is outlined by boundary cones and lights spaced approximately 300 feet apart. Red obstruction lights are mounted on all obstructions. Green range lights in the boundary system mark the best approaches and runways. The wiring diagram of a typical field lighting system is shown in *Figure 10*. An internally lighted wind cone is mounted on the beacon tower. Ceiling lights are installed at intermediate landing fields at which weather reporting stations are located. The ceiling light is a 14 inch projector and is shown in *Figure 11*. The light is projected at an angle of 63 degrees—26 minutes above the horizon and the height of the ceiling is measured by a ceiling height indicator shown in *Figure 12*.

Airway Lights for Isolated Localities

The maintenance of airway lights through isolated and sparsely inhabited sections presents a serious problem. To meet this situation an improved acetylene route beacon was developed by the Airways Division. It combines the highest development of railroad signal practice with marine range lighting system and is applied to airway lighting in a new and unique manner. Two lanterns are used, one being mounted above the other. The top lantern is an azimuth and off course light, having a separate flasher, piping and gas supply, showing 40 flashes per minute of 180 candlepower. The lower light is a course light of 15 degree beam spread and 5,000 candlepower flashing 20 times per minute. The lower light is shown in *Figure 13* and is a double ended range light lantern having 18 inch bull's-eye lenses with 10 inch doublet lenses. This acetylene apparatus offers the greatest degree of reliability with its dual lanterns, each with separate mechanism and gas supply, and its automatic features enable its installation in isolated localities for operation without attendance for periods of six months or more. These lights will be spaced three miles apart. They bring within the realm of possibility, close spacing of lights of adequate candlepower, luminous period, and distinctive aeronautical character at a cost of installation and maintenance comparable to electric lights at ten mile spacing.

Where a revolving beacon of two million candlepower is picked up by a pilot at thirty miles, the acetylene range light of 5,000 candlepower will be visible thirteen miles. Under conditions of fair visibility when a revolving beacon is seen ten miles, the acetylene range light is visible five miles. On a thick night when the pilot advances five miles beyond a revolving beacon, before he picks up another revolving beacon five miles ahead of him, the acetylene range beacons will be visible from light to light at three miles spacing.

Airways are laid out over the safest low level routes providing weather landing fields 30 miles apart, preferably following habitation, roads, communications and power, and reconciled to the installation of lighting and radio aids. A high percentage of completed trips on schedule time is essential for the success of air transportation and the combined use of lights and

radio direction is essential to meet this requirement. For safety the radio marked airway must coincide with the lighted airway, the pilots making use of all facilities and traveling the same routes in bad weather as on clear nights. When lights are not visible one to another, radio direction takes the pilot over the airway, enabling him to catch a glimpse of lights and fields at close range



Figure No. 11. Ceiling light.

and this combination of blind-contact flying will increase the flying efficiency with the greatest degree of safety. On the Transcontinental Airway 15 radio range beacons are required to mark the lighted airway from coast to coast. The radio range beacons will be erected at the center of straight courses and radio mark 50 to 150 miles of airways in opposite directions.

Once established and checked the radio marked course will be permanently

fixed so that the edge of the radio range will cut on definite landmarks and never be shifted. This requirement will develop the greatest confidence in blind flying by the pilots. At the change of course and at intersections of airways, great confusion would result due to interference of the overlapping signals if all beacon signals are transmitted on one wave length, and to meet the situation about six channels separated by a frequency of 5 K.C. are required. Each beacon should also be identified by its individual characteristic. This winter will see nine radio-beacons in operation on the Transcontinental, marking lighted airway courses. Five individual characteristics suitable for the interlock equisignal range beacon will be used for identifying the beacons.

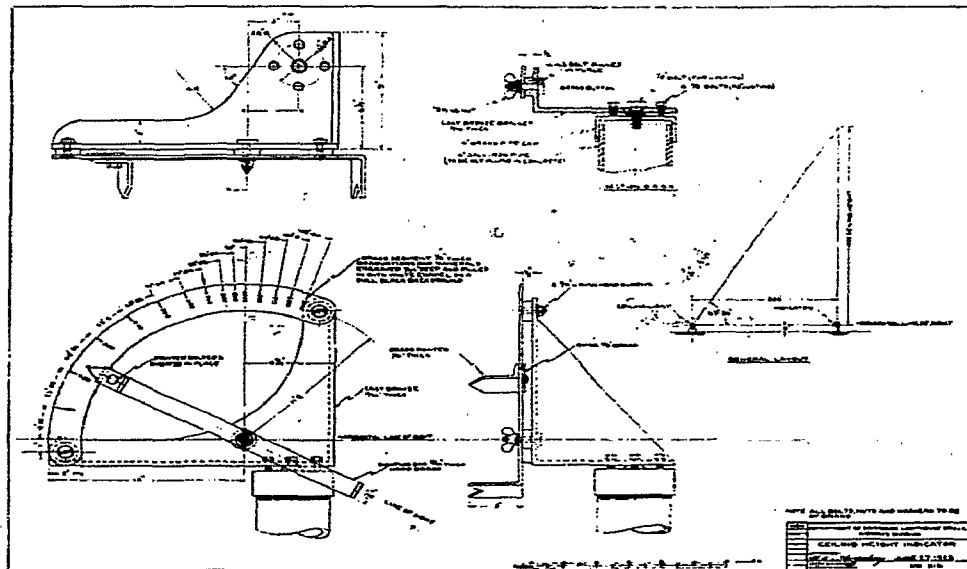


Figure No. 12. Ceiling light indicator for measuring ceiling lights.

Visual indication appears to have great possibilities when developed to meet operating conditions involving a number of radio-beacon installations with overlapping ranges. Radio direction is the subject of a paper by another author and is introduced here to show its inter-relationship to lighted airways from an operating point of view.

Maintenance of Lighted Airways

Careful consideration has been given in the design and construction of structures and equipment to reliability of service for the safety of air navigation. Lamp exchangers are used to guard against lamp failure and duplicate engine generators are installed where power is not available. Electrical work is placed in waterproof conduits according to the National Underwriters Rules and underground cable is lead incased and armoured with underground connections made in waterproof boxes filled with insulating compound. Apparatus

is rugged in construction and efficient in operation. Airway mechanics are assigned to about 200 miles of airways and thoroughly inspect and overhaul all apparatus at least once a month. A fleet of 40 trucks, some of which are shown in *Figure 14*, are used for transportation and carry spare parts for all apparatus so that immediate replacement of any defective apparatus may be

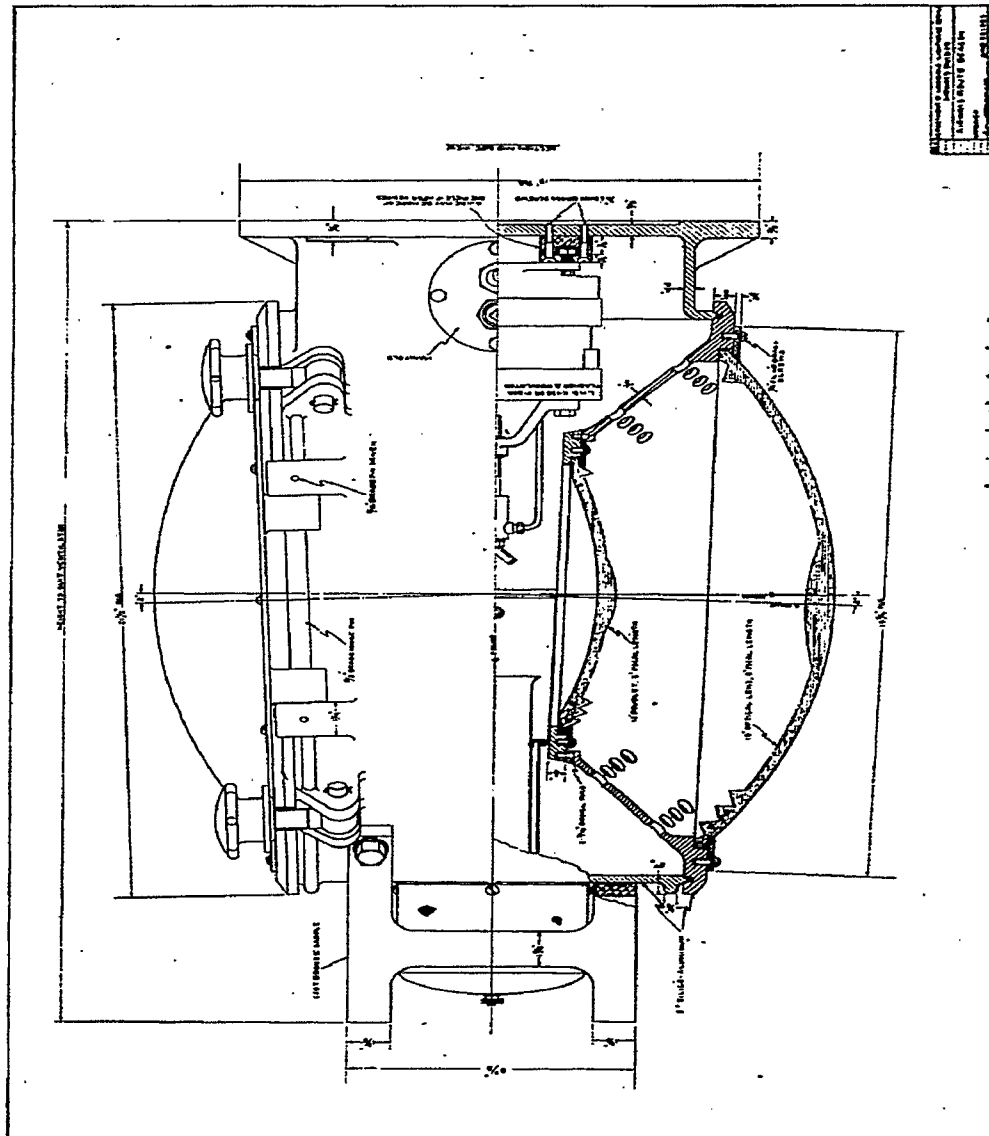


Figure No. 13. Acetylene airways course light of 5000 C. P. and 15° beam spread.

made. The general supervision of airways is under the direction of District Lighthouse Superintendents and Airway Engineers assigned to these offices supervise the maintenance work. (The lighted airways receive the same attention and the same policies and practices are followed as in administering the great work of the Lighthouse Service.

Cooperation With Air Transport Companies

Close cooperation exists between the Air Transport Companies and airways personnel. Arrangements have been made on all lighted airways for daily pilot reports covering the operation of lights. Airways mechanics communicate each morning with Air Transport representatives for pilots' reports and defects reported by pilots are given immediate attention. Local notices to Air Transport Companies and to the aeronautical public are issued covering all changes in aids to navigation and these changes are published in the *Domestic Air News*.

Certification of Safe Airways and Landing Fields

Steps have recently been taken to equip an airplane for the quarterly inspection of all airways and landing fields, for the purpose of certifying to the aeronautical public the adequacy and safety of air navigation facilities. The crew will consist of a pilot, radio engineer and airway mechanic and the airplane will be equipped with radio transmitter, receiving equipment and testing instruments. The pilots will be experienced in night flying and expert on airways and landing field requirements. The radio engineer will check up on the communications service and radio direction as well as communications to aircraft. The airway mechanic will check up on the proper focus, elevation and proper operation of lights and equipment. By landing in each field, by day and by night, and checking up on the service rendered by each airway mechanic and radio communications station, a thoroughly efficient organization will be assured and safe airways maintained.

Private Aeronautical Lights

Privately established aeronautical lights are certified as to their adequacy by the Department of Commerce under the Air Commerce Act. The airways lights established by the Department and the majority of airport lights are revolving beacons and this type of light has been developed and characterized as an aeronautical light. Lights established on an airway are given characteristics similar to airway lights, revolving 6 R.P.M. and elevated about 1 degree above the horizon. Rotating beacons that are not located on an airway revolve 2 R.P.M. and are elevated 15 degrees or more. Private advertising lights that serve a useful aeronautical purpose must establish a landmark from which a departure can be taken to reach a landing field or must mark a landing field. Unfortunately great demands are made for the establishment of revolving beacons for purely advertising purposes that do not serve the best interests of the pilot. Most of these lights are not certified or authorized. The establishment of a great number of advertising lights of aeronautical character leads to confusion and destroys the value of true aids.

- Before authorizing and certifying private aeronautical lights, the local aeronautical interests and air transportation companies should be requested to submit their reports and recommendations as to the purpose served by its establishment. Proper attention to these matters will prevent the establishment and certification of improper lights. The Air Commerce Act authorizes

the discontinuance of any false light or signal at such place or in such manner that it is likely to be mistaken for a true light, and private lights that prove a menace should be reported by pilots so that steps may be taken under the law for their discontinuance, after proper investigation.

Lights for Marking Major Obstructions

Under agreements made between the War Department and the Department of Commerce, aeronautical lights and markings are required on transmission lines and other structures built across navigable waters of the United States. The towers of transmission lines are required to be painted alternate bands of chrome yellow and white separated by narrow black bands and the towers marked with red obstruction lights. The electric code lantern with 200 watt lamps and red globes is suitable for tower obstruction lights. Marking the span across navigable waters is required but presents several difficulties in



Figure No. 14. Airways trucks equipped with tools and spare parts for servicing air navigation facilities.

connection with proper maintenance. The indirect marking of the span by high intensity projected light beams from the tops of the towers along the span is suggested, using 14 inch ceiling light units with 250 watt low voltage lamps for spotlight service.

It is suggested that the Federal Radio Commission be prevailed upon to require the painting of all radio towers to increase visibility and the lighting of them, by use of 100 watt red lamps in waterproof glass globes at the top and at points one-third and two-thirds from the tops of towers, the lights being visible from any angle of approach. All radio stations operate on licenses issued under the authority of the Federal Radio Commission. If necessary, proper legislation should be passed to assure safeguarding airplanes in flight from the hazards of radio towers. The marking of high lines at intersections with an airway is needed to safeguard airplanes in flight and this requirement is taken into consideration in laying out the airway lighting system. It would facilitate lighting if neon high voltage lamps of 10,000 hours life were available for installation on high tension lines, using lamps built for the voltage carried by the high line. The intersection of the airway with the high line could then be marked for the full width of the intersection and would facilitate and cheapen the maintenance of a more adequate lighting system.

The marking by owners, of obstructions not in the navigable air space, is not required according to present policies. However, bridges, transmission lines or other obstructions, spanning rivers used during bad weather as airway routes, must be marked.

CHAIRMAN HUNSAKER: I think most of us are aware that night flying is going on all over the country, and with a fair degree of safety, certainly a commercial degree. It is especially interesting to me now to learn how it is done. It has been done by reason of lights of many kinds, organized, integrated, worked as a system. It has taken a good many years to arrive at this place. As I recall it, night flying really began during the war and there were no license lights involved at all. If they were bombing somebody you sneaked in and hoped to get back. After the war it was proposed that we fly the mail at night. People threw up their hands and said, "It can't be done. They will never find their way."

The question was put up to the National Advisory Committee of air lights. This committee said that it could be done. Professor Durand, of Leland Stanford University, a member of the committee at that time, might perhaps tell us why the committee had the courage to recommend this thing to the government. I am sure they didn't have much evidence.

PROFESSOR DURAND: I wish I could tell you just why it was or how it was that we believed this thing could be done. We had no tangible evidence; it never had been done; but we had the courage of our convictions. We saw clearly that if transmission of mail across the country was going to be of real commercial value, it simply had to be done. There would be no significance, whatever, in flying mail by day and putting it on the railroad train by night, and again going on by day. That might do, possibly, for the beginning of passenger transport service, but if the transport of important correspondence was going to be of real value it had to be a continuous flight without any interruption by way of railroad transportation.

We knew there were certain elements which might serve toward the solution of this problem. Just how they were going to be combined we didn't know. We knew we had the electric light and projectors. We knew there were possible aids through the use of radio energy and we had faith that in some way or another the problem could be solved. It is by faith of this sort that many of our great achievements in engineering, of course, have been accomplished. We may not see the exact method, may not know the exact details of the solution, but we can see certain elements in the picture and believe certain people can be found who will be able to put those elements together in a practical way.

That was about all the foundation we had, but certainly the achievement which has been sketched or developed in the paper you have just heard, the splendid results which have been realized in recent years, have, I think, abundantly justified the measure of faith we had at that time.

CHAIRMAN HUNSAKER: We have a little time before proceeding with the next paper, and whereas I am sure Captain Hingsburg will be very glad to answer any questions anyone may ask about matters he didn't have time to go into, I hope nobody will ask that kind of a question. I would rather have something controversial. Does anybody disagree with anything, and if so, why? Is there some factor we might have called to our attention?

S. W. HICKS (Lakehurst, N. J.): There is one thing that came up a short while ago in discussion between the Navy Department and a commercial concern, that wasn't covered by the paper. That is—what are the rules on the lighted way? The Los Angeles was proceeding down the lighted airway on the righthand side of the course, and a plane in the middle of the night almost hit it. That thing is under discussion now. The plane was going in the opposite direction at 100 miles an hour. The Los Angeles was coming at 50 miles an hour. They were

coming head on at the rate of 150 miles an hour. The plane finally saw the ship in time. Naturally the big ship couldn't manoeuvre in a few seconds. The plane side stepped, stuck one wing down, and got out of the way. That started the discussion of who, what and where, and the question should be raised as to what are the rules of the road on the lighted way.

CHAIRMAN HUNSAKER: Is it a question so much of whose turn is first and why as between sailing vessels and steamships, or a question of what kind of lights are they carrying, and can they see each other at a great enough distance to avoid collision. Both ships had lights, but could not see as far as they thought they could with the short time element. Then should the southbound travel be on one side and the northbound on the other? I think that is more pertinent because when you are on the water your rate of speed is so much lower that you have a great deal more time.

CAPTAIN HINGSBURG: The air commerce regulations set forth the rules of the road under the air traffic rules. The points brought up by you are covered by regulation. Any violations of those regulations when they do occur should be sent to the Department and have the proper investigation, and the proper penalties will be made.

For flying at night, airplanes are supposed to carry navigational lights—green, red and white lights—and a flying light along the airway. The air way is three miles wide for the purpose of interpreting the application of the air commerce regulations and the air traffic rules. The right of way is provided for by the regulations and reference to the regulations you will find set out as established by the Department.

W. PARKER BERRY (Somerset, N. J.): I would like to ask if there is any known or theoretical apparatus manufactured, or that can be manufactured that is practical, which will be actuated upon by a radio wave of very short wave length and which will give the pilot a definite light or signal in his cockpit if his aerial is directional on his plane and centered on a certain directional beam of radio waves? If he turns off his course, he will receive another from another town. Is there any apparatus made by being actuated on a very sensible relay which will light a light or give him a visual notice of which town he is heading toward?

CHAIRMAN HUNSAKER: I could say, from my knowledge of sense relation, they can be made so they will be actuated by radio signals. The trouble is, static and other signals will actuate them, too. You have to have a combination of correct impulses like the combination of a safe.

MR. PERRY: You know wave lengths run down to way below x-rays. A short wave length is anywhere from a millimeter up to a yard. There are very few wave lengths so short, I believe. Is that true?

CHAIRMAN HUNSAKER: I don't believe so. The shorter they get, the worse they get, according to my experience. Your suggestion was bearing on the problem of collision, I take it, meaning to avoid collision by an indication of someone coming who can't be seen by lights.

MR. PERRY: Not necessarily, although it would hold to that somewhat. Supposing you had the ideal type of visible or invisible lighting from a town. Is there an apparatus made which will be actuated by this visual or visible light: which will give a telltale signal to the pilot?

CHAIRMAN HUNSAKER: I think it is a good question. Let's save it. We have just a minute or two more and we had better go on to the next paper. Is there anyone else who can make a contribution on the matter of safety as affected by air way or airplane lighting?

When the lighting began, it seemed to be very essential to night flying. When it began we had night flying, but had lighting, and some of our pessimistic pilots said, "These lights are fine. I love to see them stretch out mile after mile. On a

very bright, starry night when I can see them I don't need them. I know my way. When the clouds are low I can't see any lights and they aren't any good."

The answer to that is to be found in Dr. Dellinger's work in giving indications of direction under conditions of visibility when the lights fail. I would like to introduce Dr. Dellinger who will give us a paper on "Directional Radio as an Aid to Safe Flying." Dr. Dellinger, as you know, is in charge of the radio section of the Bureau of Standards which is developing these directional beacons, signal type beacons for our airways. It is a new conception, entirely original, I believe in this country, and gives great promise of affording an additional element of safety.

Directional Radio as an Aid to Safe Flying

By DR. J. H. DELLINGER

Chief Engineer, Federal Radio Commission, Washington, D. C.

Among the several developments now in progress to make flying safe, none is more urgently needed than the navigational aid supplied by radio. I would go so far as to say that without it genuine air passenger service is impossible. I may be considered a heretic for the implied assertion that we have no air passenger service at present. However, real service is not available until the air traveler can count on a scheduled service as regular as the railway trains, independent of weather or other contingencies.

This is no imaginative ideal. On December 13 last I was scheduled to give a talk in Chicago. I dislike to use up the twenty hours necessary to reach there from Washington on the train. Instead of leaving Washington the preceding afternoon, I could, theoretically, have taken the trip by airplane in less than six hours on the day I was to be in Chicago. What happened? Since I had to be sure of being in Chicago at the appointed time I went on the train. If I had planned to go by airplane I would not have kept the appointment on the 13, as a dense fog settled down during the night of the 12 and there was not an airplane in the air in north-eastern United States on the 13.

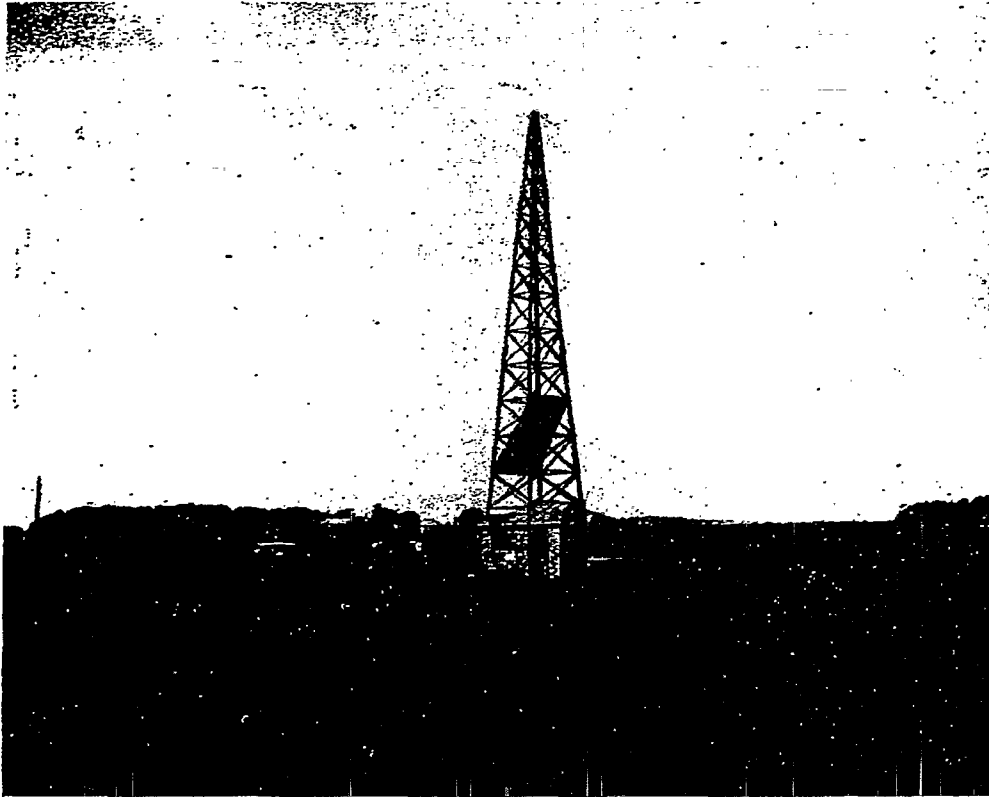
Take another instance. On July 11 last year I called on Air Commodore Blandy, in charge of radio in the British Air Ministry, who arranged for me to see the start of an experimental flight at Croydon the next day. This flight was to be from Croydon to Brussels. Commodore Blandy also had business in Brussels in the evening of the same day. While he would have liked to be a witness to the experimental work abroad the airplane, he went by boat instead because his appointment in Brussels was important. His judgment, so it happened, was confirmed, for a fog prevented the airplane's flight.

The nullification of the most essential feature of the air passenger travel as a serious service arises entirely from the hazards of weather. As we shall doubtless learn from the accounts of progress now being given in the various phases of safety in aviation, all other limitations are in a fair way to be overcome. Airways and airports are being provided in abundance, aircraft of adequate strength and stability are more and more available, every provision of comfort and convenience is offered the air traveler, and yet air traffic can still be halted when low visibility prevents the pilot from seeing his landmarks or lights on the ground.

It is impossible to exaggerate the solitude and helplessness of an airplane flying in dense fog. Deprived of all landmarks, under incessant strain at the controls to maintain equilibrium and direction, the aviator must frankly abandon dependence upon his senses and navigate according to the information conveyed by his instruments. It is contrary to all human instinct to throw overboard the testimony of the senses and stake life itself on a mute instrument dial. Not every pilot can

do it, and unquestionably the oceans hide the sad remains of more than one hero whose only mistake was failure to learn "instrument flying" before he essayed the great adventure.

By means of the familiar instruments such as the altimeter, turn indicator, and compass, a pilot can continue flying in fog, but it is only by radio means that he can be certain to keep on a given course and find his landing field when the ground



Radio beacon tower. First radio beacon installation on the transcontinental airway, installed by Bureau of Standards at Bellefonte, Pa.

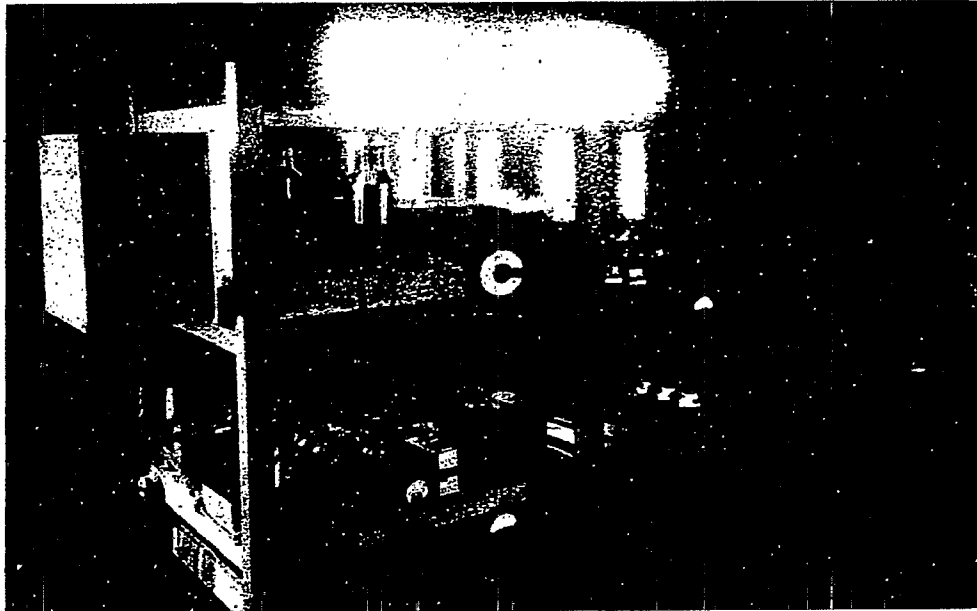
is invisible. Accurate as a compass may be, it can not tell the pilot how much he is drifting sidewise due to cross winds, nor what actual progress he is making forward because of the unknown effects of head or tail winds. Unless radio aids are used, fog always brings the hazard of getting off the desired course into unfamiliar or dangerous areas, and also makes even the possibility of a landing unknown.

By radio means, however, particularly by the use of the radio beacon system which is being established on the airways of the United States, the pilot can, regardless of fog, keep accurately on his course, know the points he is flying over,

and proceed unerringly to the landing field. This, I believe, largely destroys the menace of fog. When this system is fully established there is every reason to believe that the last great obstacle to safe flying will have been conquered, scheduled flights will be dependable, and passenger flying can be considered established as a serious service.

Directional Radio Off the Airways

Before describing the radio beacon system I would like to indicate briefly the possibilities of navigation by radio on other than the established airways. The beacon system will mark out the airway routes but will give no aid to the flyer



Transmitting apparatus in the radio beacon house.

on an independent course. There are several ways in which radio can be adapted to this navigational need.

One is the system used in Europe: radio direction-finding stations are maintained by the Governments at various airports, and each airplane carries both a transmitting and a receiving set. Upon request by radio from an airplane, two or more of the direction-finding stations determine the direction of travel of radio waves from the airplane; combining their determinations they calculate the airplane's position and send this information by radio to the airplane.

A second means of radio navigation for the independent flyer is the use of a radio direction finder on the airplane. By steering a course in the indicated direction of a radio station on the ground, the airplane can be certain of reaching that point, the accuracy of the indicated direction increasing as the objective is approached. Direction finders are used extensively as a navigational instrument

on marine vessels and on lighter-than-air craft. On airplanes their use is difficult. It is considerably more difficult to protect them from error and disturbances caused by the engine ignition and other sources aboard an airplane. They have been used successfully to some extent, and their use will doubtless increase; they do however, require expert handling. This method of navigation has the inherent limitation that it does not prevent wind-drift from shifting the airplane off its course; the method does eventually bring the airplane to its destination, although by a circuitous route if there is a side wind.

A third method of furnishing navigational aid to the independent flyer is the rotating radio beacon. This is a radio transmitting station, located at an airport, which has a rotating directive antenna. This causes a sort of beam of radio waves



Experimental airplane of the Bureau of Standards equipped with vertical pole antenna and visual indicator.

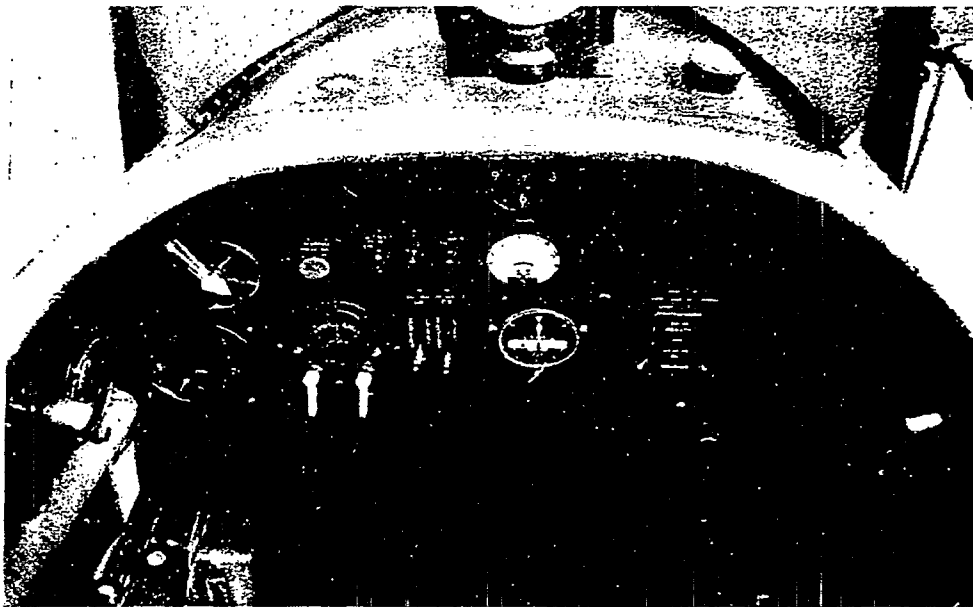
to sweep constantly around. A special signal indicates when the beam sweeps through the north. A pilot listening for this beacon's signal with his receiving set can determine his direction by the time elapsing between the north signal and the instant when the beam is heard with maximum (or minimum) intensity. The elapsed time is determined by means of a stop-watch, which can be calibrated to read direction.

The Airway Radio Beacon

The radio beacon system for the United States airways has been designated to operate with the minimum of apparatus and attention on the airplane. The objective in its development was to place a simple visual indicator on the airplane instrument board to tell the pilot whether he is on the course or how far off, which should operate without any effort or attention by the pilot. This has been successfully accomplished, and navigation over the official air routes thus has the advantage of a superior means of radio navigation not available to the independent flyer off those routes. The three methods of radio navigation for the independent flyer described in the foregoing require the pilot to listen with headphones through the

roar of noises on the airplane. Also, each of them requires other apparatus besides a radio receiving set; thus in the first method the airplane must carry a radio transmitting set, in the second a direction finder, and in the third a special type of stop-watch.

While the radio beacon system for the airways attained practical development only this year, its origin goes back to 1920. At the request of the War Department, the Bureau of Standards undertook to develop a directive radio system for airplane navigation. A method was devised in which radio waves were transmitted alternately from two directive antennas placed at an angle with each other.



Airplane instrument board showing beacon visual indicator.

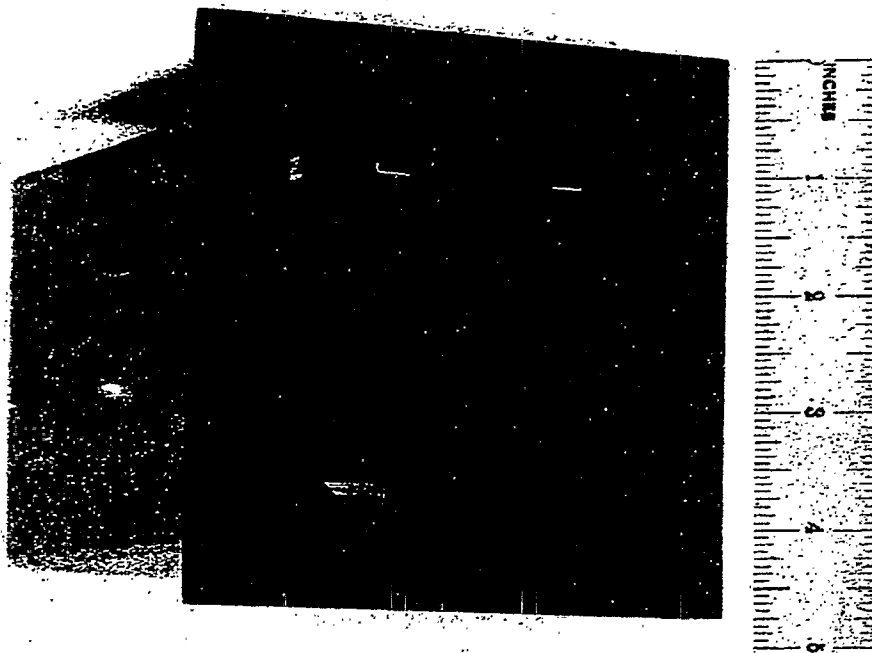
Equality of signal intensity from the two antennas along a certain line or zone determined a course which an airplane could follow. The system was tried out successfully in Washington and in Dayton, Ohio. In succeeding years the Army engineers at Dayton developed the system further.

When the Aeronautics Branch was formed in the Department of Commerce in 1926, it determined that radio aids would be necessary on the civil airways, and assigned their development to the Bureau of Standards. As part of this work, the Bureau undertook to perfect the radio beacon, particularly by developing a visual indicator so that a pilot would have a direct indication, on his instrument board, of his location.

The required radio equipment on the airplanes is reduced to a short pole antenna and a simple receiving set weighing a few pounds, plus the indicator on the instrument board which tells the pilot whether he is on the course or how far off. All

of the expensive and powerful apparatus necessary for the system is on the ground, maintained by the Government.

The radio beacons operate in the frequency band 285 to 315 kilocycles. Airway radio telephone stations are to communicate with airplanes in flight, in the band 315 to 350 kilocycles. These are allocated to air service by the 1927 International Radio Convention. For the present the beacons are adjusted to the frequency of 290 kilocycles, and the telephone stations to 333 kilocycles.

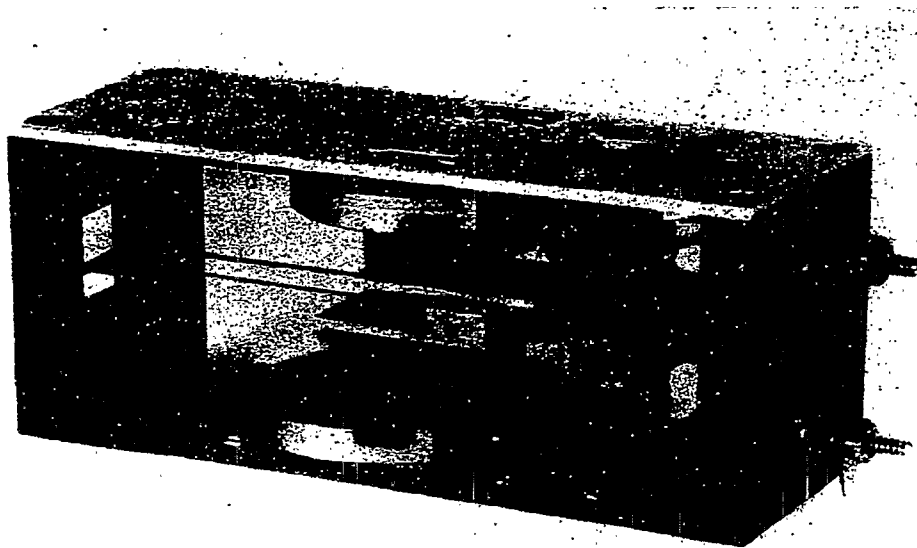


Visual reed indicator in shock mounting for installation on instrument board.

The directive radio beacon is a special kind of radio station, usually located at an airport, just off the landing field. Instead of having a single antenna like an ordinary radio station, it has two loop antennas at an angle with each other. Each of these emits a set of waves which is directive, i. e., it is stronger in one direction than others. When an airplane flies along the line exactly equidistant from the two beams of radio waves, it receives signals of equal intensity from the two. If the airplane gets off this line it receives a stronger signal from one than the other.

The current in the two antennas is of exactly the same frequency, but is modulated at a different low frequency in each. I. e., the current in one antenna has a tone of 65 cycles impressed on it, and the current in the other antenna has a tone of 85 cycles impressed on it.

The indicator connected to the receiving set on the airplane shows when the signals from the two beams are received with equal intensity, by means of two vibrating reeds which are tuned to the different modulating frequencies used on the two antennas at the directive radio beacon station. When the beacon signal is received the two reeds vibrate. The tips of these reeds are white in a dark background so that when vibrating they appear as a vertical white line. The reed on the pilot's right is tuned to a frequency of 65 cycles and the one on the left to 85 cycles. It is only necessary for the pilot to watch the two white lines produced by the vibrating reeds. If they are equal in length, he is on his correct course. If the one on his right becomes longer than the other, the airplane has drifted



Interior of visual indicator showing the two metal reeds and electromagnets.

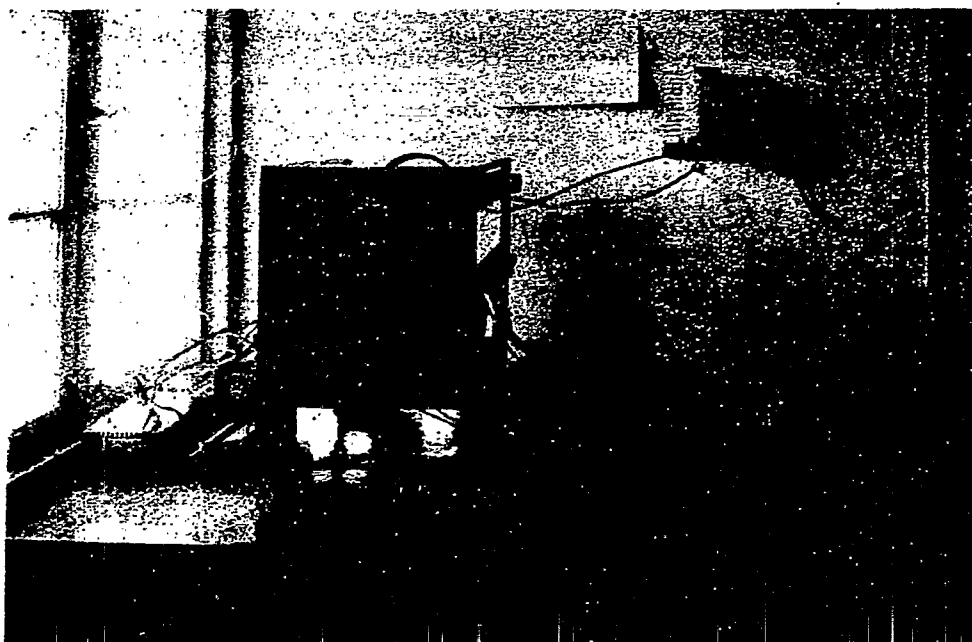
off the course to the right (into the region where there is more of the 65 cycles). If he drifts off the course to the left, the white line on the left becomes longer. Thus if the pilot leaves the regular course either accidentally or to avoid a stormy area, the radio beacon will show him the way back.

The whole receiving system comprises a small indicator unit on the instrument board weighing one pound, a receiving set weighing less than 15 pounds, and a 15-pound battery. The same receiving set can be used to receive radiotelephone messages, by plugging in a pair of headphones. The receiving system is very little affected by interference, including static, other radio stations, and airplane ignition interference, which has hitherto been the bar to satisfactory use of radio on airplanes.

The beacon stations will probably be placed at airports in general averaging about 200 miles apart. The Airways Division of the Department of Commerce

Aeronautics Branch has begun a program of installing them on the various airways. The directive beacons, with a straight airway between them, will be supplemented by small marker beacons at intervals (perhaps 20 miles) along the route. These are simply very low-power radio transmitting stations serving as mile-posts. A characteristic signal from a marker beacon will show on the visual indicator aboard the airplanes what point is being flown over.

Thus the radio beacon system guides the airplane along the airway regardless of fog, informs the pilot of the distance passed over, and brings him to the landing field. There are two other services which directional radio can eventually perform,



Marker beacon. A low power transmitter developed by the Bureau of Standards for use at emergency fields to mark fixed points along an airway.

to complete the conquest over fog, the providing of a field localizer and a landing altimeter, i. e., to mark out clearly the landing area and to indicate distances above ground in the act of landing. While it is not yet certain whether radio or other methods will be the best means to provide these two services, the need of a field localizer is already partially met. When the pilot arrives at the radio beacon station and flies over it, there is a sudden deflection of his indicator which enables him to ascertain the location of the radio station within 100 feet. This is accomplished by virtue of the peculiar properties of the vertical pole antenna on the airplane, and is of material assistance when landing during poor visibility.

The increasing role of directional radio in safe flying has already been foreshadowed. The successful flight of Art Goebel and Lieutenant Davis from California to Hawaii in 1927 was made with the aid of the radio beacon of the aural type. A long flight over sea, terminating in a relatively small objective like the

Hawaiian Islands, is extremely hazardous if undertaken without radio aid. Navigation by compass is subject to the indeterminate effects of wind drift, and the airplane's path may easily be shifted entirely away from the objective. Any practical scheme for transoceanic air service would seem to require directional radio aid. It would be imperative for a system such as that involving a number of seadrones anchored at intervals across the ocean. Navigation on such a system without directional radio could not be considered; there is no other known means of being sure to arrive at the next airdrone.

Exploration by air is another instance where directional radio must be used. An exploring party takes unnecessary risks if it neglects directional radio aids to reach its objective or to find the way back to its base. This is recognized by Commander Byrd who is taking direction finding equipment along on the airplanes which he will use in exploring the Antarctic Continent.

The principal saving of life and saving of time through directional radio, however, will doubtless come on the regular commercial airways. The radio beacon system developed for the airways is now being subjected to the test of routine operation. As an instance of what has been accomplished in trial flights, I may cite a recent experience. On a day of low visibility, a pilot unfamiliar with the route took the air in Philadelphia for Washington. With no maps or instructions as to landmarks, he was told to proceed to Washington and land at the College Park field solely in accordance with the guidance given by the beacon indicator on his instrument board. He not only flew in a straight line to Washington, but when over College Park field, which he had never seen before, the special deflection of the indicator told him he was at his journey's end, whereupon he landed.

As the radio aids have been slow in coming, compared with the advances in airplane design, engine reliability, and airway development, there has been a constantly increasing percentage of aviation accidents due to the hazards of weather. Directional radio seems the answer to those hazards, and there is ground for hope that not only this percentage of accidents but the whole number of accidents will become vanishingly small when the present possibilities of directional radio are realized in practice.

(At this point lantern slides showing the pictures on the accompanying pages and many others were introduced.)

CHAIRMAN HUNSAKER: I think our section is fortunate in having two authoritative papers on most important developments in the art that are making commercial flying safe enough to be commercial. This radio beacon service that Dr. Dellinger has outlined, I think, is 100 per cent American. He mentioned, in passing, the European system (I think largely British) in which the direction finding equipment is on the ground. The man in the air has to have a transmitter and receiver to find out where he is. I looked into that myself once and found it has elements of risk and confusion that are not in the American plan. In the European system, as used at Croyden, it so happens that people starting from the Continent time their flights to arrive before dark, so between five and six on a foggy afternoon, there was a Belgian, a Dutchman, a German, two Frenchmen and several Englishmen, all coming in and unable to find Croyden, asking in various versions of the English language where they were, all on the same wave lengths. The thing didn't work. They had to pick out one fellow and say, "Now you talk for a minute." The others would break in and were told to lay off until they got through. They had to cruise around and waste time until the positions had been given one at a time. The longer they waited, the worse they got lost.

The American system, I think, is a broadcasting system. Broadcasting is an American idea, anyway, and is in a way an indirect subsidy to civil aviation, because all the apparatus along the airways is provided by the Government of

the United States. A flyer has to provide only the receiving equipment. The service of the radio beacon will serve any number of airplanes on the route. There is no question of precedence. I think that is a feature that has great elements for future explanation. The system of the man in the air asking people on the ground where he is, is all right when two or three are in the air, but it is no good with 40 or 50 coming in.

I notice that we have a radio pioneer in our audience. I don't know whether he has worked on radio beacons. He may have some comments as to where we are going. I would like to call on Dr. Alexanderson.

DR. ALEXANDERSON: I am getting intensely interested, and have been spending a lot of time in the air just recently. I feel that it is an intensely practical subject, this navigation. The ideas we have gotten in discussion today will have to serve as a guide as to what we may be able to do in adapting radio to these purposes.

The question was asked here as to what should be done to avoid collisions. A skipper at sea blows his fog horn when he is in danger of collision. Couldn't we perhaps have the equivalent of a fog horn by radio on each ship, a loud speaker to give out a kind of noise that is easily audible, where a wave would be sent out not selective and directive, but be picked up with any kind of receiving set? Whether that is a practical suggestion or not, I don't know; but I think we have to think along those lines and get our suggestions from the aviators.

CHAIRMAN HUNSAKER: I think there is something being done to avoid collision at sea, isn't there? I heard some discussion recently of some device for warning ships when approaching each other by radio means.

CAPTAIN C. F. HINGSBURG (Chief of Airways Division, Department of Commerce, Washington, D. C.): Yes there is. It is proposed to place a small radio beacon on board ships using the direction finders placed aboard the ships to determine the direction of ships. They are low powered and in that way will give warnings at greater distances than now practicable with the audible signals.

CHAIRMAN HUNSAKER: I suppose we are really considering means of navigation. We began with lights, how they can help the man navigate and find his way. We have spoken of how radio helps find the way when lights are not available. No one has mentioned the lights that are placed by the good God in the sky, the old-fashioned, celestial navigation. Have we a seagoing navigator here? What is the state when we go over the ocean. We are not going to have all these lights spread out.

LT.-COM. Z. W. WICKS (Lakehurst, N. J.): I was looking over the program last night before I started here from Lakehurst. As I read it over, I noticed this lack of celestial navigation as one of the subjects. That is a very moot question, and many people who haven't been to sea consider navigation as avigation, and there isn't any such hope as the stars and moon and sun being any good to you. That has been very severely handicapped the same as radio and lights and everything else.

It has been a question studied by a few for many years. I don't feel like saying much about this subject because I am not one of those who have been doing the work, but I have been associated for several years with Commander Pierce, at Lakehurst, and for the last five years he has been working on navigation, not only for the airplane and airship, but also to make it easier for sea-going men. He has two phases to the subject. One, of course, is taking the altitude of the object. The other is the solution of the position after you know your altitude. The solution he has divided into two parts, one by means of tables, the other by mechanical solution. His scheme as worked out is the camera. In other words, he takes a picture of the sun or moon on a filament which at the same time takes a picture of a bubble which is in the camera section, and a picture of the watch so he has the time right on the film.

In order to get away from acceleration errors he can take anywhere from five to ten sights on the same film, the average of the times, the average of the bubble error, the average of the altitude is obtained by measuring the distance above the base line and taking in conjunction the angle of the lens which is printed on the film.

Several years ago one of these cameras was made by the Bureau of Standards and the advisability of it proved. Just recently the Eastman Kodak Company took up the matter of development of a real proposition and pushed one through in time to give it to Dick Byrd to take South with him. That will not only give him a knowledge so he can calculate his position, but will enable him to bring back proof that he got where he said he was. There isn't any question. The altitude is there on the film, and he can bring it back. The watch time is right there. The only thing we can say he gypped us on is the direction to his watch. If his pictures don't show he was there, he didn't get there.

That is an expensive proposition that was developed there, and it is not suitable for the stars as yet, although the Eastman Kodak people are working on it and hope to be able to take a picture of the stars, as well. As a cheaper means of getting the same thing and making it usable for any kind of celestial object including the stars, they have taken a standard camera. On the front they have mounted a board ahead of the lens which carries the watch and a pendulum instead of the bubble. There is a telescope to look at the moon, sun, stars, whatever you want to take the altitude of. When you have that object on your crosswire, you snap your button and take a picture. That gives you everything on the assumption that your celestial object is on the crosswire and on the base line so you have a picture of your object. That instrument will come out very shortly as a commercial proposition and will undersell the ordinary sextant.

The advantage for the sea-going man is that you need no horizon. It has its artificial horizon. For aircraft, where it is hard to use the natural horizon, it is good where the horizon is obscured. It is also good not only over the sea, but also over the land when you can't see anything under you, providing the fog is so you can see over the top of it. If you get over the top of the fog, you can find out where you are just as well. In that it has its assistance in flying over low clouds or fog even over land.

The second phase of it was a question of developing a quick means of solving the celestial triangle to determine your position from altitude. It is worked out by switching the astronomical triangle around, turning it up-side-down. Pierce has worked out a set of tables which, after a couple of hours of practice, anybody can work out a line of position from, including the bearing, in 30 seconds. It requires only two entries on a table and two additions.

QUESTION: How long does it take to have your picture developed?

MR. WICKS: On taking the picture, you take your sights in about ten seconds, take five or ten of them just as fast as you can snap the trigger, and it takes a minute to develop the film. So you can get your position, or line of position, in two to three minutes after you take hold of your sextant.

That question of the tables is one that he has spent many years on and he has developed several sets of them. He wouldn't put anything out until he had what he considered the best to be obtained. He is now in Washington arranging with the hydrographic office to have the tables printed, and other special tables for aviators. For that reason he couldn't be here today. He should be talking to you about it; however, I will give you a line on what he is doing.

His third proposition is to solve the position by means of mechanical apparatus which requires no books, whatever, for a solution of the star, not even a nautical almanac. All he needs is time and the instrument to find his position. When he uses the sun or moon he has to have his nautical almanac in order to get his declination.

The question of time has been overcome to a large extent because we now have watches which will keep sidereal time and local apparent time. Those watches are set at Greenwich sidereal time and Greenwich apparent time. Before you start your flight, you take your picture, read your time and hour angle direct in the watch, with no fooling around with finding the time which has always been the bugbear of the navigator. As I told the Commander, the only thing I had against him was that he didn't do it 20 years ago to make it easier for seafaring men.

CHAIRMAN HUNSAKER: Thank you for completing our records.

To go back to our radio beacon service, that is the interesting and new thing that is going all over our airways. It makes a very important contribution. The question as to whether the general scheme and type are satisfactory, I think, has been answered by the work done today. There is one question I would like to throw out. Perhaps some of you have an idea. That is the new radio device which obtains measurement or effect by comparing amplitudes. The question is, what will be the effect of fading; if the fading takes place to a degree on both modulations, there may be no effect; but if the fading is at all selective would it not cause a shift of the equal symbol zone to one side and the other?

DR. J. H. DELLINGER (Bureau of Standards, Department of Commerce, Washington, D. C.): We discovered that just a year ago and made some study of it. In the mountainous area, the Bellefonte sector between Cleveland and New York, such fading will affect the accuracy of the directive beacon at instances of 50 miles and up at times at night. So the beacon system will have to be used with caution at night particularly in mountainous areas. We have made some trials in other areas where the topography is more ordinary, and get very little of that effect.

Furthermore, the effects mentioned, caused by fading in distances which were concerned, that is distances less than 150 miles, are essentially caused by interference between the radio wave along the ground and that which goes up to high levels in the atmosphere, and is reflected down by changed conditions in the upper atmosphere; so that the fading is an interference phenomena between the ground wave and sky wave, and is only evidenced differentially between the two beams when you are dealing with an antenna somewhat directional, and thus receive differentially the ground wave and sky wave. We have made only a few tests but we have some evidence now that by the use of this vertical antenna, which does not receive very much of this wave which is reflected down, does not receive much vertical, only horizontal components, and it is practically ineffective. So it seems as though this vertical antenna has largely solved the question of possible errors due to fading. I can't say positively that this has been done, but there is every evidence so far that it is true.

That is one of the main reasons, in fact, why we proceeded to the use of this short vertical antenna. The shorter the antenna, the less intensity it receives, so you are sacrificing something when you use so short an antenna and have to compensate by increased amplification which brings in more intensely additional services. You have to do a better job of shielding your apparatus, but a little expenditure for electrical shielding seems well worth while if it does relieve us from possible directive errors.

COLONEL H. E. HARTLEY (New York): I would like to inquire if there is any impairment of the range of this very wonderful visual signalling?

CHAIRMAN HUNSAKER: Where the range is as great visually as aurally?

COLONEL HARTLEY: Yes, from the ear phones. I can recall cases where pilots have absolutely thrown down ear phones in disgust and almost stopped the progress of any radio advance on the plane. I certainly think it is wonderful to have this visual signalling to the pilot instead of through the phone. I am

wondering if we are not giving away something, perhaps the range, or we have to resort to too much shielding.

DR. J. H. DELLINGER (Bureau of Standards, Department of Commerce, Washington, D. C.): You have to provide some shielding. As far as the range is concerned the use of the visual indicator is a gain over the aural system because it discriminates better against interference. You have not only your electrical tuning and receiving set, but also mechanical tuning in the vibrating reed. Therefore, it does not respond as much to atmospheric and other disturbances and any lack of sensitivity you can compensate. The receiving set is supposed to do that. The distance range you get depends entirely on the ratio of the effect of disturbances of the receiving set and the desired signal. This discriminates better against disturbances and therefore the distance ranges are better than the aural system.

This particular means of visual indication was the result of quite a long series of experiments. A good many other types have been tried out. Perhaps this isn't the best answer, but it is by far the best of any we tried out.

MR. RHEA (General Electric Co., Schenectady, N. Y.): Have you automatic amplitude control on these reeds?

DR. DELLINGER: As the pilot proceeds along when the deflection gets too large because of getting closer and closer to the object, he turns it down, brings it down to a convenient amplitude. It looks as though it is quite possible to develop automatic amplitude.

MR. RHEA: May I ask what is being done to bring the pilot down after he has found the airport?

DR. DELLINGER: Well my reply would be, not much. There are a lot of possible schemes. I don't think it is worth while to go into that, Mr. Chairman. It will make a fine subject for somebody to give a paper on two or three years from now.

CHAIRMAN HUNSAKER: It has nothing to do with safety yet.

DR. DELLINGER: There are a number of things being developed that are more or less hopeful, but none has given much service yet and it would be a long story and hardly worth while.

W. PARKER PERRY (Somerset, N. J.): Is there any way of propagating radio waves in one direction other than with one wire or loop aerial?

CHAIRMAN HUNSAKER: You can have an array of wires such as a Marconi system. You know, all waves are supposed to be reflectable from a polished metal surface. Working on that principle, if that is true, then a reflector with the aerial focused in the reflector would logically send out a beam somewhat similar to a searchlight of invisible waves. Is that true?

DR. DELLINGER: I will just say in a general way more directive antennas can be used than the one we are using here, and it may well be that an improvement will be using a more directive antenna, and reflectors, as you say, can be used effectively in directing radio-waves. I don't know yet whether it will be worth while or not.

CHAIRMAN HUNSAKER: Isn't the reflector matter limited to short waves because of the physical dimensions?

DR. DELLINGER: It is harder and harder the longer the wave.

JOHN B. KOHLER (Chicago, Ill.): In the discussion of the fixed radio beacon with direction finder on the plane, the discussion was entirely along the line of a single beacon. Has anything been done in using a combination of numerous beacons spaced at widely different points to get different bearings on a series of different fixes?

CHAIRMAN HUNSAKER: We were shown a map where there were 15 or 20 airports with beacons at them.

MR. KOHLER: I have in mind a fixed beacon, not a series, along the route so a

pilot with his direction finder on the plane can get a series of definite fixes along the route through the combination.

CHAIRMAN HUNSAKER: That is more marine navigation.

MR. KOHLER: Yes, marine navigation.

DR. DELLINGER: You can do it analagously, the way a ship does. When discussing direction finders, it is a very expert job to use it. It is less sensitive than a receiving set. You have disturbances affecting sensitivity and direction and it is very difficult to use under practical conditions. I do believe they are going to be used, but on account of the difficulty, I don't know.

DR. LANGMUIR: A question about the distance markers. Is that affected by the third vibrating reed and the indications obtained when that rises to maximum and falls?

The Idea Behind the Marker Beacons

DR. DELLINGER: The idea of the marker beacons is this: (It isn't the only way it can be done; it is one way.) The pilot flies along, keeps on his course by observing the two white lines remaining equally as to length. If he gets off to the side one gets longer and he comes back. There is a third reed near by, tuned to another frequency characteristic of marker beacons. Normally it doesn't vibrate. We have every 20 miles this little low power transmitting set. When it gets within perhaps five or three miles, whatever is found most convenient for the pilot's use (say five miles) he begins to see this little white spot widen out. It is beginning to vibrate. It rises up to full amplitude when it is exactly over the point when the signal is being sent and falls off; so for a period of five or ten minutes he is getting gradually increasing and decreasing indications that he is flying over such-and-such a point. Probably that won't be just a constant deflection, but will be rising up and back again in accordance with the characteristic dot and dash arrangement. Whether that will be before him for one minute or ten minutes, it remains to be determined what will be the most useful.

PROFESSOR W. F. DURAND (Leland Stanford University, California): How much energy are you putting into those radio beacons at the present time?

DR. DELLINGER: The directive beacons are being run on one kilowatt. The marker beacons at 5 watts.

CHAIRMAN HUNSAKER: I suppose there is theoretically another form of beacon we haven't mentioned that would be equivalent to a lighthouse. That is, one which would give a distinguishable signal for various degrees of azimuth. That wouldn't be a beam signal at all. Have you considered that type of beacon?

DR. DELLINGER: I take it, that it would have to be a beam signal, otherwise you couldn't distinguish azimuth.

CHAIRMAN HUNSAKER: Perhaps a multiplicity of beams, a whole star-shaped array from every five or ten degrees you get a signal, so an airman then flying along would get the signal of a character which would tell him the line of bearing.

DR. DELLINGER: I should imagine the transmitting outfit would have to be rather complicated for that. Of course, the same thing is accomplished by the rotating beacon.

CAPTAIN C. F. HINGSBURG (Chief of Airways, Department of Commerce, Washington, D. C.): The system you speak of, I believe, has been in operation in England.

CHAIRMAN HUNSAKER: The rotating beacon?

CAPTAIN HINGSBURG: No, the one having distinguishable beams rotating with changed characteristics on each point.

CHAIRMAN HUNSAKER: That is a rotating beam, isn't it?

CAPTAIN HINGSBURG: But a change of characteristic as it goes around the compass.

CHAIRMAN HUNSAKER: Yes, I understand they have experimented with that.
COLONEL H. E. HARTLEY (New York): What would be the total weight, roughly, of the receiving apparatus necessary to operate one of these beams?
DR. DELLINGER: Twenty pounds, including the batteries and everything.
COLONEL HARTLEY: That is very remarkable.

ADJOURNMENT

Aids to Navigation

(Continued)

REAR ADMIRAL W. A. MOFFETT, Chairman
Chief of Bureau of Aeronautics, Navy Department, Washington, D. C.

The second session was called to order at two-fifteen o'clock by the Chairman, Rear Admiral W. A. Moffett.

CHAIRMAN MOFFETT: I feel particularly fortunate in my duty as Chairman to be able to introduce two officers of the Service—one of them formerly of the service and one in the service at the present time—both very distinguished. One I have had the closest personal relations with for a great many years and I am glad to see him now directly connected with aviation.

The two papers we have to read, I am sure, will do a great deal of good when published. We will listen to what is said with much interest, and will first have the pleasure of hearing Dr. J. C. Hunsaker who needs no further introduction.

Communications as an Aid to Safe Flying

By J. C. HUNSAKER, D. Sc.

Assistant to Vice-President, Bell Telephone Laboratories, New York City

Is flying safe? Is it safe enough? The answers to these questions are yes and no, with reservations depending upon what sort of flying is meant. So far as concerns aircraft and engines, we must agree that flying, under favorable conditions, has now demonstrated a commercial degree of safety and reliability. We also must agree that under unfavorable conditions flying has been amply demonstrated to be not only unsafe but highly dangerous. The safety of flying, then is conditioned upon circumstances. The relation between an aircraft in flight and the circumstances which govern its safety is largely dependent on communication services.

To fix our ideas, I have somewhat arbitrarily classified flying in what follows but have left out of account acrobatic and exhibition flying, flight instruction of students, naval and military formation flying and maneuvers. Such flying will always be inherently dangerous but under proper regulation need not endanger the public.

Short Flights

Flights of less than one hour's duration in the vicinity of a landing field (sight seeing trips) are usually the public's first introduction to the delights of flying. Such flights are unscheduled and performed in daylight and in fair weather. A flight begun under weather and visibility conditions evident at the start can be completed before dangerous weather develops, due to the fortunate tendency of our weather to persist or to change slowly. There is no need for radio communication between the airplane and the ground, and it should be sufficient for the landing field to be in possession of the Weather Bureau's morning weather report and general forecast. If the nearest airport issues a short range forecast of local weather, this can be obtained by telephone, and used to determine whether flights should be repeated. A commercial telephone connection is all that is needed.

Short cross country flights and taxi trips of less than two hours duration

require knowledge of weather and visibility conditions at the terminal field. This information can be obtained at the start by a commercial long distance telephone call and it is unlikely that the weather will change greatly during the flight.

Similarly, scheduled flights of less than two hours' duration along an airway may depend upon commercial telephone service to avoid unpleasant surprises due to bad weather. Such point to point communication service between landing fields is an essential of all flying that leaves the vicinity of the home port.

Long Flights

Scheduled flights of more than two hours' duration along an airway, especially at night, and long cross country flights are relatively unsafe unless adequate communication services are provided. A ground organization is required which will collect by wire at frequent intervals weather data from points along and to the side of the airway and which will, from this data and the general weather map, prepare short range forecasts of local weather. This special forecast of flying weather is supplied the pilot when he leaves and a revised version should be transmitted to him by radio enroute. When approaching his destination the pilot should obtain by radio from the terminal airport the actual visibility and landing conditions there, and he may consult as to the relative safety of attempting a landing or proceeding to some other landing field.

There is, therefore, required to safeguard long flights from the dangers of bad flying weather, a comprehensive ground organization to collect weather data over a wide area and a radio service to transmit the results of such collection to planes in flight.

This is no place to discuss the growing ability of modern aircraft to survive in bad weather. Every improvement merely increases the number of days per year that flying is possible. There will always remain, however, especially in the winter months, a discouraging number of days and nights when flying is unsafe.

Scheduled flying becomes commercially impractical in the face of uncertainty. Safety is, of course, obtained by cancelling scheduled flights, but operations cannot be suspended indefinitely. More exact knowledge of weather would enable disturbances, fog, etc., to be localized and flights to be got through in safety avoiding the really dangerous times and places.

Short Range Forecasts

Meteorological science is able to forecast weather phenomena with a high degree of precision provided data describing present and past weather can be collected from a sufficient number of places. The collection of data is a problem of the communication art.

A full scale meteorological experiment is now being conducted in California in cooperation with the Weather Bureau by the Guggenheim Fund for the Promotion of Aeronautics and the Pacific Telephone and Telegraph Company, one of the Associated Companies of the Bell System. About forty observers are now reporting weather by telephone to the Los Angeles and Oakland airports five times a day. The collected reports are exchanged and airplanes starting over the airway are provided with a forecast of the weather they may expect to meet enroute and upon arrival. On the basis of these forecasts, it is hoped that the pilots may be able to avoid bad weather by choosing an alternative route or by selecting the terminal field where weather conditions are more propitious. Both Los Angeles and the San Francisco Bay region have several airports and there are two routes between them, one up the valley via Bakersfield, and the other the more direct line to the west.

In the East, weather data from observers in New Jersey and Pennsylvania is also being collected at frequent intervals by the meteorologist at Hadley Field employing a somewhat similar method of sequence operation of the long distance telephone lines.

Point-to-Point Service

In addition to the problem of collecting weather data, there is the closely related matter of distributing local weather reports and forecasts between airports. This is a point-to-point service and may be accomplished by a special radio telegraph network, by commercial telegraph or long distance telephone, or by a private or leased wire service, either telephone or telegraph. Local conditions, rates and volume of traffic determine which type of service should be provided.

Besides its use for weather messages, there is need for point-to-point communication between landing fields along an airway to follow the progress of an airplane and its passengers and cargo. Such a despatching service is somewhat analagous to that of a railway and is a necessity if connections with trains and other aircraft are to be met.

The present airways are laid out with intermediate landing fields spaced at short intervals upon which planes may land when forced down by weather or mechanical trouble. Such landings are infrequent and will presumably become increasingly rare. However, when a forced landing does take place, instant communication with the nearest airport becomes a very urgent matter, involving the passengers, the mail and the air transport company. Telephones are now provided at these intermediate fields by the Department of Commerce and kept available for such emergency use. The same telephones can be used, in addition, for the routine collection of weather data.

Communication between terminal landing fields or airports on certain airways is now handled by radio telegraph and on others by long distance telephone. Neither system is ideal. Radio telegraph is slow and is often unreliable in times of bad static when weather messages become urgent. It also takes up radio channels needed for communication with planes. Moreover, a telegraph operator must be constantly listening throughout the 24 hours even though messages come infrequently. Commercial wire telephone service while generally fast and reliable gives no written record of the messages passed. Long distance telephone service does not economically repeat messages at other and distant airports which may be interested. For example, the weather at Cleveland is of interest both to New York and Chicago Air Ports. Likewise the time of departure of the New York air mail from Chicago is of interest to all terminal fields enroute.

An ideal system which is instantaneous and reliable, repeats messages at all airports, is free from interference, takes up no radio channels, and furnishes a permanent record of all messages at all airports, is the telephone typewriter or printer service developed for the use of business houses with branches scattered over the country.

To apply the telephone typewriter to an airway requires the installation of keyboard transmitting and tape printing apparatus at terminal fields and their interconnection by a private wire circuit. Then anyone familiar with a typewriter may type a message which will appear on the tape fed automatically from the apparatus at every other connected point. No one is required to be in attendance to receive the messages which are typed automatically under the control of the sending station. The receiving operators are thus free to attend to telephone calls from intermediate fields, operate radio telephone service to airplanes, radio beacons, lights, or to carry on whatever duties may be assigned them. Telephone typewriter equipment has been installed between Oakland and Los Angeles with drops at Fresno and Bakersfield.

Radio Service

An aviator leaving an airport should be given information of the weather along the airway ahead of him and a forecast of the nature of probable changes during the time of his flight. If general weather conditions are settled, or if his flight is a short one, such a forecast is entirely adequate. However, for long flights and at times of uncertain and threatening weather, it is important to keep the pilot advised by radio during the flight of the weather conditions he may expect. In particular, visibility and landing conditions at the airport where he expects to land and storm warnings are required.

Weather and landing advice can be broadcast from each airport along the airway. Provision of radio transmitters at airports and receiving sets in the planes will make possible a simple one-way system of communication and will permit any number of planes in the air to be advised without confusion. European practice, however, has not developed a broadcasting service along this line but has evolved a two-way system in which the pilot of the airplane talks with the nearest airport. Such a system has obvious advantages where it is desired by an air transport company to control rather than advise its planes. The obvious disadvantage lies in the fact that, on one radio channel, the airport can converse with but one airplane at a time.

This two-way system has the great merit of permitting the pilot to discuss the weather outlook with the airport meteorologist, to consider alternative landing places in view of his remaining fuel supply, direction of wind, etc., to decide on a change in landing place and to make necessary arrangements there to care for his passengers and mail.

It seems reasonable to predict that operators of air transport fleets will want two-way communication with their planes in flight, while taxi services and private owners without ground organization along the airway will be content with a public one-way or broadcasting service.

Whether one-way or two-way communication is desired, it appears that, for plane to ground use, radio telephony, as distinguished from telegraphy, will be essential. Radio telegraphy requires the individual attention of a special radio operator on board the plane for sending and receiving. While very large multi-engined passenger planes will certainly carry a relief pilot in flight, it is doubtful whether good commercial pilots can be made into good telegraphers and vice versa. Telegraphy has the advantage of longer range with the same transmitter power and can be read through a higher level of interfering signals and acoustic noise on board. For long distance over-sea flights and for expeditionary purposes the radio telegraph has, without doubt, preponderating advantages from a power-distance point of view, aside from the convenience of communicating with surface vessels enroute. For regular service on established airways, however, the telephone is undoubtedly superior.

Goniometry

The perfection of facilities for communicating weather and landing information to planes in flight, which will enable them to operate with safety under relatively unfavorable meteorological conditions, will greatly stimulate the demand for improved aids to navigation. It seems to be established that flying under conditions of poor visibility, when landmarks are totally obscured and beacon lights are useless, requires some form of radio goniometry if the pilot is to find his way through. A number of systems have been proposed for this purpose. The London-Paris airway is equipped with radio direction finding equipment on the ground by means of which the position of planes can be determined on request. The disadvantages of this arrangement lie mainly in its relative slowness and its lack of

traffic capacity. The radio beacon of the type being developed by the Bureau of Standards, giving an equi-signal zone which can be observed by the plane, is free from these objections but is subject to the disadvantage that it indicates a straightline course which cannot always coincide with the airway and further it is of little value if detours to avoid storm centers and foggy areas are required. Another system, a recent development of the British Royal Air Force, employs a rotating loop transmitter at the ground stations. The plane obtains its bearing with respect to the transmitter by means of an ordinary receiving set and special stop watch. This system is relatively slow but permits the pilot to navigate as he would if one or more beacon lights were visible. All of these various methods of goniometry have special advantages and disadvantages, and occupy more or less of the valuable and restricted ether space. The evolution of the system which is most satisfactory will be a matter of time and will require close cooperation on the part of all factors in the industry.

Future Development

It seems evident that commercial aviation in this country requires and should have for the regularity and safety of its flying operations as, indeed, for its commercial survival, a wire service on the ground, a radio beacon service and a radio telephone service. The wire service can be obtained from the existing communication companies and needs no discussion here.

It remains to consider whether a radio beacon service and a radio telephone service at all the airports over the country can be made practicable without jamming one another. The frequency bands available are rapidly being occupied and the definite space reserved for the airways is likely to prove very inadequate at an early date. As our airports become equipped with modern radio apparatus, we may expect serious interference, which can only be eliminated by the assignment by Federal authority of communication channels additional to those now reserved.

While radio communication appears to be essential to the safety of the public when flying on long distance commercial routes, today American aircraft are not provided with radio. The provision of a proper radio service will take time and can only follow the ground organization. Evidently the installation of radio apparatus in airplanes cannot be insisted until the airports are equipped to broadcast weather information which has been collected by wire and digested by competent meteorologists.

Legislation to require radio apparatus in certain airplanes will no doubt parallel similar legislation for shipping, but any consideration of such legislation would be futile at this time. We must first have public airway wire and radio services. This part of the problem is analogous to that of the Lighthouse Service of the United States and, within the limit of funds appropriated by Congress, a practical solution is being approached.

Though not yet required, it can be predicted that at busy airports there will soon arise a need for radio means to control precedence in the take off and landing of airplanes. This virtually amounts to traffic control and can be accomplished by low power two-way radio telephone. Planes wishing to land will announce themselves and remain aloft until landing at a designated part of the field is directed by the airport manager in the control tower.

Transoceanic Flying

The foregoing discussion has all been based upon present conditions and tendencies of commercial aviation within the continental limits of the United States. Transoceanic flying has not yet been exploited commercially. A number of air-

planes and seaplanes have attempted to cross the Atlantic, with varying degrees of success. There have been three attempts by rigid airships, all of which were successful. Of the airplane attempts many have never been heard from again. The successful contenders have waited for weather, have left at times considered by them to be as favorable as might be expected, yet practically all have reported bad weather encountered and arrived with little fuel. The area covered is so large and the time of flight so long that it seems unlikely that a forecast given at the start can hold good until arrival.

Frequent reports of ocean weather could, of course, be transmitted by radio to an airplane in flight, but a report of bad weather ahead is of no help to an airplane with only a few precious gallons of fuel remaining to reach land. The North Atlantic is so wide that bad flying weather may be assumed to exist somewhere on the course at practically all times.

To fly the Atlantic safely and regularly appears to require such a margin of fuel or flight radius that localized bad weather may be avoided by alteration of course. Otherwise one gambles with weather. Existing cable facilities can be organized to collect weather data from the shores and islands of the North Atlantic from the West Indies to Labrador and from the Azores to Iceland. Existing radio services can collect weather data from the ships at sea. From such collected data a weather disturbance can be located and tracked. Frequent reports and forecasts transmitted by radio telegraph would give the commander of a Transatlantic airship the data from which to draw his own weather map and on it to select his course with confidence that he is avoiding trouble.

It can be argued with some force that, by means of adequate communication, a Transatlantic airship can be made safer than a house on shore. With a margin of endurance of a day or two beyond that required for the direct crossing, and with modern communication facilities giving the airship a thousand eyes scattered over the sea, a severe weather disturbance can always be avoided. No amount of surplus endurance nor radio warnings will save the house on shore from a twister. Being fixed, the house gambles with the weather, but fortunately its chance of survival for many years is good merely because the track of a tornado is narrow.

An airplane at sea has a very slight margin of endurance and is in an unfortunate situation. It must hold its course in order to conserve fuel. Either the weather on the course is good or it is not. Fog, sleet and gales have been, without doubt, responsible for the deaths of many aspirants for Transatlantic laurels. Definite knowledge of the meteorological situation can, if the effort be made, be supplied by modern communication agencies, but the weather itself cannot be altered. Safety is, therefore, to be secured by choosing a course to avoid trouble. To do this one must have adequate communications combined with a large margin of flight endurance.

CHAIRMAN MOFFETT: I was told when I was asked to act as Chairman here that they were very anxious to have discussion following the papers, and some one remarked if the paper was read with no discussion and no further light, we might as well let them print them for us and send them to us so we could read them at home. I hope in the time we have allowed that those present will discuss what has been said by Dr. Hunsaker and criticize or offer further suggestions you may have to make.

LIEUT. A. F. HEGENBERGER (U. S. Army Air Corps, Wright Field, Dayton, Ohio): I would like to ask him if he knows of any agency now trying to organize the broadcast service so that they will broadcast the weather?

DR. HUNSAKER: The gentleman on your left is equipping our airways very rapidly to broadcast the weather right across the transcontinental airway.

CAPTAIN C. F. HINGSBURG (Chief of Airways Division, Department of Commerce, Washington, D. C.): We have listened with a great deal of interest to the discussion presented by Dr. Hunsaker on communications of various kinds. That is a problem which we are confronted with right now. The Department is getting delivery on twelve 2,000 watt broadcast sets and nine radio beacons which will be installed before the end of this year. It is our responsibility to determine the plan on which these facilities will be operated.

Radio direction and radio communications are interrelated, owing to the fact that frequencies must be assigned to the various types of facilities and weather, for that is what we are embodying to the pilot and is also connected with the same problem. In order that the plans of the Department may be more fully discussed and in order that we may get some of the benefits from the discussion which will ensue, I have prepared a paper covering the discussion of weather information and communications to aircraft which I would like to read if I may.

CHAIRMAN MOFFETT: Certainly.

Discussion of Weather and Communications From an Airways Maintenance Point of View

By F. C. HINGSBURG

Chief Engineer, Airways Division, Department of Commerce,
Washington, D. C.

Weather is one of the uncontrollable factors that seriously affects the reliability and safety of air transportation and, therefore, influences the air navigation facilities that must be provided on airways. Candlepower and spacing of lights, as well as location of intermediate landing fields, are determined in conjunction with the study of weather conditions encountered on an airway route. An adequate weather service and communications system, in addition to aids to navigation along the airway is essential for the full development of a dependable and safe air transportation system. The establishment of safety aids essential for this purpose has been authorized by the Air Commerce Act of 1926.

Airway facilities may be classified into two groups: first, the facilities designed to make flying feasible and safe under conditions of poor visibility and thick weather and second, the safety aids that are required to bring airplanes safely to a well-lighted and equipped landing field when hazardous weather conditions are encountered.

Radio Direction for Thick Weather Flying

The aids to navigation established on an airway should make it possible for airplanes to maintain a high degree of flying efficiency. The airway routes are laid out to follow the best flying country and equipped with a lighting system of closely spaced lights that permits flying in moderately clear weather. Radio-range beacons are essential to guide airplanes over the lighted route when the lights are not visible one from another. Radio-range beacons for the guidance of airplanes flying the Transcontinental route are now being installed. Two radio-range beacons are in operation experimentally and six additional stations are under construction. By the close of 1928, radio-range will mark the lighted airway between Hadley Field and North Platte. The radio-range beacons are being installed at the middle points of straight stretches of lighted airways and the range signals extend in both directions along the course.

The stations will be located at Hadley Field, Bellefonte, Cleveland, Goshen, Sterling, Des Moines, York and Gothenburg, marking a continuous route by a

series of straight courses. The radio-ranges will intersect at Ringtown, Clarion, Toledo, Lansing, Cicero, Grinnell, Ft. Crook, Kearney and North Platte, at which points marker beacons will be installed to mark the turning points in the airway courses. Each Radio-range will have a definite characteristic so as to identify the course flown, and will take the airplane over the lighted airway, giving the pilot full advantage of lights, landing fields and landmarks, which may be visible at close range.

Typical characteristics of radio-range signals are as follows:

- (a) Dash Dot
Dot Dash
- (b) Dash Dot Dot
Dot Dot Dash
- (c) Dash Dash
Dot Dot
- (d) Dash Dash Dash
Dot Dot Dot
- (e) Dash Dot Dash
Dot Dash Dot

The radio-ranges are never shifted and can be operated continuously, thereby serving any number of airplanes flying the route in either direction at any time. The greatest service would be rendered and absolute confidence in instrument flying developed when the pilot appreciates that the radio-ranges mark definite unvarying courses over the safe lighted airway and radio-range signals intersect on fixed landmarks. Instrument flying over airways must develop as a necessity to maintain a high percentage of flying efficiency and can be accomplished with safety, but blind landing at airports and terminal fields is not yet an assured accomplishment. Airport terminals along the route may be marked by a system of radio marker beacons or leader cables to bring the airplanes directly above to the landing field, but it is very evident that reliable radio communications to aircraft is required to advise the pilot as to landing conditions at terminal airports. Should landing at the terminal become hazardous due to fog or thick weather, the pilot may be advised regarding landing conditions at alternate fields and the airplane brought down safely elsewhere. There would be no justification in flying blind by instruments over an airway unless a safe landing is certain at the completion of a trip.

Present Weather and Communications System

Under the Air Commerce Act of 1926, the Weather Bureau is the responsible agency for collecting and disseminating weather information. The Airways Division operates in connection with the Weather Bureau in disseminating weather information along airways. The Weather Bureau maintains personnel at the principal airports to analyze and interpret weather reports. The Airways Division now maintains twenty-eight radio stations for the exchange of weather information and dispatch of airplanes; this service being supplemented by telephone and teletype communications. The present system of weather information is the expansion of the system initiated by the Post Office Department, which has served for more than 10,000,000 miles of flight, and has established a fine record of performance. Nevertheless, the system cannot be considered altogether satisfactory. The pilot receives the weather information and forecasts before taking-off and concerns himself with weather conditions he may encounter three or four hours hence at points 300 or 400 miles distant, whereas, the bulk of his information turns "stale" and unreliable thirty minutes after taking-off, due to rapidly changing weather conditions. An adequate weather communications system should convey to the pilot enroute the changes in weather and landing con-

ditions, giving him reliable information as of the moment. It is, therefore, considered that radio communications to aircraft is the solution of the weather problem.

Radio Telephone Communications

Great progress has been made during the past year in the development of radio communications to aircraft. On the Transcontinental Airway, two stations have been in operation experimentally for several months, and twelve additional radio telephone transmitters are being installed at Cleveland, Bryan, Chicago, Omaha, North Platte, Cheyenne, Rock Springs, Salt Lake City, Elko, Reno and Oakland. By the close of 1928, these radio stations will have been completed and a new system of control of airways operation will be initiated. The radio telephone transmitters are of 2,000 watt capacity, broadcasting voice on 900 meters, with a reliable range of 125 miles. Apparatus for fifteen additional stations is on order for delivery seven months hence, and the additional stations will be established along other routes on which night flying takes place. In addition to the foregoing, a radio-beacon and communication station is now being established at Key West for the Pan American Air Mail Service.

New System of Weather Communications

An entire new system of weather communications service is under consideration to develop the greatest utility from the new radio telephone facilities now available, and it is proposed to introduce this system on the Transcontinental Airway, using the stations now under construction. This system promises the degree of safety required by air transportation on a basis that permits unlimited traffic. Timely and accurate weather and landing conditions will be made available to any airplane, airport, landing field, or individual, that cares to tune in. The information will be broadcast on hourly schedules. Any airplane equipped with a radio receiver similar to the apparatus installed for the reception of radio-range signals will receive weather information at any point within the sector.

The Transcontinental route will be divided into six sectors, with control centers at Salt Lake City, Omaha and Cleveland. The Weather Bureau, as well as the air transport companies, have their principal offices at these points. Two weather sectors will be controlled from each control center. The six weather sectors are San Francisco-Salt Lake sector, and Salt Lake-Cheyenne sector, which are controlled from Salt Lake City; Cheyenne-Omaha sector and Omaha-Chicago sector, which are controlled from Omaha; Chicago-Cleveland sector and Cleveland-Newark sector, which are controlled from Cleveland. Each sector will have three radio communications stations, located about 200 miles apart and which will be connected by leased telephone lines for chain broadcasting so as to cover all points within the sector.

The weather service, forming the basis of this new system, is founded on the regular weather reports gathered by the Weather Bureau throughout the United States each morning and evening, supplemented by a secondary net of weather reports gathered at intervals of three hours from critical points in the vicinity of the airway route and further supplemented by hourly reports of weather and landing field conditions from intermediate landing fields located sixty miles apart along the airway. The weather reports are gathered at the control centers and weather information and landing conditions along the routes are broadcast once each hour.

In order that the proposed system may be more clearly described, let us consider the service rendered to an airplane leaving Hadley Field, at 9:35 P. M. for Chicago, with a mail stop at Cleveland and due to arrive at Chicago at 5:35 A. M. The control point for the two sectors involved is located at Cleveland.

Radio stations with telephone transmitters for voice communications to the pilot on the Cleveland-Newark sector are located at Cleveland, Bellefonte and Hadley Field, and are connected with leased wire telephone for chain broadcasting. The sector between Cleveland and Chicago is likewise controlled from Cleveland.

A radio operator is in charge of each radio station along the airway and an additional operator at Cleveland is in charge of the leased wire telephone and microphone lines which are controlled from Cleveland. Two-way voice amplifiers are connected along the telephone line, and the circuits are properly balanced by the telephone company for the service to be rendered. Telephone loops are connected to the leased wire telephone at the principal intermediate landing fields located approximately sixty miles apart. On the Cleveland-New York sector, these points are located at Northampton, Park Place, Numidia, Bellefonte, Snowshoe, Clarion and Mercer. The weather reporters located at the intermediate fields and critical points along the airway telephone weather data on sequence schedules to the Cleveland operator, starting at fifteen minutes before each hour. The reports are taken over the telephone and typed in triplicate on prepared forms, one copy goes to the operations manager of the air transport company, and one copy to the Weather Bureau representative, who analyzes the data and interprets the conditions. The Weather Bureau prepares a fifty word statement covering their interpretation of weather conditions based on the primary and secondary nets together with the data gathered along the airway. The Weather Bureau keeps track of the movement of storm centers and, from the weather data collected hourly along the airway, determines the time when storm centers will move across airway routes. On the even hour, the Cleveland operator broadcasts the sector weather and landing data followed by the Weather Bureau statement, and in addition, such orders as may be necessary from the operations manager to the airplane pilot in flight.

At fifteen minutes after the hour, the Cleveland operator gathers weather data over the Chicago-Cleveland sector from intermediate landing fields and reporting stations located at Chicago, Lansing, Lakeville, Bryan, Toledo, Vickery and Sandusky, and delivers copies to the operations manager and Weather Bureau representatives. At thirty minutes after the hour, the Cleveland operator broadcasts over the Cleveland-Bryan-Chicago chain of stations followed by the Weather Bureau statement and air transport company orders.

Before taking off from the Newark airport, the pilot refers to previous weather reports received over the radio and notes especially any orders from the operations manager concerning the scheduled trip. After taking-off, the pilot receives hourly reports on landing conditions and Weather Bureau forecasts. If landing at the terminal field becomes impossible, reports on intermediate fields along the route and alternate terminal fields permits the pilot to land safely and await more favorable weather. The operations manager has the privilege of following weather conditions closely, advising the pilot enroute regarding his judgment of conditions and transmitting such orders as are found necessary for the proper protection of the interests of the transport company. Arrangements made for motor or rail transportation of passengers and mail, if landing is ordered at a field other than the terminal, can be communicated to the pilot so as to provide for the comfort and safety of the passengers and expediting the mail. Circumstances may require flying at high altitude over ground fog on radio-range signals over the airway, or flying blind by instrument through thick weather and this may be done with safety as long as the pilot is kept advised that landing conditions are safe at the terminal field; or at some other specific landing place. Many trips now lost will be completed with safety as soon as a comprehensive weather communication service is established.

CHAIRMAN MOFFETT: We would like some discussion on this paper.

W. R. GREGG (U. S. Weather Bureau, Washington, D. C.): As one who is connected with the service, I am, of course, vitally concerned with the subject which has been under discussion this afternoon, that is, communications. In fact, for a long time it has been generally recognized that the key to the situation so far as the weather hazard is concerned, is largely communications. Probably in the future, after the experimental stage is over, no one method will be used to the exclusion of others, but perhaps one will be the principal method and others auxiliary. Certain it is that radio must be one of those because it is essential, it seems to me, and I think it is generally recognized that the pilot in the air be constantly informed of the conditions ahead of him.

In this connection perhaps I would take the only exception that I would be inclined to take to anything Dr. Hunsaker said. He made the statement in general, "perhaps we can say the weather we have now will be the same two hours from now." I wish it were true. It is, of course, often true and particularly at the time when we are least interested in it, that is during the spells of good weather. However, during much of the time in the winter, particularly in unfavorable weather conditions, it is constantly changing and it is very essential that the pilot be informed of that.

Short range forecasts will provide remedies to a certain extent, but it will be a long time before we have data sufficiently comprehensive and complete, and meteorologists sufficiently capable to interpret those data to give a forecast that is perfect 100 per cent of the time.

One matter that Dr. Hunsaker brought up and asked me to comment on is the weather conditions at sea. It is true, as he said, that the occasions are extremely rare when even moderately favorable conditions could be experienced all the way across the Atlantic. The Atlantic, of course, is notoriously stormy and the distance is great. In an analysis of daily weather maps for a period, of ten years, we found, to be perfectly frank, that there were no occasions when we could call conditions really favorable all the way. Something like 10 per cent was moderately favorable—all the more reason, therefore, why we must have a dependable and up-to-the-minute system of communications over the sea as well as over the land. That would have to be by radio telegraph.

Having the information, the commander or captain of the airship, or the pilot of the airplane, could take advantage of it and go around the stormy areas, those of the greatest disturbance, providing he had sufficient cruising radius.

CHAIRMAN MOFFETT: Is there any further discussion of this paper?

LIEUT. C. R. BROWN (Bureau of Aeronautics, Washington, D. C.): There is one point that Dr. Hunsaker brought up that I thought ought to be discussed a little. That is the question of local communication around a crowded airport where air traffic conditions are very complicated. He suggested the radio instead of ground signals. My personal reaction to it is that the simpler you have it the better. The less complication, perhaps the more efficient the apparatus will be. With the simple system of control from visual signals on the ground panels, and so on, there is not anything which can disturb it very much except, of course, fog. In that connection, of course, the aircraft carriers are of a good deal of interest. We have about as crowded an airdrome there as you can imagine, particularly when you are trying to put off a large number of planes and get others back at the same time. We have found it entirely feasible and most efficient to use hand signals.

DR. HUNSAKER: Only in daylight operation.

LIEUT. BROWN: Yes, that is what I understood. Of course, in night operation you have your lights. When the fog comes in you have to bring them in and land them by radio.

DR. HUNSAKER: There wouldn't be very many up at night.

COL. H. E. HARTLEY (New York): Under this subject of Communications as an Aid to Safe Flying, I think I ran across a situation that I really believe the National Safety Council could perform a service in which would make flying more safe in the country, and I will have to ask Mr. Gregg about that situation. It is simply this: We are not getting enough information from the ships at sea, because the Weather Bureau hasn't the money for sufficient messages from over the ocean to enable them to predict with certainty the way they do over the land.

If I am not mistaken, before the war there was a movement on foot to obtain communications from a larger number of ships. Two years ago when we got after that first trans-Atlantic flight I discovered that the British Air Ministry was getting and buying a lot of information from a lot of American ships that were not transmitting (because they were not paid) to our own Weather Bureau. We in turn got hearsay evidence from the British Air Ministry. If that is a situation that exists, surely the National Safety Council could in some way get behind the Weather Bureau, who, while extremely efficient are often not too zealous about asking for more money. We might start in here a resolution to the effect that the National Safety Council should post the Weather Bureau in its desire to strengthen the premise upon which it bases its forecast. In that way we will be rendering one of the greatest services conducive to safe flying that I can think of at the moment.

I don't know whether it is within the range of our meetings here to put forth such a resolution, but I think something should be done on it, and communications are certainly the aid to safe flying. If we haven't the money, what is the use of having them? If it is within the range of possibility, I would be glad to frame a resolution, and pass it through you, Mr. Chairman.

CHAIRMAN MOFFETT: I think it would be a very good thing to do.

DR. HUNSAKER: I will second the motion.

CHAIRMAN MOFFETT: You frame it and we will pass it to the Safety Council.

COL. H. E. HARTNEY (New York): I suppose the sense of the meeting is that way here, is it not? Probably Mr. Gregg might have a few suggestions.

W. R. GREGG (U. S. Weather Bureau, Washington, D. C.): Along that subject, the question of more reports at sea was under discussion last May and June in Paris by an international congress on safety at sea, and preliminary measures, at least, were taken at that conference by the meteorological offices of France, Great Britain, Canada and the United States to that end. I am not prepared to say whether a resolution by this body will assist or not, but I thought you would be interested in knowing the matter is under advisement and we hope to get results in the comparatively near future. I won't say the immediate future. As to the advisability of a resolution here, I think I would rather not express an opinion.

DR. HUNSAKER: Being free and a Bolshevik, I will say something Professor Gregg will neither confirm nor deny. I think this matter of getting from the American side reports from ships at sea will depend entirely on whether the budget will permit the Weather Bureau to do it. To that end, any resolution does no harm. It might do some good. It is purely a matter of appropriation of the budget officer. The thing as proposed is going to be up in Congress this winter. It is more important to the Europeans because the weather that may be over the Atlantic is going to be over them tomorrow. It is not so important to our general public. We have had our weather. It is going to sea and we are glad to be done with it.

H. W. FORSTER (Philadelphia, Pa.): I speak not as an aviation man, because I am sorry to say I am not that, but for many years I sat on the Executive Board of the National Safety Council. I thought I might tell you how this perhaps might best be phrased. We should be delighted to have a resolution to set forth what is needed and might be had. If you could give the Executive Com-

mittee a little background of the why and the importance, they will be in an excellent position to pass on it, because they don't have the background that this group has. Be sure to have the formal resolution that this group may endorse carry with it an explanation of the why of it.

CHAIRMAN MOFFETT: Is there any further discussion on Dr. Hunsaker's paper or Dr. Hingsburg's?

CAPTAIN HINGSBURG: I would like to hear from Dr. Hunsaker his reaction to the proposed plan, slightly different than was referred to in his paper.

DR. HUNSAKER: I think it is grand. More strength to you. It is in line with getting an adequate communication service going. It is very hopeful and forward looking. It seems designed on a basis which will serve an increasing number of airplanes. The thing to avoid always is to get the communication service that will break down the traffic situation. I think your system is free from that possible danger.

CHAIRMAN MOFFETT: Is there any further discussion?

C. G. ANDRUS (U. S. Weather Bureau, Hadley Airport, New Brunswick, N. J.): One feature of the two-way communication, I hope, that will be very helpful to us in the Weather Bureau at the terminal airports, will be our ability to then get in touch with what the aviator is meeting up aloft. Whatever system we now have in its completeness is after all but more or less on the ground contour. We cover the ground pretty well; by means of small balloons we covered a certain amount of conditions aloft.

Frequently the pilot is in conditions, the worst of which are ice forming, upon which we would like to get some information. At the present time we do not get it until he is down. Pilots may take off in the meantime and run into that condition. We have no way whatever at the present time except by theoretical measurements of determining what the conditions are. We look forward to a chance to tap not only the ground, but conditions aloft along the line of flight.

Another feature is while all directive means of guiding airplanes across airways are 97 per cent (at times) effective, and a matter of great safety, there is at least one weather condition which is not a matter of navigational obstruction, but is rather a matter of flight obstruction. Of course, it vitiates any directive guidance or any other means of directing the pilot along the line of flight. That condition is a formation of ice barnacles on ships. We face during the next six months at Hadley Field the biggest program we have the whole year of getting ships through ice. Ice has no effect, whatever, upon the directing of the aircraft. It does, however, frequently stop flight in a short time; oftentimes it is as little as ten minutes, and we are anxious to get some means to determine what those conditions which make ice are, when they exist, where they are, so that we may avoid them, and by all means have the most complete information about them.

JOHN STOCKMAN (Philadelphia, Pa.): I would like to ask, what is the present radio range, that is, the meter range for aircraft?

DR. HINGSBURG: Between 900 and 1,050 meters.

MR. STOCKMAN: Is it the same range as projected into other work of Dr. Hunsaker?

DR. HINGSBURG: Let Dr. Hunsaker answer that.

MR. STOCKMAN: I wanted to find out what the present meter range of the radio is that you expect to use, the radio wave length.

DR. HINGSBURG: I think the international congress has fixed 850 and 1,050 for both beacon and broadcast service and my idea is, looking at the future two-way communication will probably be on an entirely different frequency band, shorter down below the broadcasting range, and not to interfere with the public service given by the government to all users of the airway.

MR. STOCKMAN: Is there any way that can be changed without going into a lot of international complications for inter-country use here in the United States so they can use a different wave length for aircraft?

DR. HUNSAKER: Different from what?

MR. STOCKMAN: From the 800 to 1,000.

DR. HUNSAKER: The international congress agreed on all of the frequencies assigned to mobile operation, meaning ships also, a whole string of frequencies we would share with ships.

MR. STOCKMAN: Would it get down to less than the 100 meter class?

DR. HUNSAKER: Yes. I think Mr. Hooper has published a warning against going down much below 100 meters for radio service that is designed with an element of safety in it, that you may communicate or may not, especially for these fellows crossing the Atlantic. If they communicate on short wave, no ships will be able to talk to them.

MR. STOCKMAN: I asked for a projected system.

DR. HUNSAKER: Of course, you are concerned with the skip system. If you are trying to communicate with a specific point near you, you may miss it and get something you have no interest in.

Discussion of Dr. Hunsaker's Paper

By CAPTAIN S. C. HOOPER

Director of Naval Communications, U. S. Navy, Washington, D. C.

In connection with "Long Flights," consider international flights. The Government, it is believed, should provide all possible practical aids for international flights, as is now provided for international shipping. For long flights within the United States, the corporations interested in aviation, it is believed should provide all possible practical aids along their routes, although the Government should encourage such commercial enterprises by permitting use of such facilities as the Government possesses due to its own aviation establishments, including facilities, wherever practicable, of the Army, Navy and Marine corps, Postoffice and Commerce Departments, especially radio weather report facilities. The railroads provide necessary aids for safety's sake along their own lines, and similarly commercial aircraft corporations should provide most of the necessary aids along their own routes.

Long flights, whether international or national in character, should not be permitted, without efficient two-way radio communication facilities. It is presumed that there will be international agreements in this matter. The International Radio Telegraph Convention, Washington, 1927, states in part (Art. 18) "2. Every station installed on board a vessel or an aircraft following a maritime route, such vessel or aircraft being compulsorily equipped with radio apparatus in accordance with an international agreement, must be able to send and receive on a wave of 500 kcs. (600 m.) Type A2 or B. Aircraft stations must be able to send and receive the wave of 333 kcs. (900 m.) Types A2 or A3 (or B subject to the provisions of paragraph 1 above)." It is believed that this provision should be applicable to all aircraft operating over 100 miles off the coast, and that radio telegraph should be used rather than radio telephone for reasons which will be mentioned later herein.

In connection with "Short Range Forecasts," it might be mentioned that the Navy already cooperates with the Weather Bureau both in reporting data to the Bureau and in disseminating weather forecasts and warnings by radio. It is known that such weather forecasts and warnings are copied and used by many commercial activities besides various Government establishments.

Under "Point-to-Point Service" the telephone or printer service would no doubt be an ideal system, for reasons indicated in Doctor Hunsaker's paper, to tie in the various fields along a given airway.

In connection with "Radio Service," it should be kept in mind that the use of radio telephone and radio telegraph will be steadily increasing with increased interference resulting. To keep the air comparatively free of interference, maximum use should be made of landline and wire telephone services in the exchange of weather information and for aircraft movement reports.

I concur in the opinion that telephone broadcast from airdromes should be used in supplying information to small commercial and private aircraft. Radio telegraphy should, however, be used by large commercial planes. The mechanic attached to such a plane might well be required to be a qualified radio telegrapher and have sufficient knowledge of flying to relieve the pilot occasionally at the controls, when not engaged in radio or engine duties. It is believed that a great many mechanics and pilots could be qualified as radio operators with training during spare time during a comparatively short period.

While radio telephony appears in some ways to be superior to radio telegraphy for two-way communication between planes and ground, there are excellent reasons for more general use of radio telegraphy. Radio channels in the air are limited in number and the demand for the available channels is great. Radio telegraphy permits more channels to be used and is subject to less interference than radio telephony. Considering the distance to be covered, the radio telegraph set weighs less than the radio telephone set, a vital consideration in many types of planes.

While considering the matter of radio channels, it might be well for those concerned to study the situation, in order to determine the number of radio channels which will be required by aircraft operations. It is believed that action might well be inaugurated now to have a sufficient number of frequencies reserved for commercial aircraft use.

Considering "Goniometry," if planes are equipped to receive intermediate frequency radiotelegraph, they should likewise have a compass coil, if practicable for use as a homing device (direction finder). This equipment makes available to aircraft all existing nondirective radio beacons and radio transmitters, including broadcasting stations.

Radio beacons are considered satisfactory for a given airway but are unsuitable in case aircraft is forced off course by bad weather. In such a case radio compasses on ground or plane will be essential. And if the radiocompass is on ground two-way communication is necessary.

Despite the use of very sensitive altimeters, radiocompasses, neon boundary lights, etc., it is believed that the only safe method of landing aircraft when fog prevails is to avoid the fog. This may be accomplished by having a number of terminal fields. The pilot may then, after fixing his position with the aid of radiocompass bearings, be directed to proceed to one of the other terminal fields where impenetrable fog is known not to exist. For example, if fog is prevalent at all of the fields on Long Island, the pilot could be ordered into a field on Staten Island, upper New Jersey, or lower New Jersey (assuming he has sufficient fuel) whichever field had been reported by landline or telephone as "clear."

CHAIRMAN MOFFETT: I know I express the feeling of every one here present, in saying we are grateful to Dr. Hunsaker, Captain Hingsburg, Professor Gregg and others. We are very much pleased to know what the Weather Bureau is doing. I myself didn't know what the extent of it was for communication and, therefore, for safety. I quite agree with Mr. Andrus that in all we do we want to be very careful that the man in the air is completely and thoroughly consulted because he is the one who can tell us where it will work practically. My own

experience is that it is extremely important to have the operating personnel, the aviators, completely intermingled with the material part, not only information bearing on safety. I think with so many more people on the ground it is very important for us all to keep in mind that the aviator is the man we all are working to make safe.

The next paper for consideration is "Instrument Navigation and Fog Flying," by a distinguished officer of the Army Air Corps. I have a great deal of pleasure in introducing him. I don't think he needs an introduction from me. We all know the great work he has accomplished and the credit he brought to the country. I have great honor in introducing to you Lieut. A. F. Hegenberger, of the Army Air Corps.

Navigation Instruments and Fog Flying

By **ALBERT F. HEGENBERGER**

First Lieutenant, U. S. Army Air Corps, Wright Field, Dayton, Ohio

One of the most pertinent factors affecting the progress in commercial aviation is fog.

Fog, even though conditional on a relatively quiet state of the atmosphere, causes interruptions and at times complete stoppage of transportation just as effectively as the most violent storm. Even a light fog slows up railroad traffic and other public carriers, while a really heavy fog plays havoc with shipping and is capable of bringing it to a complete standstill.

This latter condition applies to road traffic as well.

The hazard of fog lies in the reduced visibility it creates. Since visibility plays a far more important role in aviation than in any other mode of transportation, it is in this field that its greatest menace lies. Trains and shipping can stop when low visibility reaches the danger point—the airplane cannot. The stability and control of the steamship or train depend in no way on vision. In the case of the airplane, however, the maintenance of straight and level flight normally depends on using the horizon, ground, sky or sun as reference. Without one of these visible references and since the pilot's flying sense is inadequate, recourse must be had to appropriate mechanical senses in the form of instruments. And without these artificial aids no one can fly efficiently in total darkness for any length of time. Moreover, until a pilot can fly in a blank void for hours looking at his instruments and nothing else, he is not a safe pilot to trust passengers or mail to.

Last but not least a pilot flying blind must have immense faith in his instruments and this he attains only by long, arduous training. An airplane with perfect inherent stability would, of course, require additional control only to the extent of maintaining a given course and altitude. The numerous requirements which must be provided for in the design of airplanes preclude, however, the possibility of providing perfect inherent stability. Particularly is this so in regard to the change in longitudinal stability with power on and power off. Yet another detrimental factor to control is that a bank caused by a "bump" commonly introduces yaw and vice versa. As a result of all of this we have created the "Blind" Flying Problem.

Blind flying is a comparatively new angle to the flying game and was principally developed and brought to its present stage of perfection in our country. Incidentally I may say that ignorance of this phase of flying was probably the predominant cause of the many sad failures during the past year or two.

The operation of an airway on schedule when fog prevails along the route produces a condition for the pilot equivalent to flying blindfolded. A pilot as a rule makes every effort to avoid fog and to maintain visual contact with the ground.

Over flat country devoid of high obstacles the practice is often followed of flying very low and in sight of visible landmarks.

Experience has taught us that this practice is not safe in hilly or mountainous country and here a pilot generally flies through the fog at a height sufficient to clear any obstacle, trusting that a break will occur before reaching his destination. It is under these conditions that the pilot's remaining senses must be supplemented by mechanical senses in the form of instruments that will make it possible for him to create a mental image of his position with respect to the ground.

Still, at times, the question is asked "Why isn't the pilot's flying sense sufficient for holding a straight and level course?" And reference is made to numerous

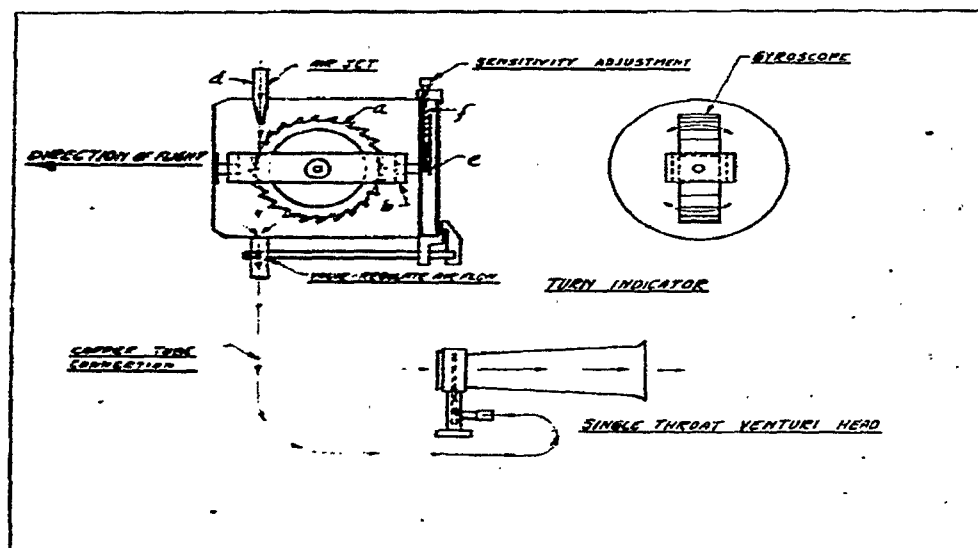


Figure 1.

instances during the war and before instrument aides were perfected when pilots flew through clouds. The answer to this question is that use was made of such inherent stability and excess power as the airplane possessed. In short the airplane flew the pilot rather than the reverse. Then, too, the period of "blind" flying was generally a matter of but a few minutes although to the pilot under tension it undoubtedly seemed much longer. It should also be recalled that at that time there were many disasters due to cloud and fog flying.

Although it is beyond the scope of this paper to enter into a detailed discussion of the physiological aspects of "blind" piloting, some reference must be made to the more important physical factors which give rise to problem in order to better understand it.

Flying sense is essentially an acquired coordination of the senses of sight, muscle, and inner ear. The predominant part played by sight is well known. It is evident that an airplane can be kept correctly orientated by visual reference to the sky, horizon or ground. Further, one's position can be located and direction determined by the identification of distinctive landmarks on the map. The installation of beacons and the marking of towns and airdromes carry this system further.

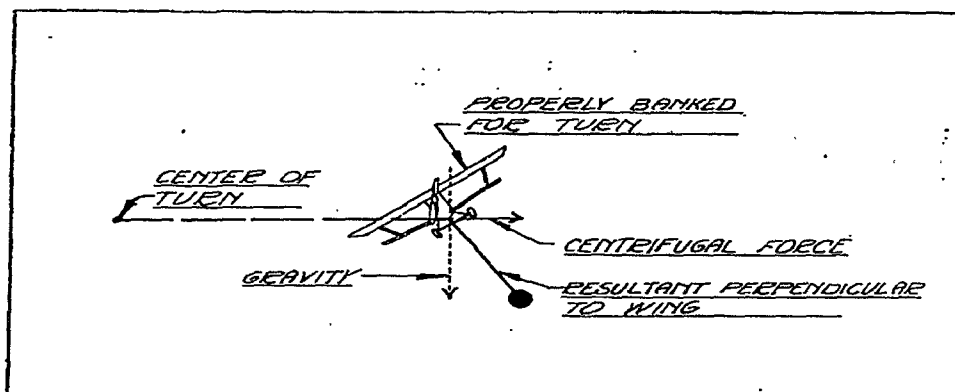


Figure 2.

The judging of height for landing is accomplished by the powers of depth perception of the eye. In fact with unimpeded sight the other senses are not a necessity but merely assist in the quality of the flying.

The muscle or sixth sense is defined as that sense by which we perform coordinated acts, unconsciously and automatically. Through its aid one assumes the correct posture. It is the "seat" sense of the air man.

The inner ear sense is stimulated into action by body motion. This sense in conjunction with the muscle sense is adequate for maintaining equilibrium in the usual motions performed in contact with the earth, where gravity is the sole or predominant force to which our bodies are responsive.

The ordinary vibrations and stress in flight greatly impair the efficiency of these two senses. Centrifugal and other large accelerating forces which cannot be distinguished from the force of gravity produce false re-actions, as to exactly what is taking place. Much valuable data concerning the foregoing phenomena have been secured by Capt. David A. Myers, Flight Surgeon, Crissy Field, San Francisco, and published in a recent issue of the Air Corps News Letter.

It is evident, therefore, that some means must be provided that will correctly

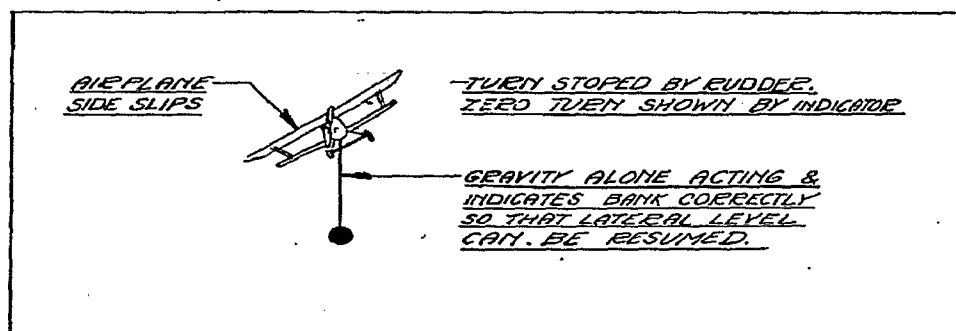


Figure 3.

indicate to the eye the attitude of the airplane with respect to the ground. While the brain can interpret, by experience, any arbitrary method of indication, it is nevertheless desirable that the method be as natural as possible in order that the position of the airplane with respect to the earth can be readily visualized. Such a device, it will be seen, must indicate motion about all three axes of the airplane.

Flight Indicator

During the summer of 1918 the Army Air Service embarked on the development of the gyroscopic turn indicator which is part of the present 3 component Flight Indicator. The turn indicator used for indicating turning about the vertical axis, makes use of the well known gyroscopic principle of precession viz. if a force is applied to change the plane of rotation of the spinning wheel it will tend to move

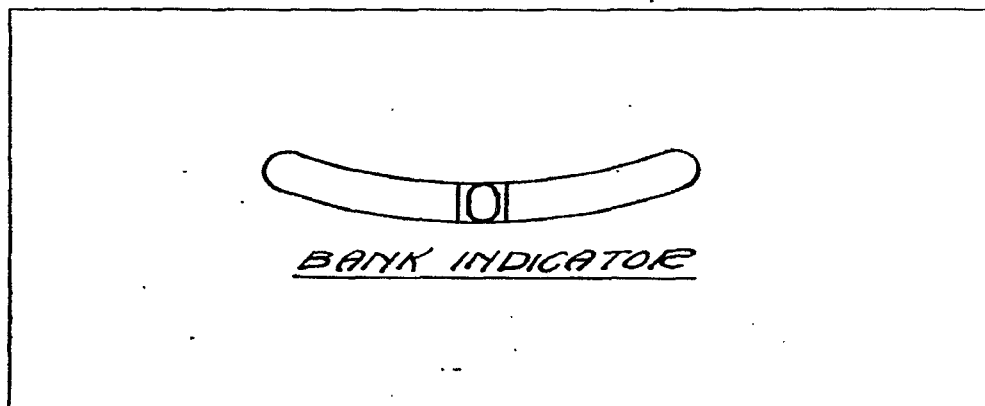


Figure 4.

in a direction at right angles to the applied force. As this instrument is now well known it will be dismissed with a reference to the diagram in *Figure 1* with the brief description.

Bank Indicators

Any device, such as a pendulum or spirit level, actuated by gravity will, of course, respond likewise to any other force as for example the centrifugal force. When two or more forces are acting such a device will indicate the direction of the resultant of these forces. *Figures 2* and *3* illustrate how a pendulum would remain perpendicular to the plane of the wings indicating a properly banked turn. In order to be applicable for maintaining level flight it must be used in conjunction with the turn indicator. In practice after straightening out the turn with the rudder, the pendulum assumes the direction of gravity permitting the airplane to be leveled laterally. The standard flight indicator actually utilizes a bank indicator shown in *Figure 4* which is simpler and more compact than a pendulum and indicates more naturally than the air bubble spirit level.

The airspeed indicator has been rather generally used as a longitudinal inclinometer. When such characteristics of the airplane as the best cruising speed, best climbing speed, and best gliding speed are known, the air speed indicator is usually very useful. There is some objection to it because of the slight lag which tends

to produce a little over-control. A greater objection, however, to the use of the air speed indicator as a fore-and-aft inclinometer, arises from the liability of the air speed head to become clogged with moisture, snow or ice at a critical time.

The indication of a gravity actuated device e.g. a pendulum, cannot correctly indicate the pitching of the airplane. The forces to which the pendulum would respond to are shown diagrammatically in *Figure 5*. A properly damped short period pendulum might be useful under certain conditions in that it would not keep in step with a slow undulating pitch. Since an airplane in flight is subject to oscillations over a wide range of frequency such a simple device would be unreliable. The operation of the gyro-controlled pendulum used in the standard flight indicator is shown diagrammatically and described in *Figure 6*.

While the information furnished by the flight indicator is adequate for main-

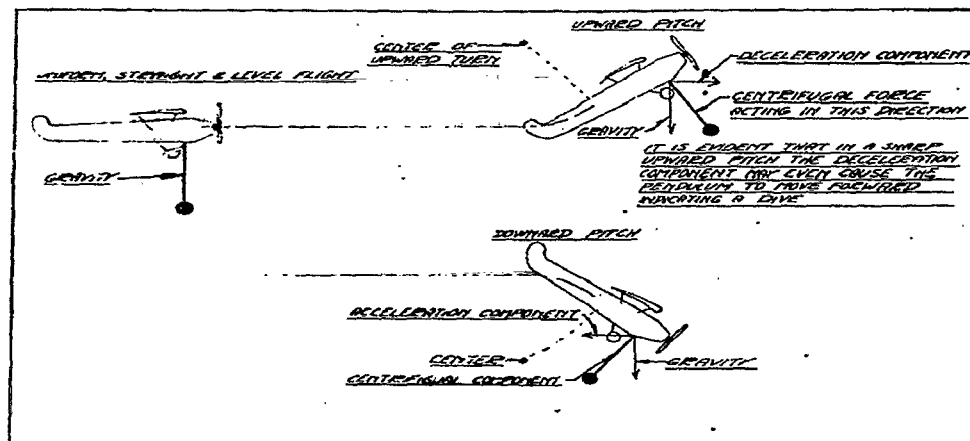


Figure 5.

taining straight and level flight, the indications are somewhat arbitrary and possibly not as natural as an accurate artificial horizon or vertical keeper. Efforts are being made to develop means for accomplishing the latter purpose.

Maintaining Direction

The pilot plunging through fog must not only maintain control of his airplane but must hold it on its course to its destination. The recently developed radio beacon offers the best solution for this problem. A compass alone would not, of course, be adequate for this purpose on account of the drift. As yet no device has been developed for measuring drift when out of sight of the ground. The compass is a valuable adjunct to flying along a radio beacon as it provides means for keeping a certain heading that will preclude frequent excursions out of the equi-signal zone. While static is rare in fog, nevertheless there have been conditions of static encountered which would render the oral beacon useless. (See Proceedings of the Institute of Radio Engineers, Vol. 16, No. 9, Sept., 1928, for description.) In this case an approximation of the drift based on previous meteorological data coupled with the use of the compass offers the best solution.

It is expected that the vibrating reed indicator of the Bureau of Standards two-frequency beacon will not respond to static impulses. (See Bureau of Standards

report "Aircraft Radio Beacon Development" by the Bureau of Standards, April 15, 1928.)

Localization of Airdrome

Assuming the pilot is approaching the airport in fog along the radio beacon and at a safe altitude. Now the position of the airdrome with respect to his own is his first concern. At a short distance out the marker beacon indicates that he is, say about three miles from the field. What happens from this point on is a matter of conjecture, for our practical experience has not been extensive enough to lay

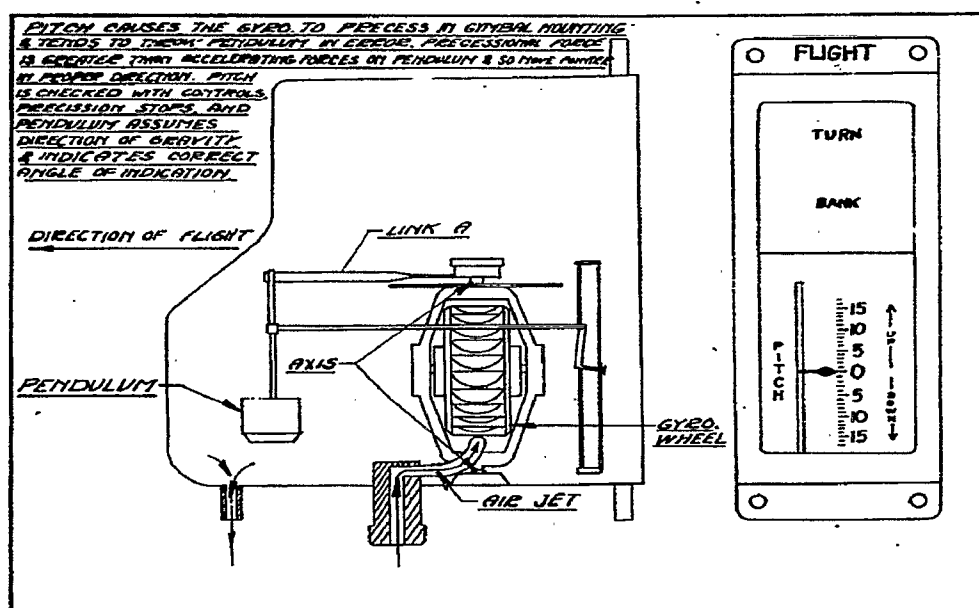


Figure 6.

down a hard and fast rule. Let us analyze the problem in the light of our experience to date until further flight tests have given us more definite knowledge.

The degree of visibility will determine the kind of equipment and methods necessary. There are few fogs with a ground visibility of less than half a mile, but to the pilot at 200 to 500 feet coming in to land it is almost zero. With such low visibility it seems as if the speed of rushing through the fog gives it an enhanced opaqueness. The flash of the small patch of ground beneath is hardly discernible but will aid the pilot in landing when the airdrome is reached. His immediate concern, however, is, whether or not his path is free from obstacles and whether or not he really is heading for the airport. If he can identify something definite in the fleeting ground pattern below him, his problem is practically solved. Successful landings under conditions as described have been made by skilful pilots, although it never will be considered good policy to subject air passengers to the hazards of a situation where some unforeseen factor or some slight error in judgment on the part of the pilot might invite disaster.

Theoretically the radio beacon will guide the airplane exactly to the antennae mast, adjacent to the airport. Due to the extreme narrowness of the equi-signal and adjacent zones in the immediate vicinity of the antennae it may be easy under conditions of extremely low visibility to deviate and fly through a number of zones thus producing a confusion of sounds.

Under such conditions, it is expected, that the leader cable will prove useful, figuratively speaking, it will take the pilot by the hand and lead him through the gate.

Altitude Determination

Before the pilot has descended sufficiently to see the ground he must know his actual distance or "tape line altitude" above the ground. This is necessary first for the purpose of clearing obstacles during level flight and second when the airplane is at a definite distance from the landing field it is essential that the actual altitude be known in order that the proper angle of glide will bring the airplane to the landing spot. Excess altitude would result in either excess speed or overshooting the field.

Definite distances from the airdrome can be indicated by marked cables at right angles to the main leader cable. The latter may consist of either a large and small loop as in the English system or of a number of lines radiating from the airdrome in the different directions.

By means of a characteristic signal the pilot will know the proper altitude over each point.

The present service altimeter because of its lag and other errors and cramped scale can be considered undependable for altitudes lower than several hundred feet. A sensitive open-scale precision altimeter equipped with an auxiliary barometric scale offers a decided improvement. In practice the barometric reading at the airdrome would be received by radio and the auxiliary scale set accordingly. In event that communication is interrupted a very close approximation could be made from previous study of the weather map.

To date the dependable range of the capacity altimeter has not exceeded 50 or 100 feet, a range so short that its usefulness at present is quite limited.

Tests to date indicate that there are possibilities in the altitude determination by the reflection of short radio waves e.g. around 10 meters. This method depends on the fact that when the airplane's height is an exact multiple of the wave length, the energy of the reflected wave is added to that of the projected wave. When a half wave-length out of phase a minimum would be indicated. The plate millimeter of the oscillatory circuit of a tuned receiver will show these oscillations for every half wave length change of height and the amplitude of the swing of the needle will be proportional to the height. An improved method of indicating which is easily calibrated is desirable.

Fog Penetration

It is of utmost importance that the pilot have the use of his eyes to as great an extent as possible rather than interpret the indication of some translating device. Given sufficient degree of direct vision the pilot will not need the aid of other devices. Assuming the existence of suitable lights capable of penetrating the fog sufficiently the problem of localizing the field and landing would be practically eliminated.

Of the entire range of the electro-magnetic spectrum the radio waves have the greatest penetration. On the other end of the spectrum the X-rays do not penetrate but a few inches beyond the vacuum tube. Fog scatters and absorbs very effectively all wave-lengths within the visible spectrum as is evidenced by the masking of the sun during fog. The greatest transmission obtained to date within the visible band is around 0.53 to 0.59, that is in the yellow.

The transmission decreases more rapidly toward the red than toward the ultra-violet. This is rather unusual as one would expect less scattering of the longer wave-lengths. The water particles in a dense fog are generally of the order of 10μ diameter which explains the absorption of wave lengths from the short infra-red down through the visible spectrum. The band of wave-lengths, between the long infra-red and the ultra-short radio waves appears as worth investigating. In fact the importance of the problem warrants a thorough analysis of a wide range of wave-lengths in search of a band to which fog is transparent. Two outstanding difficulties present themselves in connection with frequencies outside the visible spectrum viz. that of obtaining a sufficiently powerful source for the emission of the wave and second a type of receiver that is selectively sensitive and rugged enough for airplane use. This would, of course, eliminate such detectors as bolometers, thermo-couples, and the radio-micrometer. The ultra-violet waves possess the advantage that an intensive source such as the mercury arc and a suitable receiver such as the fluorescent screen already exist. It is suggested that depth perception might be obtained by the use of quartz binoculars. Further work needs to be done on the measurement of the penetration of ultra-violet waves.

The development of a sufficiently powerful source of ultra-short radio waves, 10 cm. or below, would open up a promising field of endeavor.

The suggestion has been made that advantage could be taken of a receiving reflector for their reception because of their directional property. High powered flood lights are, of course, scattered so that illuminated fog appears as an impenetrable wall before the pilot's eyes.

The possibility of filtering flood lights to produce monochromatic light for purpose of penetration remains to be investigated.

In fogs that are predominantly of smoke origin, the neon light appears to have greater penetration than white light. The long red wave-length are less scattered by the smoke particles, which average in diameter of $.5\mu$, than are the shorter visible wave-lengths.

Neon apparently does not excel white light in the penetration of water fog but is of advantage due to its distinctive color.

Conclusions on Fog Landing

The difficulties of fog landing vary through a wide range from the light fog with several miles of visibility, which is not serious, to dense fog with less than 200 yards. The latter case occurring at night would represent the worst extreme. At this stage of development it is impossible to define what part each of the suggested means will play in final practice. Until the limitations and degree of usefulness of each means are determined, it will be impossible to know where the function of each overlaps and possibly which can be eliminated. It is hoped that the final solution for the worst conditions must be simpler, than at present appears possible, or else the operation of the airplane may have to be divided between two pilots much the same as a dirigible.

Fog Dispersion

Fog dispersion does not appear capable of an early solution. The electrical method consisting of shooting charged particles (either hygroscopic or water) into the air has failed to date because of the small volume affected.

From calculations, the method of drawing cold dry air from above the fog, appears too costly.

Artificial warming has cleared areas up to 200 yards diameter but it remains to be seen if the scale effect will not defeat this procedure also. Sir Napier Shaw has calculated theoretically that 13 tons of coal per hour would be required to raise the temperature over an area 400 yards square with a fog 50 feet thick

drifting 2 miles per hour. In practice probably four or five times as much would be required due to dissipation in all directions.

Radio communication is essential for the interchange of vital information between the ground and the airplane.

Loss of Control Prevention

Such aerodynamical devices as slotted wings are steps toward eliminating some of the greatest hazards, as for example, loss of control at stalling speeds. Automatic control, full or partial, by relieving the pilot of part of his numerous duties should add materially to the solution of the fog landing problem.

Experimental Fog Flying Airplane

Early experiments in fog landing should be conducted under as safe conditions as can be anticipated. The following requirements for an experimental fog flying airplane are suggested:

1. Slow landing (about 25 or 30 mph.).
2. Stable at stalling speeds.
3. Controllable at stalling speeds.
4. Safe in a crash (special padding, bracing, etc.).

A step toward obtaining suitable airplanes for fog landing, as well as for general service, has been taken in the form of a Safe Airplane Competition inaugurated by the Guggenheim Foundation for the advancement of Aeronautics.

CHAIRMAN MOFFETT: Gentlemen, I know you have heard Lieut. Hegenberger with a deep interest and appreciation of what he said. He is one of the greatest authorities on flying, not alone in this country, but the entire world. We can feel that what we have heard from him is about the last word on the subject from a practical standpoint of the man of the air, as well as the man on the ground. I will be very glad now to hear some discussion or questions on the subject.

LIEUT. C. R. BROWN (Bureau of Aeronautics, Washington, D. C.): Mr. Chairman, I have been asked to read this paper prepared by Lieut. Lonnquest of the Navy Department. It was just handed to me.

Instrument Navigation and Fog Flying

By **LIEUTENANT T. C. LONNQUEST**
United States Navy

Aircraft navigation, having passed through a phase in which the airworthiness of the plane was the principal consideration, is now entering a phase in which the ability to make use of this airworthiness under all conditions of weather, in daylight and darkness, is of paramount importance. Aircraft cannot aspire to a position of permanent importance in the world of transportation unless they can present some reasonable guarantee of reaching their destinations, independent of weather. A corresponding responsibility rests with military and naval aircraft. Aircraft cannot properly assume an increasingly important role in national defense unless they can demonstrate that the weather causes no greater reduction in their effectiveness, than the corresponding handicap which bad weather imposes upon other arms. Aviation, both commercial and military, must display the "Business-as-usual" pennant, 24 hours a day, every day. Instrument aids will be of primary assistance toward this end.

Just as commercial and military aviation are partners in the problem of operating during conditions of fog, storm and darkness, so, too, in the development of instrument aids, their problems are practically identical. This is in considerable

contrast to some other contacts between commercial and military aviation; notably, in the design of the airplane itself, where the difference in employment has led to the development of totally dissimilar types. In the solution of the problems associated with the instrument equipment of service type airplanes, practically every instrument perfected through the assistance of the Army and Navy is directly useful to commercial flying, and likewise every instrument developed through commercial operations may constitute a contribution to national defense. In this connection, it is not without significance, that the rather elaborate instrument equipment of military and naval aircraft has successfully withstood the searching scrutiny which service planes must undergo for the purpose of eliminating every unnecessary item. Instrument equipment may be considered to have justified itself in the eyes of service personnel, even in high performance planes, where weight and space are at a premium.

There are available today modern aircraft instruments of domestic design and manufacture of such excellence from the viewpoint of accuracy, reliability, ruggedness, and precision of workmanship as to constitute triumphs of the instrument maker's art. Tremendous progress has been made in instrument engineering during the last decade. However, the fact that the difficulties of blind flying and blind position finding are so great as to prevent, frequently, the utilization of the full capabilities of modern airplanes under all conditions, except by acceptance of prohibitive risks, suggests that the development of additional instrument aids is urgently needed.

Among these new devices the need for at least three instruments stands out rather conspicuously. First, possibly, is the ground speed and drift indicator—a device which would at all times indicate the true ground speed and track of the plane without the necessity of seeing the ground. Another instrument which suggests itself is a non-barometric altimeter of sufficient accuracy, reliability and openness of scale to permit a safe landing to be effected by its use. And finally, the development of a non-magnetic compass, operative under the severe vibrations and accelerations characteristic of aircraft, and uninfluenced by the presence of magnetic material, would be a valuable contribution to blind flying.

The subject of safe flying in foul weather can hardly be dismissed without mention of one element somewhat remote from the subject of instruments, and that is, the degree of stability of the aircraft itself. The problem of making a safe passage through fog is greatly simplified by the employment of an airplane with a high degree of inherent stability. If I may be pardoned a personal anecdote, this subject was very impressively demonstrated to me a considerable time ago.

In connection with some experimental work I had occasion to make a flight in a commercial cabin plane—my first experience in a totally enclosed airplane. From the start, nothing seemed exactly right. The pilot, wearing a straw hat and smoking a cigar, flew along, comfortably at ease. Four passengers and fuel for three hours constituted the additional load for the 220 H.P. engine. There was no turn and bank indicator and the air speed indicator, when it indicated anything, persisted in sweeping around through a full circle, backwards. When we started up through a heavy cloud ceiling my feelings were those of deepest dismay, to express it mildly. Visions of a spin, followed by an immediate excursion of all the passengers from their un-safety-belted chairs into the pilot's lap, predominated in my thoughts.

Eventually we staggered through two or three thousand feet of clouds and out into the sunshine. When we returned to the field and I had worked the cramps

out of my fingers, I ventured to remark to the pilot that he had done a nice piece of work in getting through the heavy cloud layer without instruments.

"Oh," he replied, "in the clouds. I just turn everything loose and give her a little more gun and let her fly herself through!"

While this scheme can hardly be recommended as standard procedure for all cases, the degree of stability of the plane is undoubtedly an element of high importance in fog flying.

LIEUT. O. P. ECHOLS (Wright Field, Dayton, Ohio): I was asked to read a short memorandum written by Captain Ocker of the Army Air Corps, which I think is of interest in connection with fog flying. It is a comment on a paper on this subject.

Memorandum

By CAPTAIN OCHER

Army Air Corps, Crissy Field, San Francisco

I do not believe that any one thing will enable us to fly safely in fog, but that it will be a combination of things. The first necessity is a course in blind flying before a pilot is given his license. This course should consist of two phases; first demonstrations in my device together with explanations concerning our reactions. Then when the pilot understands this, practice in blind flying in a dual control machine having one covered cockpit. Then, and not until then, will a stable machine be of any use for, assuming we have an inherently stable machine that will fly if let alone, or if we have an automatic stabilizer to control a machine, how many pilots without the knowledge that my device gives will let these machines alone? I have come to the opinion that possibly one in ten will do so. The others will presume that their machine and instruments have suddenly failed to function properly and will themselves force the plane from its proper attitude into one of danger, not realizing that the instruments which are not functioning properly are the ones in their own head. The delusion of which you speak in your article, has happened to me also. Had the fog extended to within one hundred feet of the water in your case the result of the delusion would probably have been a fatal accident as it has been in many other cases.

General Discussion

LIEUT. ECHOLS: This device is simply a combination of the flag indicator which Lieut. Hegenberger was describing, and the flying chair with which pilots are familiar. He simply takes a pilot, puts him in the chair, puts a hood over his face, turns it to the left and then decelerates still turning to the left, and asks the pilot which way he is turning. Every time the pilot will say he is turning to the right. He mistakes the deceleration for a change in direction. Then he puts the flight indicator under the hood and lets him see by means of the instrument. Most of them, the first time, feel that the instrument is wrong and they are right.

R. P. SMALL (Aviation Financing & Trading Company, Chicago, Ill.): I would like to ask Lieut. Hegenberger if there is at the present time any ground speed indicator if you are in a fog.

LIEUT. HEGENBERGER: There is none. In the several devices that have been made such as the accelerometer, accelerating forces are greater than the force you are trying to measure. As yet there is none.

MR. SMALL: Is there a need for that?

LIEUT. HEGENBERGER: It is one of the outstanding needs.

C. G. ANDRUS (U. S. Weather Bureau, Hadley Airport, New Brunswick, N. J.): May I ask Lieut. Hegenberger whether the hardest time to get down in a fog is the time betwixt dark and daylight? It is our experience that flyers can get down at night pretty nearly without a great deal of difficulty, and often in broad daylight, but there is a period when both types of visual indicator fail. We are badly in need of something like that.

LIEUT. HEGENBERGER: I think that is experienced in both clear weather and fog in landing at twilight, the period between daylight and darkness. That is the hardest time to see.

Comment on the Climb Indicator

CHARLES H. COLVIN (Pioneer Instrument Company, Brooklyn, N. Y.): I would like to compliment Lieut. Hegenberger on the completeness of this statement of the use of instruments in fog flying. He said he got it up in a hurry. I think there is one thing he left out altogether. That is the climb indicator now being used quite extensively for longitudinal control. That is an instrument showing the rate of change of elevation, and while it is being used to some extent as the sole indicator longitudinally, it is also being used for supplementing the flight indicator he has described.

He mentioned also in the air speed indicator, and quite correctly, the fact that it was sometimes unreliable because of the pitot freezing up. I think it would be interesting to add to what he has said that to a limited extent during last winter and much larger extent this winter, the pitot tubes in transport service will be electrically heated so they do not freeze up, and that maintains the air speed indicator in continuous service.

I have one other note, and that is on the altimeter which he mentioned, that its accuracy in the service altimeter is only within several hundred feet. The commercial altimeters which are of lower range than the service altimeters are accurate within very much closer limits. The standard commercial altimeters of 10,000 or 15,000 feet range have a return to zero accuracy of about 25 feet. The altimeters that are made for service up to 30,000 and 40,000 feet necessarily have a more cramped scale and they do have much greater errors, but in commercial flying the low ranges can be used. It is now quite possible to get down with an accuracy within 25 or 50 feet, using a barometer.

Characteristics of the Altimeter

LIEUT. HEGENBERGER: It was an oversight leaving that out. We have been using that in conjunction with the flight indicator and find it very useful. They supplement each other very nicely.

Regarding the error of the altimeter, service type, I had more in mind the overall accuracy that is found in practice in the usual installation, for example, the question of vibration. It is very difficult to eliminate it all. For that reason it is hard to read the scale. Then over a period of years in use you get a falling off in the axis of the altimeter due sometimes to slight corrosion in the mechanism; sometimes the oil becomes gummy up and dust affects it. So, in speaking of the errors in the service altimeter, I had more in mind in service the overall action.

H. J. E. REID (Langley Field, Hampton, Va.): I would like to ask Mr. Colvin whether this electrically heated pitot tube will prevent the clogging of the pitot lines by heavy rain.

MR. COLVIN: The usual pitot installation on transport ships is arranged so the rain can't get up into the lines. Of course, there is the problem of condensation of water in the lines to be overcome, but that is relatively slow; if strained regularly they are kept clear. With a pitot tube installed with sufficient drop from the pitot tube to the line through your connection, you don't get water into the lines.

When the "Los Angeles" Was in Great Peril

LIEUT. C. R. BROWN (Bureau of Aeronautics, Washington, D. C.): Mr. Chairman, there is one thing that doesn't come right in step with this discussion that I was asked to bring up at this meeting, and this is about the most feasible time to bring it up. It is the question of lighting of aircraft, the navigation lights to be carried by aircraft. I might as well bring up the particular point which happened to bring this to a head.

The Navy's rigid ship, the Los Angeles, was traveling over the airways a short time ago and very nearly had a collision with one of the airmail planes. The Los Angeles was well over to the right of her course along the airways, and had all her navigation lights lit. She was therefore conforming to all the rules of the road. That wouldn't have helped her any if that airplane had piled into that big gas bag. There would have been very few people who would have gotten out, probably.

The matter was brought up at that time that we followed surface vessels too closely in navigation lights afforded to aircraft. You have your exhaust flames extending out six inches or more from each exhaust port. You have a lighted instrument panel. You have your metal propellers giving your reflection disc in front of you. You have your goggles with their glasses in them to give a glint. In that way the pilot does not have the visibility at night that a man on a regular surface vessel has. As a person who has gone to sea, I can say it is almost a court martial offense on a bridge for a ship to allow exposed lights to be shown at night. It absolutely blinds you for vision ahead.

At the same time we usually only require aircraft to have two lights. They are going much faster and come together much quicker. Not only that, but the pilot has to watch the mechanics controlling the aircraft at the same time he is doing everything else. On the other side of the question you have the fact that if you increase the lights on the aircraft, you add weight; you are making more light to be reflected against the propeller and you will be blinding the pilot that way. It seems that nobody has worked out a scheme yet. The Department of Commerce requires one thing and the Army another, the Navy another, and international rules require a fourth. It is a problem that ought to be settled with increasing flying at night, and quickly, before some very serious accident results.

Resolution Regarding Budget for the Weather Bureau

CHAIRMAN MOFFETT: If there is no further discussion, I think the only other business before the meeting was Colonel Hartley's proposed resolution. I will read the resolution if it meets with your approval. It is this:

"RESOLVED, That the National Safety Council communicate with the Director of the Bureau of the Budget to the effect that any increase in appropriation for the U. S. Weather Bureau, which will enable that Bureau to obtain more data

from more ships at sea, will be in the interest of greater safety in flying and thereby conducive to the furtherance of America in the air."

(Upon motion regularly made and seconded, it was voted that the resolution be proposed.)

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Medical Aspects

First National Aeronautical Safety Conference

Under Joint Auspices of

*The Daniel Guggenheim Fund for the
Promotion of Aeronautics and the
National Safety Council*

October 4 and 5, 1928

PORTER ADAMS, Chairman

President, National Aeronautical Association, Washington, D. C.

The session on Medical Aspects of Aviation, at the Seventeenth Annual Safety Congress, was called to order at 10:10 o'clock by the Chairman, Porter Adams, President, National Aeronautical Association, Washington, D. C.

CHAIRMAN ADAMS: Gentlemen, we all know one of the newest and most important developments in aviation has been the attitude of aviation companies, particularly commercial companies, on the medical aspects of flying. It is a very great privilege to present to you today Dr. L. H. Bauer, Chief Medical Director of the Aeronautics Branch of the Department of Commerce.

Medical Aspects of Safe Flying

By L. H. BAUER, A.B., M.D.

Medical Director of Aeronautics, U. S. Department of Commerce,
Washington, D. C.

The privilege of addressing this Congress is an honor I greatly appreciate, for the medical aspect of flying is a topic that is too apt to be confined to the discussions of purely medical meetings. Yet it is a subject which should be familiar to the general public and especially everyone closely concerned with flying, and I know of no better place to emphasize its importance than before this Congress.

"Aviation Medicine," as it has come to be universally called, had its origin in the World War. It was found that the ordinary physical examination required for other branches of the Army and Navy did not suffice for those in the flying arm of the service. It has been said numerous times that the British found 60 per cent of their air casualties were due to physical defects of their pilots as against only 2 per cent due to the enemy. The adoption of a more rigid physical selection and constant medical supervision resulted in this figure being reduced in two years from 60 to 12 per cent. It has also been stated that during the war a flyer (if not killed first) was good for only 150 hours over the lines before he became totally "washed out" physically.

During the past ten years a great amount of experience has been added to the war experience and much research has been accomplished. Mistakes have been made and perhaps are still being made, but I think it is no exaggeration to say that accidents from physical causes are a rarity in both our Army and Navy, and are becoming more and more rare in civilian flying.

During the war a foreign flyer went up to try out a new plane against the earnest solicitation of a flight surgeon. The doctor knew he was convalescent from influenza and in a state where his judgment was unreliable, his attention easily distracted, and carelessness prone to develop. He disregarded the advice, however, and was killed. This could hardly happen now. The cases of service flyers with demonstrable serious eye defects who crashed in exactly the same way that the flight surgeons predicted they would crash if allowed to continue flying, could hardly be repeated today. When the physical examination of civilian students became necessary, air accidents caused by students subject to fainting attacks or epileptic convulsions were obviated. In 1927, of civilian air accidents, 75 per cent were in the case of unlicensed pilots and 41 per cent had never been physically examined.

Man has become adapted over centuries of existence to a terrestrial environment. As a result of modern aviation he is subjected to a new and rapidly changing environment and one calling for quick decisions. He calls into play physical factors he did not know he possessed. He travels at terrific speeds and he has to compensate to the diminished oxygen of high altitudes, to intense cold, violent winds, intense glare, and marked disturbances of his equilibrium. He is subjected to conditions which are markedly fatiguing from both physical and nervous standpoints.

Physical standards for pilots are becoming standardized the world over. While methods of testing these differ, the requirements vary but little.

The physical examination of pilots may be divided into four parts each of which we will consider briefly. First let us give attention to the eyes.

Good vision is essential, because the pilot must constantly watch the sky for other planes. He must see the ground and obstructions clearly. Poor vision interferes with his ability to judge distance. When two planes are traveling towards each other at over 100 miles per hour, it does not take long from the time they are first in view of each other, for them to meet. Hence it is essential that the eye pick them up as early as possible. In military flying the eye is even more important. Certain famous war flyers made the following remarks: One said, "Men with poor vision do not come back." Richtofen said, "Only a wonderfully trained, practiced and observant eye can see anything definite when one is traveling at a great height and at a terrific speed. I have good eyes." Another stated, "If you can't see what you are expected to, your vision is of no use; if you don't see clearly, your information is of little value."

The pilot is constantly called on to judge distance, in landing, taking off, and in formation flying. He has to judge his distance from the ground, buildings, trees, telegraph and light poles, and other planes.

Good eye muscle balance is essential because, it, also, is involved in the judgment of distance. Imbalance likewise produces a vicious circle of fatigue, headaches, inattention and carelessness, and the ever present danger of double vision.

Normal visual fields are important because the flyer not only must see straight ahead, but must be able to pick up objects out of the tail of his eye. This is especially important in the combat flyer. Constructed visual fields are also associated with difficulty in night vision.

Color vision is important because the flyer must detect navigating lights on other ships, colored lights on the airdromes, colored signal panels and lights, his map is often printed in colors, and most important of all, the different shades of green and brown indicate to him the character of the terrain and aid him in picking out an emergency landing field. Recently the question has been raised as to whether or

not color vision is an aid in judging distance. In Connecticut two partially color-blind students were said by their instructor to be helpless so far as landing the plane was concerned. Whether or not their color-blindness was the important factor can only be guessed at, but it raises an interesting question for future study.

A certain amount of accommodation is desirable—that is the power to focus from far to near and back again—else the flyer can read neither his map nor instrument board.

The question is frequently asked why, if a pilot's vision is fully corrected with glasses, we reject him if his uncorrected vision falls below a certain standard? The answer is, in a trained, experienced pilot we do not but almost invariably grant him a waiver. In a student we require to begin with, only a little less than half normal vision, which we wish corrected approximately to normal. The wearing of glasses under goggles is not approved for the following reasons. The flyer has to look through two panes of glass. Furthermore, the lenses of glasses are small in comparison with lenses of goggles. So long as he looks straight ahead he has good vision, but if he turns his eyes to one side he has blurred and distorted vision. The grinding of corrections in goggle lenses has been done satisfactorily in a number of cases, but often the results are not satisfactory, particularly with large corrections. Granted that the correction is satisfactory, there are many times when goggles become misted or smeared with oil. If the pilot is about to make a landing and this happens, he tears off his goggles. We feel that the pilot should have enough vision to get his ship back on the ground without his correcting goggles. A man whose vision is so poor that he cannot even see the ground is certainly helpless.

We now come to the ear, nose, and throat. We find that diseased conditions of the nose and throat light up in acute infections under exposure and fatigue. Obstructive conditions interfere with free breathing and also are apt to hasten infections. Hearing is not particularly important but the pilot should be able to hear his mechanic say "contact" and "switch off" or other directions.

Equilibrium may be considered here though it is properly considered under several headings. The eyes, ear, deep muscle and visceral sensations and effects of gravity all play a part in maintaining our equilibrium. Abnormalities of equilibrium, particularly a hypersensitiveness to motion are a hazard to the pilot and such conditions should be eliminated. Sensitivity to motion has a relation to safety other than that pertaining to defects of equilibrium. The work of Ocker and Meyers has proven conclusively that instrument flying under blind conditions of darkness or fog is more reliable than flying according to one's sensations. The reason for this is, that our brain gives us faulty information. For example, after being turned to the right and the turning stopped, one has the sensation (if he cannot see the horizon) of turning to the left. If, therefore, a flyer goes into a spin in a fog and comes out of it, he has the sensation of spinning in the opposite direction. He manipulates the controls to come out of his supposed second spin and, of course, goes into another. He becomes hopelessly confused and crashes. This, probably, accounts for some of the fatalities to the ocean flyers.

The next part of the examination is a general physical examination. This includes looking for structural defects such as would interfere with the handling of the controls of a plane, organic diseases of the heart, lungs, circulation, kidneys, and other viscera. These diseases lower resistance, increase susceptibility to fatigue and render the flyer unreliable from a physical standpoint. It has been found that the flyer who is suffering from any organic disease or convalescent from the same is a danger to himself and others when in the air.

Finally, we come to the nervous system. This is the system of the body subject to the greatest wear and tear. All organic diseases disqualify, such as mental disease, paralysis and epilepsy. Also functional diseases of any consequence should disqualify. The neurotic type of individual does not last long. He also is the type that "freezes onto the stick." Hence, effort is made to eliminate all those whose

past history shows they do not react well to stress of any kind either physical or emotional. The Army has found that a large percentage of the men it has had to ground after selection are so grounded because of defects of the nervous system. When the nervous system is upset, the whole physical mechanism is apt to go wrong.

The standards to be adopted will naturally vary with the types of work to be done. The Army and Navy will have the highest standard because they require their pilots to be fit for any military duty and this causes rejections for defects that have nothing to do with flying. Then, too, they take their pilots more or less for life. Next highest will be the standard for passenger carrying commercial pilots. Then comes the industrial pilot, and finally the private pilot.

It should be clearly understood that when an applicant is physically disqualified, we do not mean to say that he could not learn or continue to fly. We do say, however, that the hazards in his particular case are increased over and above a reasonable amount.

Before taking up the physical requirements of more special situations, let us consider the necessity of periodic physical examinations and the importance of the flight surgeon. Woolford has said, "periodic physical examinations of the nervous system are imperative to detect early evidences of undue strain in order that an interval of rest may be taken and thus permit the nervous system to recover its normal tone. Failure to take this precaution simply means that disaster is courted as the nervous state goes from bad to worse and the pilot's judgment becomes so impaired that eventually he is involved in a serious crash. Periodic physical examination of flyers presents unusual opportunities for the conservation of health and it has been shown that there is a direct relationship between physical fitness and flying.

A pilot would hardly fail to give his ship periodic inspections. The human element in flight is quite as subject to deterioration as the mechanical. Periodic physical examinations are becoming recognized as life-prolonging. Life insurance companies are offering free physical examinations to their policy-holders because they have found that the early detection of defects leads to better chances of cure and a longer life. The same applies to aviation.

Already in the Department of Commerce we have found a number of cases in which the physical condition of the pilots had fallen off considerably in six months. In a few cases the change was so marked as to cause a new flight test to be required. One large transport company has already instituted the procedure of having its pilots checked once a month by a flight surgeon. This does not mean a complete physical examination but a check for "staleness." The results obtained in the Army and Navy from the constant medical supervision of pilots has been so satisfactory and the spirit of coöperation between the pilots and flight surgeons so excellent that I predict the day will come when all large transport companies will have their own flight surgeons to supervise the health of their flyers. One crash prevented will save lives, and also thousands of dollars worth of equipment. It will be a worth-while investment.

Not only can flight surgeons be trained to make the physical examinations of pilots, but their further knowledge of aviation medicine and flying itself can keep flyers fit to fly and reduce the number of accidents.

Flying is attended by a severe stress and strain on the physical and nervous mechanism. Too much flying day after day, too much dissipation, lack of physical exercise all contribute to produce a condition known as "air-staleness," or "aero-neurosis." This condition is evidenced by irritability, loss of interest, occupational dreams, insomnia, fear of the air, a falling off in flying ability, and certain physical symptoms. If this condition be detected in its incipency, the case can be cured. If it is let go till it is severe, recovery is slow and frequently impossible. Here is where the trained flight surgeon is invaluable.

The Army has found that the incidence of so-called "staleness" is approximately 33 times as great among Air Corps Officers as among officers of the rest of the Army. This certainly shows the flying personnel is subject to a stress that does not affect those in non-flying occupations. Transport companies must realize that too much flying decreases the efficiency and lasting abilities of the pilot. Pilots must realize this and also realize the importance of rest and exercise if they expect to keep in flying trim. The pilot must realize that because he receives a physical certificate today is no guarantee that he will be physically fit to fly every day for the next six months. He must learn that minor ailments may be serious in the air, that consulting a flight surgeon is only good insurance and that minor things taken care of now may prevent serious conditions developing later. In the civilian field the efficiency of medical supervision after the original selection depends largely on the cooperation of the industry and the pilots themselves. Sound physical condition is more important in flying than in any other occupation.

We now come to some of the more special features of flying in which the medical service may be of help. High altitude flying concerns civilian pilots but little as a rule. It is of deep concern to war-time pilots for combat work is carried out at very high altitudes. It has been found that not all individuals react equally well to high altitude. If the day ever comes when we have a 100 per cent efficient oxygen apparatus this fact will be of less significance. At present, however, high flying should be done by those best fitted to withstand it. A classification of pilots should be made and they should be restricted to the altitudes at which they are most efficient. Here again, the classification is only in the interest of efficiency. I have heard more than one pilot boast as follows: "I took the altitude test and they limited me to 15,000 feet. I went out, got a ship, and climbed to 18,000 feet without difficulty." Naturally, he could. He misunderstood the purpose of the test. The classification means, not that the restricted pilot will drop dead if he crosses the line, but only that he will not do efficient work and that his physical makeup will be under too severe a strain at high altitudes to warrant his flying repeatedly over the limit set for him.

There is one other feature of altitude that should interest those who contemplate trying to break the altitude record. The ordinary person believes that if he takes oxygen the effects of altitude are nullified, and that is true *up to a certain point*. However, beyond that point, no person may go and still live even though he is breathing pure oxygen. The reason for this is that man depends for life on a certain pressure of oxygen in his lungs and a certain pressure of carbon dioxide in his blood. When these are absent he dies. Somewhere between 40,000 and 45,000 feet is this critical line. Here the pressure is so low, that even though man is breathing pure oxygen, the pressure of that oxygen is too low to sustain life, and in addition the pressure of carbon dioxide in his blood has been diminished to such an extent that his blood cannot let go of the little oxygen present to his tissues. The effects of oxygen want come on insidiously. The individual is unaware of his flagging efficiency. Unconsciousness supervenes before he is able to do anything about it. Continued high altitude flying is fatiguing. The use of oxygen even at moderate altitudes helps ward off fatigue and above 20,000 feet it is a necessity.

There is one more danger to the flyer and that is high speed. We know too little about it but we do know that flyers have complained of dizziness and faintness on sharp turns at high speed. We know of one instance, where the flyer had hemorrhages into his retinae and probable slight brain injury. Experimental work has shown that speed may cause brain injury sufficient to kill. Straight ahead flying is far less dangerous to the body than making turns at high speed. What the limits will be, I do not believe anyone can say, though I doubt if turns can be made at much greater speeds than 300 miles an hour.

When opportunity permits we shall have valuable statistics to work up at the Department of Commerce with over 14,000 original examinations and over 2,000

re-examinations to draw from. We may as a result find we should revise our standards. We have tried making them more lenient than has ever been done elsewhere. Whether or not this has been wise time will tell. There are many points that need further investigating. Work on color vision and corrected goggles particularly needs to be done. Improvements could doubtless be made on some of our tests. In general though, I think our physical examination is satisfactory and the results bear this out. We need, particularly, closer cooperation between the civilian flyer and the flight surgeon. We need recognition of the importance of aviation medicine by the transport companies, with closer supervision of the health of flyers. We need a more general appreciation of the effects of altitude and high speed with research work on the latter. We need some means of determining the reaction time of students. Slow reactors do not make good flyers. Certain individuals who can pass a satisfactory physical examination never learn to fly for lack of aptitude. It is not purely a medical proposition. It is a matter for cooperation between the doctor and the instructor. The British believe they have solved it in the Reid control apparatus. The Army has hopes in the Ruggles Orientator. It is a matter of great importance to aviation and it will need the cooperation of all those concerned to solve the problem.

The general medical profession is slowly becoming alive to the importance of this new specialty. Facilities must be provided for the training of the civilian flight surgeon. We are endeavoring to have instruction given in all first-class medical schools. We have already succeeded in some cases. The response of the medical profession to the call for examiners has been very gratifying. We have close to 500 examiners now and more are being appointed daily.

We wish you to look on aviation medicine as a branch of preventive medicine. Its sole purpose is to make aviation safe by weeding out those physically and mentally unfit to fly and keeping those selected in a constant state of physical fitness.

Speaking for the Department of Commerce (and I believe I am safe in saying the medical services of the Army and Navy also) we have but one idea and that is to put everyone possible into the air and keep him there. We have no desire to keep anyone out, but a few must fall by the wayside in order to protect the public and those who are safe flyers and aid the progress of this aviation era.

"Normality" Can Be a Doubtful Point

CHAIRMAN ADAMS: The Chair would be very happy to hear any discussion of Dr. Baur's paper. There is no written discussion, but we want to have, if possible, all the discussion we can from the floor.

DR. W. J. FRANCIS (Medical Examiner, Department of Commerce, New York City): One of the things which rather puzzled me has been this: In making out blanks I have noticed that the candidate likes very much to get hold of the blank and see what is on it, and so it has been my custom to use just a check, and that meant "normal" where he was normal, and the thing that has rather puzzled me is whether a man who had had his appendix removed was still normal or whether the fellow who hadn't had his appendix removed was or wasn't normal. The same thing applies to the tonsils and deflected septum. I would like to ask Dr. Bauer about that being normal or abnormal.

DR. EDW. H. BEDROSSIAN (Medical Examiner, Department of Commerce, Philadelphia, Pa.): There is no question that civilian flying is progressing in leaps and bounds. In Philadelphia and in the neighborhood when this work came up, there were only three flying schools with probably less than 100 students altogether. In the course of a year and a half we have about nine flying schools with nearly 500 students. These are not very accurate figures, but they will illustrate the progress of the work.

It seems to me that the students like a medical examiner who is a little bit easy on them. In my experience, when I went through the family history, many of them would ask me what that had to do with their flying—for example, asking about their father's occupation; if he had ever had a nervous breakdown; or about the mother's, the sister's and the brother's health. So in our form, I believe, if we could put down this question of family history and the nervous makeup in a definite form that we could all follow, more or less, and use the same routine, the students would then feel that no matter where they go, more or less the same questions will be asked in reference to their family history.

Another help that came to me, which might be of great benefit to flight surgeons or medical examiners, was this: If we could have some regional conferences. We have been called to Washington, I think, about once a year, and whenever I have been present there it was very helpful and interesting and very stimulating. If any of us could take the training in one of the Army Aviation centers, it would be a great help, but all of us can't take advantage of that opportunity; I thought if, between New York and Philadelphia, or in this section, we could have about three or four conferences of the medical examiners, we from Philadelphia could come to New York some day and those from New York and vicinity could come to Philadelphia; and we could call some sort of conference to meet probably once every three months, to take up problems that might arise in the course of our work and give our opinion or experience. It would be of great assistance.

Many Cases Are Difficult to Handle

In the course of my hundred examinations during the year I have had several problems that I didn't know just how to handle. One, that I come across quite often, is simply tachycardia; no organic disturbance, but the student and the pilot reports a pulse rate of around 112 to 116, and after some exercise it has gone up to 140 or 160, then returning again to 120. I had one heart specialist who took over a case of that kind and said the boy was all right. I wasn't sure whether it was staleness or whether there was some myocardial disturbance there, or whether it was purely psychic or nervous. However, it was a questionable condition.

Then in several cases I have had albumin. I don't see why a young person, healthy in every way, should show so much albumin. I have asked other medical examiners and they tell me they do not find such a high percentage of albumin. In my cases at least 30 per cent had traces of albumin, but not quite so many cases had casts.

There are quite a few cases that could be brought up if we had regional conferences at which we might take up the experiences that occur every day. There are things coming up every day which require our study and co-operation.

Returning to the co-operation between the schools, the instructors and the medical examiners, my personal opinion is that the school likes the medical examiner who doesn't turn down very many cases, because each time that you disqualify a student it means at least \$300 to the school. How we are going to overcome that is a matter to be studied, without compromising with our professional obligation and without hurting the school's progress. Some way ought to be found so that the schools will not look at the medical examiners in some instances as being too fussy and turning too many cases down, while others are more lenient.

DR. BAUER: I would suggest that any medical examiners present who have any technical questions to ask, save those until after the conference is over and I would be glad to stay and answer them as long as you wish. There are a good many people here who are not physicians and I don't think they would be particularly interested in the technical questions, and I think we should confine our discussions to a more general discussion of the subject.

Discussion of Dr. Bauer's Paper**By LT. COMMANDER J. F. NEWBERGER****U. S. Navy, New York City**

I want to congratulate Dr. Bauer on his excellent paper. Perhaps on this particular subject there is no one in this country who can speak with more authority, and it is pretty difficult for me or a great many others to get up in discussion and throw any doubt upon what he has had to say.

In 1923 and 1924 I was attached to the Aircraft Squadron of the Scouting Fleet and we at that time undertook a trip with one of the largest squadrons of planes that had ever been gathered together in a force; that is, in peace times, and we flew from Philadelphia down to Panama. Of course it wasn't a non-stop flight. We stopped at different places because at that time the planes weren't flying such great distances. In addition to that, these planes that we were flying with were bombers, large planes, and could only fly a certain distance as a consequence.

When we started out on this trip I had just left Pensacola, the Flight Surgeons' School in Mitchell Field, and was assigned to the Air Squadron. There were a great many pilots, and the question came up at that time (it was just about the period that we had introduced the new physical examination; at least new for the Navy, though it was the old Army examination). How can we keep these pilots in the best physical condition? Another question that came up, in particular with me, was: How can we avoid, in the best way, any accidents or any fatalities? We started out in January, 1923, and we had a number of severe accidents in the Squadron. Of course the physical examination for entrance or for qualification of a flyer when he first enters the Service is one of the least important. It is only an indication that the man is in the best possible condition at entrance examination for qualification for flying.

The most serious problem in aviation today, and one which is not only in the Army and Navy but also is more important in commercial flying, is how to keep this pilot, or the man who is directing the plane, in the best possible condition. That is one of the most difficult problems to solve because you cannot have a medical officer with your pilot all the time and you cannot have him under constant observation, and you never know what the pilot is going to do. He may stay out till four or five o'clock in the morning, and then the next morning get up and fly. I have had a great many arguments on this question on board ship. I have had officers, for instance, when I approached one and told him, "You didn't come home until three-thirty this morning," say to me, "Well, doctor, it doesn't make any difference to me because you know I am in the finest physical condition. You know I never smoke or drink, so I don't see how it is going to affect me." I have had the greatest difficulty in these cases to convince the officers that in order to fly, particularly in a military organization where you have to undergo a lot of tactics and you must have navigation and a great many other problems, in the first place a pilot has to keep himself in the best possible physical condition; in order to do that he has to get a certain amount of sleep and has to obey a certain number of rules.

Naturally, the problem came up as to how we were going to check this up. Of course in the Aviation examination we have an index which was got on up by Dr. Snyder, who used to be one of the teachers at the Research Laboratory in the School at Mitchell Field, and I have used this index as an indication of each pilot's standing. I had a big board with each pilot's name on it, and this index goes anywhere from 7 to 16. A good index is from 10 to 16. Below 7 is supposed to be poor. In that way you have something by which you can gauge a man. It wasn't

so much the actual gauging of the man, however. For instance, we took "normal," and I checked each man up for about a week or ten days, and sometimes two or three weeks, in order to get his average index, because he might have 8 one day and 12 the next, and I had to get a fair average. Then I checked him up and put him on the board. So at any time during the week that I suspected anything was wrong I could call this man in and say to him, "I want to check you up and see where you stand."

If I had a normal index of him which was 10 or 12, and then suddenly he went down to 7 or 8, I knew there must be something wrong, whatever the cause might be, such as some illness or disease. In that way I created a certain amount of rivalry among the pilots because I noticed, after we had had this system instituted for a period of two or three months, every morning they used to come up and look at the number on the board to see where they stood and who stood the highest. In that way they watched their own physical condition with great interest. There were about 80 pilots and their records were always posted. One had 15, another 16, and another man had only 5. Naturally, after a while they began to take a personal interest in it themselves.

After all, the law of self-preservation is very strong in human nature and if a man has something wrong with him he wants it to be corrected. Thus we checked up on our men in that manner. Our method showed results. The first year we flew to Panama and the next year we flew to Crata. In 1923 and 1924, during this entire period we never had one single fatality, and one year we flew 225,000 miles in this squadron (1923). Of course, we had one or two minor accidents, such as, for instance, we broke wings on landing or pontoons, and so on, but we never had one single fatality to personnel; and with the amount of flying we did I thought it was quite a remarkable thing. The only thing to which I could attribute it was that we kept pretty close watch on them.

In 1924 we got out a paper on "The Causes of Crashes," and at that time we made an analysis of the crashes not only in the Army but also in the Navy. Of course we found in analyzing these crashes just what Dr. Bauer has told you, what the British flyers found during the war, namely, that 75 per cent of all accidents and crashes and fatalities were due to the human element. The Bureau of Aeronautics has made an analysis of crashes, but handled it from a different point of view. They have made an analysis of the crashes in the Navy, because after all the crashes and the circumstances surrounding the Navy are a little bit different because we do a great deal of flying over the water, and that analysis was made from a different point of view, grouping these crashes according to the days in the week, the unit operating, the type of aircraft, the mission of the flight, the cause of accident and experience of the pilot. These various groups were then subdivided until every single factor which seemed possible to trace had been located, and their conclusions were as follows as to the tabulation of the facts elicited:

"1. The modern type of aircraft with welded-steel construction is 75 per cent safer in an accident than the earlier type where the construction was almost entirely of wood with wire bracing."

I remember six or seven years ago, in 1920 or 1921, when I was with the Aviation Unit, we used to have these old type flying boats, and they were very peculiarly constructed, entirely out of wood, and very easily went into a spin. They used to call them "flying coffins," and that was a very good name, because whenever one of them went into a spin it was very difficult to get it out, and whenever one of them crashed the plane was all smashed to pieces and there was often fatality to personnel. Of course it is an entirely different thing today. A great many planes have forced landings, and if a plane gets into a spin you get it out, and I would venture to say that over 40 per cent of the men who have such accidents today get out of it without a scratch. That didn't happen years ago, however.

"2. Within certain limits the number of crashes, injuries and fatalities are indicative of the state of discipline and efficiency of the various units. Further consideration must, of course, be given to the type of duty performed and other affecting elements.

"3. Eighty per cent of the fatalities which have occurred during the past seven years can be traced directly to personnel. In other words, the human and not the mechanical element is most often subject to failure. This is in general accord with the results of similar analyses made in other services at home and abroad."

In 1924, when we analyzed the crashes in both the Army and Navy, we took it from a different standpoint. For instance, the first classification was "Human error in judgment;" then "Mechanical defects," "Bad weather," and so forth; but this is from a different angle.

"4. When a mission of a flight is such as to require the pilot to exercise caution, such as flights where sick or injured are being transported, where other officers not pilots are being carried as passengers, or in other cases where the other occupants of the aircraft are incapable of looking after their own safety and the responsibility rests solely on the pilot, the records show the pilot can and has risen to the occasion with a record of only a few accidents."

That is a remarkable thing. With all the number of accidents we had in the Army and Navy, compared with civilians where a man is carrying other passengers or even in the Service where a man is carrying passengers, we had very few accidents.

"5. The two leading causes of the failure of the human element are bad judgment and inexperience."

There is no question about that. One sees that particularly when one goes to a training station like, for instance, Pensacola, where a great number of flyers are training, and where of course experience counts. A man who hasn't any experience gets scared, just like a man driving an automobile; if he hasn't had much experience, he loses his head and crashes.

"6. During the seven years mentioned above steady improvement has been made in the safety with which aircraft have been operated, amounting to 340 per cent. It is safe to assume that at least half of this improvement represents improvement on the part of the pilots and is a record in itself which the bureau considers with pride.

"7. Over two-thirds of the crashes resulting from so-called engine failures are not a fundamental fault of the power plant, but in the final analysis can be traced to a faulty operation, maintenance or inspection."

So that is the human element.

"8. The factor that counts most with the efficiency of the individual pilot was determined to be experience. Pilots with an average annual flying time of 400 hours have 40 per cent fewer crashes than those with 100 hours. The fact that the pilots of the first named group flew four times as much, and were, therefore, subject to the hazards of flying four times as long, as those of the latter group makes this 40 per cent reduction no less than astounding. In other words, pilots of the latter group had almost eight times as many crashes in proportion to their flying time. Also, seasoned pilots who had been flying over 1,500 hours showed a 75 per cent reduction in crash probability as compared with the inexperienced pilots."

I am, therefore, of the opinion that these steps and other steps of an intelligent nature which may present themselves from time to time as a result of the studies being conducted will bring about a highly satisfactory reduction in aviation accidents.

I am sorry that time does not permit me to discuss in detail all the different factors brought out in Dr. Bauer's paper. I am particularly interested in vision and in disturbance of equilibrium, because in the last three or four years I have done a great deal of work on this subject, but of course the subject is a big one and time

doesn't permit. We might go ahead and talk for the next two or three hours on that subject alone. However, there is one thing that stands out and is going to stand out until perhaps we get a new "Gyro" airplane (such as the one, for instance, in which a man recently flew from Croyden to Le Bourget Field, in France), where you can, perhaps, with the helicopter type of plane stay in the air, just hang there, and there won't be any crashes. But until that time comes, we still have to rely on the human element and look after the personnel.

CHAIRMAN ADAMS: Is there further discussion?

HON. EDWARD P. WARNER (Asst. Secy. of the Navy for Aeronautics, Navy Dept., Washington, D. C.): I don't know whether the layman, having no connection, direct or indirect, with the medical profession, has any right to intrude in this discussion. I have heard several words that are entirely strange to me, but the relation of the flight surgeon to his subject, especially in the preliminary examinations and in the periodic examinations that determine whether or not fitness for flying continues, is, it seems to me, entirely different from any ordinary relations of a doctor to his patient; and I don't believe that the flight surgeons themselves realize entirely in how rarefied and mysterious an altitude you dwell or how uncomprehending the average layman is when he comes under the flight surgeon's jurisdiction for examination or for check on his flying capacity.

Every one of those who have contributed discussion has made some remark about the curiosity of the candidate, the subject of examination, on what is being done. One of those who spoke remarked on the tendency of the candidate to cross-examine the doctor and to try to find out what it all meant and what significance these questions had. Another speaker mentioned the desire of the examinee to see the record and find out what was being put down against him, and still another remarked on the necessity and the difficulty of convincing the officers that this was all being done for their own good.

I have had occasion to talk about accidents and accident reduction and the relation of physical and psychological examination to accident reduction, to a great many airplane pilots in the last couple of years, and every now and then one runs up against an attitude somewhat like this: A fellow says, "Yes, I go up for an examination and the doctor asks me a lot of questions about my ancestors, and he looks me in the eye, and he measures the time that I take to respond to each of his questions, and he reels off a string of words to which I am supposed to respond with a word that each one suggests to me. I think it's all the bunk and I don't believe it has anything to do with flying."

You can satisfy yourself readily enough, I am sure, that it does. You have evidence that is satisfactory to the members of the medical profession that it does have something to do with flying. But it is absolutely necessary, if you are to get a sympathetic attitude from the pilots, without which flight surgery cannot attain its full value, and still more if you are to get a sympathetic attitude from the schools (the absence of which has once been hinted at), that the individual pilot, the head of the organization, shall also understand what is going on and that it is for his own good.

The reputable school has no desire to take students who are not going to learn to fly and be a credit to the school, but they want to be satisfied that the man really isn't going to be able to fly. The most direct means of getting at that, it seems to me, is to make a study and a presentation available to and comprehensible to the layman, of the accident records of those who have been known to be either below the borderline of what is acceptable to the doctor, or very close to that borderline. It seems to me manifest, again speaking as a layman, that if the fellow who just barely gets by has no more accidents than the man who is as nearly as possible perfect on his medical examination, then the fellow that objects to the examination has a fairly strong case in favor of lowering the line of demarcation and letting in those who are still a little lower down the scale. Fur-

thermore, in order that these tests may be acceptable, I think a little explanation by the doctors would be very helpful, and it is very desirable, it seems to me, that the tests be related, so far as possible, to the operations of aviation in some way that the layman can himself understand.

The Reid control apparatus is a success, it seems to me, very largely because it looks like an airplane; it has an airplane control in it and is simply something that the pilot can accept and understand. The same thing is true with the Ruggles orientator. It is a part of an airplane and it looks natural to the aviator. I don't say that it is necessary to follow the airplane in detail, but Dr. Snow, of Northwestern, made some experiments a few years ago that seem to me to have a decided bearing on the question.

He tested out taxi drivers for the Yellow Taxicab Company, and in citing the results I hope you won't suspect that I am drawing any analogy between pilots and taxi drivers. It was required that the would-be drivers go through various maneuvers with an egg and a little paper bag of sugar and a lighted candle and a dish of gasoline, and so on, and it ruined the morale of the organization because they thought it was a joke. So he exercised his ingenuity and built a complicated machine which looked more like a taxicab than anything else, and that accomplished the results because everybody trusted it, whereas before it would have been difficult to have gotten the candidates to take a sympathetic attitude and to get what information they could.

The flight surgeon has a definite responsibility (as it appears to a layman very much interested in finding methods which will reduce the cost of training and reduce the accidents both in training and afterwards), not only to produce tests which satisfy himself and impose them by fiat from on high (as you can impose a prescription on a patient who already knows that he is ill), but also to devise methods which can be explained to the layman, and to produce statistical records of the effect of physical or psychological or temperamental unfitness which can be presented to the layman in such a way that he can't escape being convinced. When you have done that, I am sure you will have the wholehearted sympathy of 90 per cent of the pilots, of the organizers of civilian schools, and of everybody connected with any Government service.

MAJOR I. B. MARCH (Medical Corps, Flight Surgeon, U. S. A., Mitchel Field, L. I., N. Y.): In making over 1,000 neurological and psychological examinations at Mitchel Field in the last three years, we have brought out some of the very features that were just mentioned—the co-operation between the pilots who are making application for flying training, and the doctor. I think the answer to what he has just suggested is an absolutely frank, honest explanation of the examination to the candidate and to the pilot. We have found with our pilots at Mitchel Field that this has helped us a very great deal in gaining their confidence and in getting their co-operation; and even with the candidates who apply for flying training we see no reason whatever for making a secret or a mystery of the physical examination for flying. There is none. In a candidate who has been disqualified, I take his paper and with a red pencil check every disqualification that he has, and explain it in detail as far as I can do so, and try to make him understand why he is disqualified and why that disqualification makes him unfit to be a candidate for flying training.

I see no reason for any mystery, no reason for concealing from the candidate any of his disqualifications, except perhaps to save his feelings occasionally when you find a psychological trait and you are not able to explain it in a way that will not make him feel that he is inferior mentally. There, a great deal of tact must be used. You cannot tell a patient or an applicant for flying training that he is crazy. You will not gain co-operation from others by doing so. But you can explain to him in a nice, tactful way that he has nervous conditions which make it impossible for him to co-ordinate properly in difficulties of flying, and explain those

difficulties so far as you can do so. We have had no trouble in that way and often get letters from candidates who have been disqualified, thanking us for our explanations, and they are perfectly satisfied. We get excellent co-operation from our flyers at Mitchel Field.

The flight surgeon is not only intimately associated with the flyers, but he is also intimately associated with their families and with their personal affairs in a confidential way, so that he can be of very great help to them in relieving them at a time when both family responsibilities and the responsibilities of the flyer conflict.

I wish to stress one thing that Dr. Bauer brought out in his talk; that is the need of greater research along certain lines. That can only be obtained by a sincere co-operation of the flyers themselves with the men who are interested in aviation medicine.

DR. PAGE NORTHINGTON (Medical Examiner for Dept. of Commerce, Bellevue Hosp., New York City): I am sorry to see the opinion expressed by Dr. Bauer, that he viewed the question of the internal ear rather sketchily. After all is said and done in the discussion of the aviation examination, of maintaining the flyer, it is the proposition of the individual being able to maintain a correct position in space and an appreciation of the variations therefrom, and in aviation a man must maintain his position with reference to the odds of gravitational force. It is a prime essential thing. Dr. Bauer submitted that in maintaining equilibrium there are three prime functions of the organs of the body which must be working; that is, of the eyes, the ears and the deep muscle sense. He submitted that with obstruction of any one of those, we can learn to maintain a fair equilibrium sense. It is not a question of the comparative values of vision and the labyrinth. It is as well admitted that acuity of vision is the greatest aid toward one being able to recognize his position in space and maintaining it as he chooses, but in conditions, as in aviation, where the proposition of equilibrium is a prime essential, it would appear that it would be necessary to have the three functions that maintain them without impairment.

It is true that in such conditions as he spoke of, when the reactions were hypersensitive, that was somewhat of a bar. We have found in examinations for the last two years of the graduating class at the Naval Academy, that it is very obvious that the vertical canal, as is recognized, is more sensitive and you get a more pronounced reaction from its stimulation than from the horizontal, which is undoubtedly true due to the fact that we are accustomed to maintain in ordinary life a position horizontal to the surface and we have merely acquired an increased tolerance for the horizontal canal, which is also comparable with that of the vertical canal.

The question has come up with reference to the matter of training. As a rule we accept about 50 per cent of the applicants for aviation. Only about 50 per cent of those people qualify, and in the case of most of the people that I have seen that did not qualify, it was because they got their wind up, they were willing to give up in the vast majority of cases. The pertinent point to me is, why did those individuals give up? Why did they get disheartened or get discouraged or get the sense of fright during their ten hours of instruction? I believe that you could take any student up, when he first enters a class for aviation, and stunt that individual sufficiently so that he will come down and never get into an airplane again. I believe that during his preliminary few hours in the air, that probably through a bump of air, probably through certain maneuvers that the instructor took him through, he became apprehensive and didn't recognize whether he was flying on an even keel or whether the plane was banked, and thus he felt that he would never make an aviator. I feel that it is lack of tolerance from the stimulation of the canal which frequently causes those individuals to give up.

Working on that basis, we devised a plan which provided in the usual gymnasium in addition to the exercises which we give them what was brought out by the Army during the war regarding reverse movements. The idea was to revolve the students by a turning movement forward, flips forward or backward on cart wheels, to see whether they had hypersensitive canals. It would be only a relatively few of them who did have them, but those who did have them, if they were sufficiently interested in aviation and wanted to go into it subsequently, would stand a far better chance, we explained to them, if they continued with these exercises. The burden was upon them to do that if they were sufficiently interested, and I believe in that way the number of successful applicants that go into aviation will be increased.

Speaking of a man turning in a plane, say, in a spin and coming out, if his labyrinth were impaired or dead it would not be as confusing, for the simple reason that he hasn't any vertigo. I don't concur in that. The man has a nystagmus following his turning and his nystagmus is usually longer than his vertigo, and I believe a nystagmus with the objects which you are seeing oscillating, would be more confusing than would be his vertigo; at any rate, his vertigo is absolutely a physiological response and I don't see how we can say that by destroying his vertigo or taking that away from a man and putting him on a pathological basis, that this is going to give him a keener sense of equilibrium. The labyrinth is the main organ of equilibrium. You can remove an eye, or both eyes, and ordinarily you won't get any impairment in the sense of equilibrium. If you removed an ear, you would get a disturbance in the sense of equilibrium; decidedly so. So in the tests we recognize the fact that there are certain conditions, such as, for instance, mumps, where the vestibular portion of the eighth nerve was entirely disturbed, as in a recent case which I saw. The man had had mumps years before and his vision functioned quite normally. The only complaint he had was that he noticed he had bad legs while walking in the dark. That was brought out merely after I had examined the individual. There was another case following encephalitis, in which there was the same thing.

In flying also he spoke of the fact that a person can get along, (I wouldn't say normally), but a man is not greatly disturbed if one of these functions is impaired or lost; but in flying a plane in direct maneuvers, that is, in a loop or a spin, if the maneuver is made directly, a man's deep muscle sense is the same whether he is in a loop or whether he is flying in horizontal. The centrifugal force of his doing a loop, if it is executed properly, the pressure on his deep muscle sense is absolutely at a minimum—a minimum in the sense that whatever maneuver you are in, if it is done correctly, you should not appreciate the change of position. Then you would have to rely mostly on your ears and your vision, your vision being the most important. In night flying, and so forth, Dr. Bauer mentioned about the lights on the dashboard. That is very true, but the lights do not function absolutely 100 per cent. A man has got to rely on his ear in many instances in order, I think, to enable him to come down and land safely.

LT. C. R. BROWN (U. S. Navy, 485-B Middle Neck Rd., Great Neck, L. I.): I have heard with a great deal of interest the various discussions by the doctors here on how to select aviators; and I am from a layman's standpoint rather familiar with it, since I have been in aviation for some time and have been under rather close observation of flight surgeons, having been psychoanalyzed and psychopsychiatrized, and all the other things; and I have from my angle developed some ideas on the other side of the question. I think—and I am very glad to say that the point I bring up is quite exceptional—that it is entirely possible to select the wrong flight surgeons. You can select a good surgeon, but it doesn't necessarily hold that he is going to be a good flight surgeon, any more than you can take a good English student and feed him mathematics and make a great mathematician out of him. I am happy to say that the Navy now is giving flight training of a certain

degree to flight surgeons, and therefore weeding them out in their ability to fly.

I know of one individual that none of us felt could ever fly an airplane, no matter how much training he was given. Not only that, but we didn't have any faith in his psychological gifts. As a matter of fact, after having known us for a very long time and being shipmate with us in the same mess and hearing us in the morning when we were feeling bad and at night when we were feeling good, he still had to resort to catch questions to get slants on us. The result was inevitable. We turned on him and fed him every kind of misinformation we could, and when the annual physical reports came out there wasn't a man on there fit to fly; as a matter of fact, most of them ought to have been in the penitentiary.

I just wanted to bring out the point that in anything which has such a close personal relationship between the doctor and his patient as flight surgery, you must have a man who is clever at that kind of work, who is a natural born judge of men.

CHAIRMAN ADAMS: Is there any further discussion? If not, Dr. Bauer will respond to the discussion.

DR. L. H. BAUER (Medical Director, Air Regulations Div., Dept. of Commerce, Washington, D. C.): Dr. Francis' question I am going to take up with him personally later. It is a technical point which I think most of you will not be interested in. The same is true of Dr. Bedrossian's question. One point he brought out was the question of having certain standard sets of questions to ask candidates. I, personally, am against that for the reason that we do not want what will be a stereotyped examination. We would rather leave it to the examiner to devise his own questions for the particular candidate; that is, each man to be considered as an individual. I know there is a tendency in examinations of the nervous system to use a stock form of examination and personally I am not at all in sympathy with it.

I was in the Army a good many years and I shouldn't make any uncomplimentary remarks, but I am not at all in sympathy with the recent Army examination in which they are laying so much stress on the nervous system. I believe it can be overdone just as any part of the medical examination can be overdone. I grant you that it is important. I believe the eyes and the nervous system are the two most important factors in the examination of flyers, but I think it can be overdone, and I believe the method of having stereotyped sets of questions to ask each candidate is in the line of overdoing the examination and not getting what you really want.

He also mentioned the question of regional conferences among medical examiners. I think that would be an excellent idea, and personally I would be glad to do anything possible to foster it.

As to the question brought up by Secretary Warner about the significance of the examination and explaining to the candidate what it means, I think that the days of mystery in medicine belong to the Dark Ages and there certainly is nothing mysterious about our examination, nor should anyone be led to think that there is. If it is mysterious and can't be explained, then it should be discarded. Examiners are busy and they don't always feel like taking the time to explain to the applicant what each point does mean, but where it is possible or where the candidate shows interest in what it is all about, I think it is well worth while from the standpoint of furthering aviation and cooperation between the examiner and the candidate for him to explain what the different tests are for. Let them understand that they are there for a real purpose; that they have some connection with aviation and are not simply there for the purpose of mystifying him.

The cooperation of the schools was mentioned. I think that the schools that

are really trying to play the game are cooperating. There are some perhaps that are not, but it is like everything else; it is a new industry as yet, and the whole idea of regulation is new and some do not take kindly to it, but I think when it is understood thoroughly what we are trying to do, that there will be no lack of cooperation. There again I think the examiners can help out a great deal by keeping in touch with those who are in charge of the schools and trying to impress upon them that they are there to help and not to deter; that our idea is not to keep them from getting students, but to keep them from getting students who are going to cause them trouble and loss of property, as well as give them a black eye because of unnecessary accidents.

Dr. Northington said he regretted to see the internal ear mentioned sketchily. I didn't intend to mention it sketchily. I said that the ear, nose and throat were formerly considered highly important, as we now went over them rather sketchily. I don't include equilibrium under the ear. I know that the ear has an important part to play in equilibrium, but I don't believe that it is the only thing in equilibrium, and I believe that this was where mistakes were made during the war. I mentioned a minute ago the danger of overemphasizing the nervous system. During the war the thing that was overemphasized was the internal ear. Equilibrium is an important factor. I mentioned that, and I mentioned particularly the question of hypersensitive canals as being a dangerous factor in a flyer, but I think equilibrium has got to be considered as an integrative whole of various factors, and not just the internal ear. While it is true that a man with a dead labyrinth will have trouble in maintaining his equilibrium, nevertheless a man with a normal labyrinth can't maintain his equilibrium when he can't see the horizon, so his eyes are also an important factor so far as the flyer is concerned. I think there has been a tendency to overemphasize the internal ear to the exclusion of other factors in equilibrium. I don't mean by any means to neglect equilibrium as being an important factor in a flyer; I think it is, but I think we have got to consider it as a whole and give the other factors a part as well as the internal ear.

I, too, agree with Dr. Northington that a man with a dead labyrinth has no place in the air, but I do believe that a man whose labyrinth is perhaps hyposensitive has less difficulty than the man who is hypersensitive.

The point brought out by Lt. Brown on the question of the personal factor in the flight student is an excellent one. I agree very heartily that it is quite possible to select the wrong man for a flight surgeon, and the wrong man can do a great deal of harm, and I think that the wrong man is more apt to go wrong with this stereotyped set of questions, which I mentioned a moment ago, than the right man is. That is another reason why I am against it. I think that each case should be handled individually. No two people are exactly alike and you can't treat them exactly alike.

I think that covers the points that were brought out.

The department is endeavoring to make a statistical study. Secretary Warner spoke of the importance of that. We are endeavoring to do that, and we hope eventually to have some worth while statistics on the results of our examinations, particularly on disqualifications and particularly on accidents. We want to find out whether accidents are happening more frequently among people to whom we have given a certain sort of waiver for physical defect. If they are, that means we are wrong in granting waivers for that defect. If they are not, it means that we are right in granting them and that we can become even more liberal than we have been in the past.

On the question of waivers, there seems to be some fear among old flyers that have certain physical defects, that they will be disqualified if they take a physical examination. There is very little ground for their fear as to that. We consider

that flying experience is an important factor in assessing any man's physical ability. In other words, we take a beginner and he shows certain defects which we know by experience are apt to increase the hazard. In his case, he is not going to get a waiver. But the man who has a history of several hundred or two or three thousand hours of flying, and his history shows that he has been free from air accidents, he has conclusively proved that whatever defect he may have has been nullified by his experience, and his experience is going to be taken into consideration. That is the attitude we take in the department in the case of all experienced flyers, and I think it is only just.

Unquestionably the most hazardous time in a pilot's life is during his training period or perhaps shortly after he has got his early training and thinks that he knows it all, before he really becomes experienced; and the man who is experienced has passed those most dangerous stages and therefore there is less hazard for him because of his defect; and also he has become compensated to it, he has learned to fly with that defect or else it has come on him gradually after he has learned to fly and he has gradually become compensated to it. So that the experienced flyer is an entirely different question from the beginner. We are very liberal in the case of trained flyers. In the case of our students we insist that they pass the private pilot's examination. Whether or not we have been too liberal I don't know. So far I am not inclined to think that we have been. It is possible that we may become more liberal, but that can only be told after we have had a chance to study statistics from these 19,000 examinations which we have had so far, and I might say that our examination is as liberal as any in the world.

LT. COMMANDER J. F. NEUBERGER (U. S. Navy, New York City): You say you want to get these statistics about these people that are granted waivers and are going to have crashes. In the Department of Commerce most of these pilots are civilian pilots. If one of those pilots flies to Boston and has an accident, how do you classify that and how do you keep track of it?

DR. BAUER: All civilian aircraft accidents must be reported. Those in charge of all transport companies, the managers of all airports, or pilots themselves, on all that is concerned with an accident must make a report to the Department of Commerce and each accident is investigated by a department inspector and an accident report is sent in to the department with as full information as can be obtained. When that comes in, a man's history is immediately consulted. If he is a pilot who is carrying a waiver, then we try to find out whether or not the accident had any possible relation to his waiver. If a man started out, got into a storm, had no place to land and smashed up the landing, even though he may have no waiver for physical defect, we can hardly call that an accident due to his physical defect. If, on the other hand, the accident very evidently was due to some defect which we have waived, then that is chalked down as an accident that is due to a physical cause. The National Advisory Committee for Aeronautics has investigated recently the aircraft accidents and has tried to devise a standard system for investigating all accidents and assessing them on the basis of their cause, and the physical end of it was not considered in that so much at first but later it was decided to consider physical defects as a basic cause. For example, each accident is assessed according to personnel, material, miscellaneous conditions such as a weather, and undetermined. Physical cause would come under personnel. The personnel is broken down into poor judgment, disobedience of orders, carelessness and negligence, poor technique and miscellaneous or undetermined. Then that may be further broken down as to the primary cause for that poor technique. Maybe it was a physical cause; it may have been lack of training or lack of experience. Eventually I think we are going to have some worth while statistics on the primary causes of aviation accidents and I hope that we are going to find that the physical end of it is almost nil; that if our standards are

at all what they should be, it is going to be almost nil. If they are not, then we are going to find some accidents due to physical causes.

CHAIRMAN ADAMS: Is there further discussion?

I know as a layman that I am very grateful for the opportunity that I have had of sitting here and finding out what a sympathetic attitude, not only the Department of Commerce, but the medical examiners and everybody, has on this question of physical examination, and I think the National Aeronautical Association can do a very real service—and I am going to ask them to do it—by making these applicants and these people who want to learn to fly understand that this is something to help them, not to keep them from flying but as far as possible to make them better pilots.

I thank you very much.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Safety of Airship Operation

First National Aeronautical Safety Conference

Under Joint Auspices of

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Promotion of Aeronautics and the
National Safety Council*

October 4 and 5, 1928

COMMANDER GARLAND FULTON, Chairman

(C. C.), Bureau of Aeronautics, Navy Department, Washington, D. C.

The session on Safety of Airship Operation at the Seventeenth Annual Safety Congress was called to order at two-thirty o'clock by the chairman, Commander Garland Fulton (C.C.) U. S. N., Bureau of Aeronautics, Navy Dept., Washington, D. C.

CHAIRMAN FULTON: With your permission we are going to make a change in the order of presentation of the papers and will hear, as the first paper, from Secretary Warner on "The Safety of the Airship and the Airplane for Trans Oceanic Operation."

Safety of the Airship and the Airplane for Trans-Oceanic Operation

By HON. EDWARD P. WARNER

Assistant Secretary of the Navy for Aeronautics, Navy Department,
Washington, D. C.

The first requisite for the author of any paper dealing with a comparison of the airplane and the airship is a firm resolve to suppress any personal prejudices. His quest must be for a purely objective analysis. There is no room for conflict between the supporters of the two types of aircraft. Their relations should be mutually supplementary, not competitive. They should support, not destroy, each other. Both the airplane and the airship have work to do, work for which they are ideally fitted. It would be a very poor friend to either type of craft who would set it to a task for which it is fundamentally unsuited. When that is done the resultant failure sheds discredit upon operations soundly and logically based and intelligently and carefully conducted, as well as upon others which may deserve all the unfavorable comment that they can possibly receive.

Safety is an important factor in any commercial or industrial enterprise. The holding of these annual safety congresses, in which aviation now finds a place

for the first time, testifies to a general recognition of that fact. It is especially vital in passenger transportation, for any hazards existing there affect the innocent traveling public. Whatever economy, speed and other advantages may be offered, a reasonable degree of safety is indispensable to the success of a passenger-transport enterprise. It is indispensable, indeed, as a moral justification for offering any such enterprise for public patronage. Many properly managed airplane lines operating over land or across stretches of water not exceeding a few hundred miles have attained that reasonable degree of safety, fully justifying the public favor that they are gaining. The problem of trans-oceanic air transportation, whether by heavier-than-air or lighter-than-air craft, is largely one of ability to duplicate there the record of freedom from accident that is already being made upon numerous air routes in the continental United States and in European countries.

In comparing two things so different as airplane and airship operation, and especially in speculating upon future possibilities, it is necessary to depend to some extent upon theory to reduce the objects of comparison to strictly similar conditions. Lest theory leads us too far afield, however, it should be shackled firmly to the practical record of past experience. Experience furnishes the definite evidence in the case. It constitutes the most effective basis for any discussion.

In selecting historic data bearing upon the present safety of trans-oceanic aircraft operation it is perhaps well, first of all, to define what "trans-oceanic" means. The title was assigned to me. I did not choose it myself, and I have had to interpret it. I take "ocean" in a literal sense as applying to the Atlantic or the Pacific, not to any island sea. "Trans-oceanic" means "across an ocean," not merely above a short stretch of it, as in the flight from the United States to Bermuda or from Scotland to Iceland. Taking that as the definition and concentrating attention upon the North Atlantic, the body of water of most interest to Americans, a scanning of the record reveals approximately thirty attempts to make the crossing by airplane in the last ten years. Prior to 1927 there had been eight attempts, of which four succeeded, and in three cases the airplanes were brought exactly to the point intended and in an undamaged condition. None of the eight had fatal results. Both in 1927 and in 1928, on the other hand, approximately two-thirds of all the trials across the North Atlantic have been unsuccessful, and a majority of those which failed had a fatal termination. In only two or three cases at most has it been possible to make a start without protracted waiting upon the weather. In only two instances, out of a total of approximately a score, has the flight terminated at the point designated in advance, and in only three or four has the ultimate landing been made without damage to the airplane.

There is no desire here to be pessimistic. No one can possibly be a greater believer in the potentialities of the airplane than the author of this paper, but the facts are there and it is well to face them. The facts are that all experience indicates trans-Atlantic travel by airplane to be a slow, doubtful and an ultra-hazardous business; over the past few years the hazard has not appeared to diminish with the passage of time. The proportion of failures has in fact shown a tendency to rise steadily, but that is partially because attention has recently been concentrated upon the more difficult western passage.

Against that dismal record stands contrasted the performance of the rigid airship. Three trans-Atlantic flights have been attempted; three have succeeded. In every case the flight has been terminated at a point previously selected, and in no instance has damage been done to the ship during flight or in the process of landing. When the *Los Angeles* came to America four years ago the ship was insured against accident at a premium of only 5 per cent, in spite of the experimental nature of the undertaking from the point of view of the insurance company, unable to distribute their risk over a number of similar ventures. The

confidence which we all more or less instinctively feel in the ability of rigid airships to carry on such flights as a matter of course is evident in the elaborate plans which are now being made for the reception and entertainment of the crews of the German and British airships which are expected shortly to visit the United States. Their safe arrival not only upon a first crossing, but upon subsequent voyages, is being taken for granted.

It may be hoped that the difficulties and dangers of trans-Atlantic operation with heavier-than-air craft will ultimately be overcome. We may hope that in course of a sufficient length of time airplanes of the flying boat type, staunch and seaworthy, will be able to ply regularly back and forth across the North Atlantic on a fixed schedule with negligible chance of mishap. As yet, however, we are far from that happy condition. For the present, practical experience and an analysis of the fundamental factors involved agree in indicating that the danger of such operation is great and inevitable. It is too great for a commercial service, even with mail, to say nothing of passengers, until vast technical improvements shall have been made. Minor ameliorations will not suffice. In the meantime there are other services which the airplane can perform economically, efficiently and safely, and which are of far more practical present importance than any attempt at regular crossing of the Atlantic or Pacific.

For those oversea operations the airship is available as an alternative, and its record up to the present time has been as good as that of the airplane has been disheartening.

Of course it is not to be hoped for that absolute freedom from accident will indefinitely continue. That would be too much to expect from any new type of transport. Mishaps will occur, especially if operating personnel ever grow careless. No effort must be spared to reduce their number. Certainly the possibility of their occurrence or the accidents themselves, if or when they come, should not be treated lightly, but they should be interpreted in accordance with the experience represented by the operation involved and with the precautions used. It is clear that airships can be operated over stretches of water of several thousand miles without serious hazard and without the necessity of appreciable waiting upon the weather, provided that the ships represent the best available in design and construction and are manned by skillful personnel by whom no precaution is overlooked. To go further than that general statement it is necessary to classify and examine the individual sources of possible trouble in trans-oceanic operation either of airplane or airship.

Such a classification includes seven factors of possible hazard:

1. Exhaustion of fuel.
2. Engine failure.
3. Structural failure.
4. Accumulation of ice.
5. Navigational error.
6. Fire.
7. Crash resulting from loss of control.

Some of these points apply preeminently to the airplane, some to the airship and some with approximately equal force to the two. They may be treated separately.

1. For an airplane engaged in over-water flights of 1,500 miles or more the exhaustion of fuel and the consequent necessity of a forced landing at sea constitutes a serious hazard. While adverse wind of an average strength of 30 miles or more over a considerable period are not common, they must be reckoned with if regular scheduled service is to be maintained over the North Atlantic for even a part of the year. Their possible occurrence requires a reserve fuel capacity of more than a third, and for real safety, taking into account the possibility of having to dodge around storms and make other deviations from the course, that margin

should be increased to 50 per cent or better. The fuel load thus necessary is so great, even on a short route via the Azores and Bermuda or from Ireland to Newfoundland, that almost nothing would be left for a commercial load on a present-day airplane. Certainly to make the venture a commercially practicable one and yet provide the minimum margin of radius compatible with safety, the useful load carried should be at least 15 pounds per horsepower.

The airship, on the other hand, puts a much smaller proportion of its total load-carrying capacity into fuel, and yet has a much longer radius. It is perfectly practicable at the present time to design a ship to carry a pay load of 10 pounds per horsepower and still have a cruising radius of twice the distance from London to New York at 60 miles an hour. With no necessity of adopting a short route and with so great an excess of radius beyond the necessary minimum, the airship pilot is able to change his course at will to meet weather conditions as he finds them, swinging as he may desire from a southern to a northern passage, and the chance of finding continuously opposing winds is much reduced. Even though it may be necessary to lengthen the course to 4,000 miles or more between our own Atlantic Coast and some European capital, there should still be an ample reserve. Fuel exhaustion, a very serious matter for the airplane, need never cause concern to an airship properly handled.

2. Engine failure is almost certainly fatal to a single-engine airplane. Only a flying boat of large size is likely to be able to land heavily loaded in mid-ocean and survive among the waves for any considerable period, while to take off again in the open sea after having made repairs is beyond the capacity even of flying boats of the present day. No one can say how much of the loss of life in oceanic flying attempts in the past two years has been due to engine trouble, but we do know that several of the pilots who have been fortunate enough to be picked up by ships have had to descend from that cause. Even for the multi-engined machine, heavily loaded as it must be for so long a flight, the complete loss of the power of one unit would be a serious matter, especially if, as is commonly the case at present, it were impossible to make extended engine repairs during the flight and put the failing member again into service.

The airship obviously has nothing to fear from engine stoppage. With several power units and the ability to keep steerage by running on any one of them, with access to all the engine rooms for repairs or adjustment in flight, and with the ability to ride indefinitely as a free balloon with no engine power at all, there need be no fear of any untoward consequences from power plant stoppage.

3. Structural failure is a greater hazard to the airship, because of the great complexity of its structure and the difficulty of making rigorously complete strength analyses, than to the airplane. It should in fact be possible to disregard completely any chance of structural collapse of a heavier-than-air machine in straight over-land or over-water flight. It is equally true, however, that the structural failures of rigid airships have been few, and that of the two notable cases one, the R-38, was a collapse of a ship having many novel features, exceedingly light in structure, and undergoing severe preliminary trials before being finally accepted, while in the other instance, that of the Shenandoah, the collapse occurred in a storm of the type most dangerous to airships, but fortunately very rare at sea.

The high winds of a north Atlantic storm may be so steady as to cause but little stress in an airship structure. Atmospheric conditions of high turbulence, most likely to tear the hull of an airship to pieces, are characteristic rather of a mountainous country than of the air above the sea, and when they exist in mid-ocean they are sufficiently local to permit of detection and avoidance by a skilled captain. Structural failure, while a more serious possibility for the

lighter-than-air than for the heavier-than-air craft, should not be a great danger for either.

4. The accumulation of ice on the wings and body of an airplane or the hull of an airship has been greatly feared, especially since the experience of Lindbergh and others on trans-oceanic flights and of many Air Mail pilots in the United States. How many of the planes that have disappeared into the unknown have been brought down by the gradual amassing of an icy burden too great to carry we cannot guess, but it is a fair speculation that that factor has been present in some of the disappearances.

For some years the collection of ice on a structure seemed a peril for which no cure existed. None of the chemical treatments or local applications of heat that have been attempted have as yet proven themselves fully satisfactory, but it has been discovered quite definitely that ice can form only over a very narrow temperature range within one or two degrees of the freezing point. An airplane, especially in flying over land, may be unable to escape the critical conditions, for the pilot must often stay low enough to keep sight of his landmarks. In trans-oceanic voyages, especially for the airship, of which the normal navigation is quite independent of sight of a horizon, it should always be possible to change the altitude, and so the temperature, sufficiently to escape from the ice-forming regions. Taking that freedom of choice of vertical position on the part of the airship's commander, together with the reserve of radius of action which makes it feasible to seek a southern route when weather conditions on the shortest inter-continental courses seem likely to be bad, the formation of ice should be a very minor, in fact a negligible, hazard to a lighter-than-air machine. For the airplane it constitutes a graver danger, although one which can doubtless be successfully combated in over-seas flying with a plane well enough equipped with instruments so that the pilot may freely go, and remain, either in or above the clouds.

The factors previously mentioned, and those which will follow in the listing, apply with equal force to all over-ocean flying. It goes without saying, however, that ice formation is most important on the North Atlantic or North Pacific, and that on a run between southern California, Hawaii and Australia, or across the Caribbean into South American waters, it should be non-existent for aircraft of any type.

5. To lose the course by imperfect navigation is an awkward matter, but by no means a fatal one in a craft having ample endurance, especially if the ultimate objective is within a continental area. An airplane or airship heading for New York might be so unskillfully guided as to make a land fall at Charleston or Portland, Maine, and it would only be necessary to turn along the coast to the port sought. When the target is an island or group of them a few miles across, as in approaching Hawaii or in the "short course" across the Atlantic via Bermuda and the Azores, or in crossing the South Atlantic by St. Paul's Rocks and Fernando da Noronha, the hazard of an error in position is greater, especially if there is no time to waste before fuel exhaustion forces a descent. For the airplane the risk is a real one, especially if the region covered is one where fog is common. For the airship it is unimportant for many reasons. The reserve of endurance permits in case of need in cruising about for hours or days to get a check on position. It permits, also, direct inter-continental passages without intermediate island stops. Most important of all, the size of the crew and the working space allow of navigation methods equivalent to those employed on naval vessels or liners. Radio and celestial navigation can be used at full efficiency. Not even in the largest flying boats is the navigator in so happy a position, although they, in turn, present an enormous advantage over the landplanes with which most of the over-ocean attempts have so far been made. Like several of its predecessors, the navigational factor stands as one distinctly to be recognized,

likely to cause some concern, in using the airplane over very long stretches of sea, but as quite unimportant for its lighter-than-air sister.

6. There have been a number of instances of fire in the air, both on airships and on airplanes, in the past, and in at least one case fire has broken out on a plane during an attempted crossing of the Atlantic. Careful attention to detail has greatly diminished the hazard, especially on passenger-carrying craft not subject to violent maneuvering and with the power plant units well separated from the remainder of the structure. In the case of the airship the substitution of helium for hydrogen has been a factor of enormous importance in reducing fire hazard, especially in electrical storms, and the substitution of the Diesel engine for the familiar type with electric ignition, making it possible to use a "non-inflammable fuel," will be another. Whatever the prospects may be for the Diesel in airplanes, and the writer believes that they will become bright within the next few months, there is no doubt that its practical installation in airships lies just around the corner. Even at the present time, given decently careful operation, the fire hazard should be small in long distance commercial flying with any type of aircraft. When gasoline has been replaced by fuel oil it should be virtually nil.

Dangers from lightning can be almost as completely disregarded; again, especially if helium is used. Electrical discharges to aircraft structures have repeatedly taken place without fatal damage. Being struck by lightning is, however, not an experience to be courted, and in long over-ocean flights it should be quite unnecessary, violent electrical storms being sufficiently local and apparent at such a distance on the horizon as to permit of their evasion without serious sacrifice of time by a ship engaged in a long over-ocean flight.

7. Last of the hazards, but by no means least in its probable contribution to the past role of fatalities, is loss of control. Obviously, that applies only to the airplane, as there is nothing in the aerodynamic behavior of an airship corresponding to stalling or falling into a spin. Provided the airship pilot does not actually run into the surface of the water, the worst that he can do is to follow a crooked course. For the airplane the danger is very real and can only be overcome by long and special training of the pilots and by the provision of very complete instrumental equipment for blind flying. To fly without sight of a horizon is perfectly possible, as has often been demonstrated, but it is equally true that many pilots who suppose themselves thoroughly competent would be completely at a loss if they were out of touch with all landmarks for more than a few minutes. The characteristics of the control of airplanes and the necessity of keeping attitude and speed within certain limits constitute a real, although a diminishing, hazard in flying under bad weather conditions or at night. For the airship, over the sea or over level country, no such hazard exists.

A review of the conceivable sources of trouble thus separately enumerated makes it possible to appraise the relative safety of various trans-oceanic operations at the present time and in the comparatively near future. In summary, of the seven factors there are two which are of major importance as dangers, and three which are of secondary magnitude, but nevertheless real and serious, for the airplane. At least one, and possibly two, of the secondary points the failures of navigation and the spins or other accidents due to loss of control should be substantially eliminated within the next couple of years. The forced landing at sea due to engine failure, the termination of a flight in mid-ocean because of the exhaustion of fuel, and possibly the accumulation of ice, remain, and to those no full answer is in sight. For the airship three of the seven points disappear completely. Of the remaining four only two, the accumulation of ice and structural failure in storm, should be real hazards. Danger from either or both of those sources is slight compared with that to the airplane from inability to reach the destination and consequent descent in the water. The insurance companies which set so low

a premium on that first experimental voyage of the Los Angeles from Friedrichshafen to Lakehurst four years ago did not err on the side of over-optimism.

We ourselves shall make that error if we consider that our safety record is good enough to be perfectly satisfactory, or that the precautions which we already take are all-sufficient. Our striving for further improvement must be incessant, but in the service of airships over water, as in the over-land flying of airplanes with passengers and mail, we can safely feel assured that we have reached a point justifying continuous commercial service and appeal for public support, while at the same time we strive to pare down to still smaller dimensions such hazards as still survive. In that constant effort the airplane and the airship will re-enforce each other technically as well as supplement each other commercially, for much that is learned about navigation, about insuring power plant reliability, about fire prevention, about structural analysis or storm stress, or about coping with ice accumulation on the one can be applied to the other. Collective progress will be most rapid if the proponents of neither type sacrifice what they can do with certainty and reliability to attempt what can be accomplished only intermittently or not at all. Nor should the advocates of either ever permit themselves the cardinal error of total self-satisfaction with what has already been accomplished. Neither in airships nor in liners nor in airplanes or motor busses nor in subways or ferry-boats will complacency be justified so long as a single potential hazard, minor or major, remains.

CHAIRMAN FULTON: I am sure I am expressing your own sentiments when I thank Mr. Warner for his excellent paper. It has been a very interesting one and I believe a thought-provoking one. In his comparison between airships and airplanes I think he has made a pretty good claim for the airship as a safe means of trans-oceanic transportation. I wonder if there is anyone who would like to discuss any part of the paper.

CAPTAIN EMORY S. LAND ([C.C.] U. S. N., Vice-Pres., Daniel Guggenheim Fund, New York City): Mr. Chairman and Gentlemen, I second the comments of the Chair most heartily. I should like to add my personal thanks to one of the busiest men in the United States for taking the trouble to write such an excellent paper and come here to present it. I think our Assistant Secretary of the Navy may not be overworked in Washington, but he certainly is overworked outside, with meetings, banquets, airport and airway openings, and what not. There is a good deal of food for serious thought in his excellent paper. My only regret is that the paper could not have been published and broadcast throughout the world two or three years ago and again each succeeding year. Then I think we might have had some wonderful pilots still with us who have taken "the last chance."

There is one point of our esteemed secretary's remarks on which I am a little more hopeful, possibly, than his paper indicates, and that is for the future of flying boats. He has just returned from abroad and has given us a wonderful lecture in Washington concerning what is going on in Europe as to the construction of large flying boats. We are behind in commercial flying boats. We might as well recognize the fact and get busy and catch up. There are in process of construction in Europe some very large flying boats that may carry anywhere from forty up to possibly one hundred passengers. Whether they will be successful for trans-oceanic purposes or not I wouldn't care to predict, but there is some great hope amongst those who are interested in flying boat development as to the possibilities of building a flying boat that is capable of being forced down and capable of getting off again under reasonable weather conditions. Whether it would be able to get off in bad weather conditions remains to be seen. But I am optimistic enough to hope that the flying boat will come into its own certainly as a coastal commercial vehicle and possibly as a trans-oceanic means of transportation, even though it may not be able to go directly across.

I should again like to add my general thanks and personal thanks to Secretary Warner.

CHAIRMAN FULTON: May we not hear from Senator Bingham who has recently returned from abroad and will doubtless have some interesting things to tell us concerning the latest development of the dirigible in Great Britain.

HON. HIRAM BINGHAM (U. S. Senator from Connecticut, President of the National Aeronautics Assn., Washington, D. C.): Mr. Chairman, I came to listen, not to talk, but as you were so very kind as to ask me what Great Britain is doing, I feel that I must return the favor by accepting your challenge to say a few words in regard to British progress.

Those of us who have been interested in aviation for a good many years have learned to regard with a good deal of skepticism anything we see in the newspapers. The other day a special dispatch from Paris to one of our metropolitan dailies described the arrival in Paris of that interesting new plane called the Autogyro, sometimes referred to as the "windmill plane," whose monoplane revolves. We know, of course, it is not a helicopter, although frequently referred to as such. But what I was going to say is that this special dispatch in one of the metropolitan dailies, in referring to the arrival of this Autogyro at Le Bourget, said, "And then, unlike the ordinary plane he was able to land with his engine entirely cut off!"

When one reads things of that kind—and one continually does, even in the most reputable newspapers—it is somewhat disturbing. In one of the greatest metropolitan areas a few days ago, in giving the picture of an Autogyro, the statement was made that "It goes straight up and comes straight down." Of course it does not. These papers are, I believe, striving to interest the public who are anxious to get an understanding of aviation but they, at times, greatly distort the facts.

Now as to the progress in Great Britain, having in mind that the British were going to build airships that would carry a great number of passengers, naturally I took that with some skepticism when it appeared in the newspapers. So I took advantage in London of an opportunity to visit the two great airports and see the dirigibles that were under construction. They will of course not be finished as soon as their designers had expected, but there is nothing new in that. Very few large yachts or steamers or anything else, for that matter, are finished on time.

One of them, built under the direction of Commander Burney at a remote spot in the northern part of England not far from the town of York, is expected to be finished this fall, and he hopes to have a trial trip before Christmas. The other one, which is being built just outside of Bedford, not very far from London, by the Air Ministry, is based on a totally different design and constructed of different materials. The Burney dirigible, so far as its framework is concerned, is being built entirely of duralumin, while the Air Ministry's ship is being built largely of steel and will probably be finished next spring. It has been delayed a good many years in construction because of their insistence upon having repeated tests of material and of everything connected with the airship.

I hope that both of these ships will meet with the success which they deserve, because I believe entirely with the last speaker (whose paper I listened to with great interest, regretting only that I was unable to get here in time to hear the whole of it), that the airship is in no way the rival of the airplane but is in every sense its proper complement. Needless to say, I believe in both for their proper uses. Until we get a new form of power plant, I do not believe in trans-oceanic airplane travel. As Secretary Warner has so clearly pointed out, the possibility of useful load for those great flights is so small as to make it commercially practically useless. On the other hand, the airship over land competing with express trains is left in the cold because of the conditions of the weather. The latest airship can cruise at about 70 miles an hour in calm weather. If it has a 20 mile wind then of course that is reduced to 50 miles an hour. Our best express trains can average 50

miles an hour, and they can do it day in and day out, weather permitting or weather not permitting, except in the hardest days of winter.

As Secretary Warner has pointed out, the dangers of the peculiar kind of storm overland which the Shenandoah unfortunately ran into, are very much less at sea.

I wish those of us who are interested in all types of aviation would insist upon the fact, so far as we can, that these two great means of travel in the air might be properly used and properly developed along practicable lines—and when I say that, I have in mind how a few days after I said something in the Congress against the use of airships by the Army and did what I could to prevent an appropriation of a large amount of the people's money for the furtherance of Army dirigibles in Scott Field, Illinois, one or two Army dirigibles mysteriously floated over Washington in an interesting manner and showed off their paces to the populace; and everybody said, "Isn't this lovely, and how nice it is that the Army has dirigibles," and of course that was the sole object of the trip.

So far as I can see, with the progress that is being made by airplanes, there is no sense in having airship travel over the land, but over the ocean the shoe is on the other foot. The larger you build your airplanes, the less useful load you get in proportion to the increased size. The larger you build your airship, the greater useful load you get. As happened only yesterday, in that German airship that started out to fly over Berlin, when the weather conditions were found not to be correct it was decided to go around by way of England and it made the 1,700 mile trip with some 70 people on board in perfect safety—not in perfect comfort according to one of the lady passengers, because they were nearly frozen to death and they hadn't anticipated quite such cold; but of course the later dirigibles will have heating arrangements; in fact, both of the dirigibles that I have referred to have heating arrangements for the comfort of their passengers.

This German flight, to which reference has been made, was not stopped by reason of the fact that there was failure in the power plant. Twice, I believe, one of the engines had difficulty, some connecting feed-pipe was broken and fifteen or twenty minutes were required to repair it, but the safety of the passengers was in no way endangered by reason of the failure of one of the engines, or even of two of them, for that matter. In the event of engine failure in an airship if two of the engines fail, a landing can still be safely made on land, but in the big flying boat, as has been pointed out by Secretary Warner, if it once comes down it will probably float for a time until some ship comes along and picks it up; but it is not able to take off in that rough water and cannot proceed with its passage when once the power plant fails. In the airship it is entirely different and you can make a landing with safety.

I cannot understand why the public is not more enthusiastic about airships and hasn't got more confidence in airships. But I know it is true from the fact that this room is not crowded, whereas other rooms where they are discussing airplanes are crowded. When you realize how long they have been trying to fly from the continent of Europe to the continent of America in airplanes, and when you realize the great ovation that would welcome anybody who might succeed in flying from the continent of Europe to the continent of America, or from the State of Germany or France to the State of New York or New Jersey—a thing which has never yet been done—that somewhat explains that great interest in the airplane.

The East to West flight of course has been made by the world fliers and more recently by the German-Irish fliers, but we must all realize that the only two times that a rigid dirigible undertook that East to West flight, both times it was successful. Not only that, but one of them flew from the interior of Germany to New Jersey without a stop, without a hitch, without any difficulty whatever.

When you take all of those things into consideration, it baffles me to understand why the public is not more interested in the advent of the airship and why they don't put their shoulders to the wheel and make it possible for airships to take

weekly trips across the Atlantic Ocean. Of course that is going to be a weekly occurrence. Apathy will not keep this thing back for long. There are five airships under way today; one of them is finished, two are nearing completion, and two just about being laid out, that can make the trip with perfect ease.

The airships which I saw in England are models of comfort, all things considered. I don't mean to say that the private cabins are as large as this room; in fact, the cabins are very small, but they are more comfortable than those on the steamships on which I traveled when a boy, where all the berths were in one big room and all the effects of seasickness of one passenger were not only in the eyes but also in the ears and nose of every other passenger. There is sufficient room in the cabin of one of these airships for two people, and each airship will carry about one hundred passengers.

Of course the trouble is with the terminal facilities, with the port. There is only one good port in eastern United States for an airship and that is Lakehurst, and it cost a great deal of money. My recollection is that it cost about \$2,500,000 to build it. You can't just come down in an ordinary field with an airship. You have to have the proper facilities. The British believe that the mooring mast is of great importance and is all that is necessary except for repairs. Consequently, they have spent a great deal of time and money and done a great deal of experimental work in developing what they consider to be an ideal mooring mast. They have built one near Bedford, north of London. They have built duplicates of that in South Africa, in Egypt, India and in Australia; and they expect to tie the Empire together in the near future by regular journeys from Bedford to South Africa, and from India to New Zealand, and so forth.

Our Navy has developed a mooring mast which brings the airship down nearer to the earth. At all events, the mooring mast problem has been solved, and so far as making a single stop is concerned, the difficulty is not so great as would seem when one says that a single hangar costs \$2,500,000. But what we must do, it seems to me, is to give every possible encouragement to those few courageous and farsighted citizens, like our presiding officer, who are devoting their lives to promoting a knowledge of the requirements of long distance voyaging by airship.

I do not like to hear people make foolish prophesies; I dislike nothing more, and I think nothing is more harmful, than when some self-seeking person who happens to be a pilot says that in the near future we are going to have airplanes carrying 200 people, going in a few minutes from New York to Chicago, when of course that is not true. I dislike prophesies of an exaggerated kind and over-optimism, but I see no reason why, within the next three or four years, certainly by the end of five years, we should not have regular service across the Atlantic in airships. There are other people who believe the thing. There are also others who believe just as firmly as I do in the safety of airships, and I offer you the proof of that in the fact that more than 200 people, (I am told by the newspapers—with what accuracy I know not) have offered \$2,500 for the privilege of coming across the Atlantic for the first time in a passenger carrying ship from England to America. The thing is undoubtedly going to come about, and what we want to do is to see to it that airships and airplanes complement one another and are developed in their own proper lines.

A bicycle on a broad road was, in the old days before the roads became infested with motor vehicles, a fairly comfortable and safe way of traveling. A rigid bicycle on a taut wire used to go across a chasm; it was something of a stunt because if it stopped, that was the end of the performer. But they never have thought any the less of the bicycle for that reason and we never have thought it was necessary to develop bicycles that would go across a chasm on a taut wire without causing the loss of a life if they stopped. On the same principle, why is it necessary for us to think it essential for a land plane to go across the ocean when, if an engine stops, a catastrophe would happen? And by the same token

should we not do everything we can to develop the airship in which, if the engine stops, it can be repaired and the airship proceed on its way?

I haven't meant to talk so long, but unfortunately the commander has caught me on a pet hobby. I have for some years tried to make some of my fellowmen in Congress realize that the airship is not a dangerous thing. Several Senators have said to me that they have determined that there shall be no airships in the United States and they are going to do all possible to see to it that no more money is going to be thrown away on this "foolish balloon stuff." They represent their constituents who have been taught to believe that way by thoughtless people, either talking or writing that way, concerning what has happened in the case of certain great disasters; but I wish that you would talk to your Congressmen and to your Senators, and if you can't think of anything else to say, remind them of this: That of all the pilots who have tried to cross the Atlantic in airplanes of a land design, less than one-half have reached their destination and many have been lost at sea. Of all the airplanes of boat design or seaplanes that have tried to cross the Atlantic, a good many have reached their destination and no lives have been lost, but not more than fifty per cent have reached their destination. But of all the airships that have tried to cross the Atlantic, all the rigid dirigibles that have tried to cross the Atlantic in either direction or to make a round trip, the performance has been this: Lives lost—none. Failures—none. Success—100 per cent.

CHAIRMAN FULTON: Thank you, Senator Bingham.

Is there anyone else who would like to discuss this paper?

DR. FREDERICK L. HOFFMAN (Prudential Insurance Company of America, New York City): I think the reason why so little is said about the airship and so much about the airplane is because the airplane industry is represented by about one hundred concerns all of whom foster its publicity. The airship is not represented by an industrial concern but by the Army and Navy.

The second point of Senator Bingham concerns mooring masts. The newspapers themselves don't realize the supreme significance of the fact that there can be no airship development without mooring masts and that all over the country these should be established.

The third point is the one of safety. Secretary Warner quoted the figures of the Army and the figures of the Navy which show unmistakably that lighter-than-air craft operate more safely per million miles run than heavier-than-air craft. Those facts have not been published because the writers on aviation subjects, as a rule, carry the plea to establish the aircraft industry. I think it is a most important thing that we should arouse a profound interest in the safety of lighter-than-air machines. The Zeppelin Company of Germany has had a most excellent record with this type of craft and it should be shouted from the housetops, but it is not known.

Finally, there is one advantage of the airship over the airplane, an enormous advantage, and that is comfort. It is ten times more comfortable in the airship than in the airplane. You can move about; you have room; you can sleep, and you can eat. You can do all kinds of things. It is far better to build airships than to build airplanes.

As to land travel and sea travel, I am not so sure that the time will not come when land travel, even in this country, between Panama and the West Indies by the airship, may be perfectly feasible; but what we lack in this country above everything else at the present time is a virile imagination to deal with these airships. We must realize the fact that we not only can ride in motor cars and railroad trains, but in airships as well as in airplanes. Too much stunt performance has frightened the public. We need to have a real interest created in normal flying. We shall never develop the aviation industry on an enormous scale until that is done, and it is bound to come, once the public realizes the difference between stunt flying or sightseeing flying and normal, rational passenger

flying, with established airports, and airships flown by licensed pilots. We have plenty of good landing fields but no airports with all the necessary facilities. In Buffalo there is one very good airport, but as a rule what we call an airport is nothing but a landing field, and we are just beginning to realize that fact. An airport is a very different thing from even a first-class landing field, and that is what we have to point out to people.

CAPTAIN HUGH L. WILLOUGHBY (Licensed F. A. I. pilot, New York Yacht Club, New York City): I had intended to make a few remarks on the safety, or immunity from terrible accidents that we have from fire on our airplanes; but there seems to be quite a little discussion about the dirigible brought out this afternoon, and I would like to answer the question which Mr. Warner asked, as to why the public didn't seem to take so much interest in building these huge dirigibles in this country.

Let us go back to the history of the dirigible. Count von Zeppelin built seven of those dirigibles, one after another. They were all wrecked, but no passengers were lost. Some of them came down in trees and the people climbed down from the trees, thus saving themselves; but the difficulty was that if they had to make a forced landing and they were away from their shed, they were sure to be wrecked. The German government, after that series of experiments by Count von Zeppelin, built a lot more dirigibles. The German people gave Count von Zeppelin lots of money to build more of them, preparing for a war. They built a good many of them during the war, but what did the airship do as a military unit?

In the flights that it made over London there was nothing that it destroyed from a military standpoint that was at all commensurate with the enormous outlay of money, first in building those airships and then in maintaining them. All sorts of stunts were tried on those dirigibles. One of the experiments tried was to drop a cage with an observer in it, with about 3,000 feet of wire attached to the cage. They suddenly discovered the fact that they might just as well have had an anchor on the ground. They couldn't do anything, and they were at the mercy of the airplane, so they gave that up.

We always thought during the war that there was a gun mounted on the top of the gas-bag. I think everybody thought so at that time. Naturally, through any fabric (it never can be made perfectly gas-tight), there is always a little ooze of the hydrogen from the top of the gas-bag. That gun was only about a foot and a half from the top of the gas-bag. They fired the gun, yes, but they also fired the balloon. That was the end of that balloon.

Now as to the question of the dirigible as a trans-Atlantic ship carrying passengers, they could do it all right, but if any adverse weather that cannot be predicted by the Bureau comes on before they make their landing, they are very apt to make a crash landing before they can get to their port.

The objection that I think the public makes to building any more dirigibles is not the enormous expense involved, but the danger of those dirigibles even in trans-oceanic work, in perhaps not being able to make a safe landing in their sheds or the wind being adverse so that they cannot put them into their sheds, as was witnessed in the loss of the Dixmude and the Roma and other ships, and that big ship that we contracted for, that broke up before she could be delivered on this side. That would naturally give the public a dread of building these dirigibles.

On the question of helium, I don't think helium could ever be made of a sufficiently low price to make it of commercial value so as to render the dirigible perhaps immune from that serious accident of fire.

I happened to be in Newport when the first experiments were made on the Patoka with the mooring mast. The Shenandoah was expected there at Narragansett Bay and I went up in the admiral's barge to see the Shenandoah make

fast to this new mooring mast that was on the Patoka. The Patoka first anchored down in the lower bay and then they found that the wind was across the current that was running out in Narragansett Bay pretty strongly and it wouldn't do to anchor the Patoka there and then anchor the airship to the mooring mast on the Patoka because it would upset the Patoka; so they moved the Patoka 14 miles up to Bristol and conducted their experiments. They had hard work to make fast to the mooring mast; there was a man on the dirigible who was trying to make fast, and it took two hours to get a line on the mooring mast to make fast to it. I said, jokingly, to the admiral, "We have got to have a new petty officer appointed here as chief lassoer to the United States Navy." They finally made fast to it and it was all right.

To my mind, the mooring mast is not a success. Take the mooring mast that the Shenandoah made fast to previous to her accident; they made fast to that mast and the wind kept blowing harder and harder. Finally, the wind blew so hard that it smashed the nose entirely off the dirigible, and it cost the Navy \$100,000 to put on a new nose; she finally broke loose and drifted in the storm, but after the wind died down she managed with the broken nose to limp back to her shed at Lakehurst.

CHAIRMAN FULTON: Perhaps the next speaker will be able to tell us some more about the things that Captain Willoughby has mentioned, but before closing the discussion Mr. Warner perhaps would like to reply to these various comments made on his paper.

HON. EDWARD P. WARNER (Assistant Secy. of the Navy for Aeronautics, Navy Department, Washington, D. C.): Of the contributions to the discussion, it would be impossible for me to offer any reply to Senator Bingham's except in the form of applause. I heartily agree with all that he has said. I, too, have had a chance of seeing something of the developments in Europe to which he alluded, as has Commander Fulton, and I hope you will all—and many who are not here—be favorably influenced by his strong recommendation for each type of aircraft in its proper place.

Captain Willoughby's criticisms seemed to be to allude to a number of points of detail which it is hardly possible to discuss in detail without the consumption of more time than I want to use now.

I do desire, however, to turn back to what Captain Land said about the flying boat. His multitudinous official duties have taken him elsewhere for the moment, I am sorry to say, but I heartily agree with him about the possibilities of the flying boat. I am enthusiastic about that, too. As at least one member of the audience knows, the last previous public appearance that I made was to talk about "Flying Boats and Their Merits," but the trans-Atlantic flight is as yet too long. They have great possibilities, and it was specifically because of what I consider to be the flying boat's prospects that I gave that definition of the trans-oceanic flights and included the Hawaiian flight and the trans-Atlantic flights of the NC boats in 1919. The time may come for trans-Atlantic operations on some routes, but for the present I consider that I am justified in clinging to the indictment that I made against the commercial feasibility of any heavier-than-air operation on the broad oceans during this year, or probably for several years to come.

CHAIRMAN FULTON: There has been a change in the authorship of the next paper which is entitled "Outstanding Requirements for Safety in Airships." Instead of being prepared by Lieut. Commander Rosendahl it has been prepared by Lieut. Commander H. V. Wiley, of "the Los Angeles," and will be presented by him. Commander Wiley is a rare bird. He is one of the very few men in this country who is really experienced as a pilot on large rigid airships. We need and must have more like him, if airships are to progress and become the safe means of trans-oceanic travel that we hope they will be. Commander Wiley.

Outstanding Requirements for Safety in Airships

By **LIEUTENANT COMMANDER HERBERT V. WILEY**

U. S. Navy, U. S. S. Los Angeles, Lakehurst, New Jersey

Since structural integrity of modern airships has been adequately provided, especially in present designs now under construction, it is proposed to limit this discussion to the *operation* of modern large airships, assuming them to operate on a regular schedule over a fairly long route. The long distance, regularly scheduled route is undoubtedly the field in which the commercial use of large airships will be developed, for their reliability, safety, comfort, habitability, accurate navigation, long cruising radii, speed, weight carrying capacity, relative independence of visibility conditions, etc., combine the desirable and necessary factors for air transportation in a manner superior to any other means of transport.

Terminal Facilities

In the discussion of terminal facilities it will be noted that the requirements are, in general, somewhat similar to those that should be available for heavier-than-aircraft. There is no reason why an airport could not combine the airship and airplane facilities, and development of them will advance side by side. Also this will be seen to be more practical when it is realized that the airplane will cover the shorter air lines and act as feeder for the long airship routes, and it will expedite passenger transfers, etc., to use the same airport.

(a) *Location Meteorologically:*

Of course, the location of centers of population and transport will govern the location of terminals to a large extent, but in locating an airship terminal the atmospheric conditions should be carefully considered, and it is possible that one site within a reasonable distance may be selected that will offer decidedly better general meteorological conditions than prevail at another. After the general area has been chosen, the local conditions should be closely studied, as local fog and even thunderstorm conditions, particularly near bodies of water, often vary remarkably within a few miles. Therefore the situation should be chosen which is favorably located in regard to the general path of meteorological disturbances, and selected locally for freedom from minor meteorological hindrances to aviation.

(b) *Necessity for More Than One Terminal:*

Since we will admit that an airship should not try to land at a terminal during a severe storm any more than a large steamship would try to enter a narrow channel or dock under similar conditions, it is foreseen that for any long distance route there should be an alternative terminal which might be used in case the usual terminal has very stormy conditions which are liable to continue for 24 hours or longer. This secondary terminal can probably be within 200 or 300 miles of the main airport. It gives the airship a haven to enter instead of "heaving to" at the edge of the storm area, and in addition to safety would probably provide a means to keep closely to schedule. For instance, if the main terminal were New York and a general snow storm or blizzard covered that vicinity, the transatlantic passengers and the airship could be shifted to some other place, such as Norfolk or Boston, and the return trip begun on schedule. In any case of fuel shortage caused by long delay in landing at one port there should be an alternative port capable of servicing the airship. It is not likely that conditions would be totally unsuitable simultaneously at two ports separated by 200 or 300 miles.

(c) *Equipment of Airport:*

The equipment of the airport for a long distance airship line does not necessarily include a hangar. Mooring and "riding out" facilities are now sufficiently devel-

oped that a hangar is necessary only for major repairs. However, necessary mast facilities must be provided. For efficient and regular handling and servicing of airships a terminal should have the following additional equipment:

A radio beacon at the port.

Availability of radio compass stations, for cross bearings. These stations are already provided along the coast.

A light beacon.

A radio station.

A fog gun or siren.

A meteorological office and staff.

Service facilities for lifting-gas, fuel, oil, food, water ballast, etc.

The radio equipment, including the radio beacon and radio compasses, enables the airship to find the station and land in dense fog. Airships have frequently landed in fog, and in the last two months the "U. S. S. Los Angeles" has landed once in a light fog when the ground crew could not be seen until 20 seconds before the landing ropes were dropped, and another time in a driving rain when the clouds were down to 400 feet. The ability of the airship to "hover" gives plenty of time to obtain location and then land when the proper place is located.

It may be noted that large landing lights or special illumination of the landing field are not necessary for airships.

Navigation Facilities

Very little has been said in the press of the navigation of airships, as they have been uniformly successful and are approximately as accurately navigated as surface ships. Their superior advantages in this regard over other aircraft are: room for charts, instruments, etc., comfort of navigator, small deviation of compasses, more accurate steering, steady platform from which to take ground or celestial observations, better radio facilities, etc. A seagoing navigator with a little aircraft experience becomes an excellent airship navigator. We may then put down as one of the requirements of airship navigation that the pilot be an experienced navigator.

Ordinary surface ship methods are not adequate for aircraft navigation on account of the much greater speed, the great and frequent changes in wind force—hence greater deviation from the course steered and the introduction of the vertical dimension, with its variable factors, to the medium being traversed. Therefore, the latest design of drift instruments and instruments for celestial observation and calculation will be demanded and can be used efficiently. Long range radio compass bearings can be used when approaching a coast if the navigator knows how to apply them to the chart in use.

Ordinary magnetic compasses are sufficiently accurate with present airship construction of nonmagnetic material. An earth inductor compass could be easily carried and would provide more accurate steering—hence less deviation from the set course—which would amount to several miles distance saved in a transoceanic flight.

It must be understood that in transoceanic navigation the choice of routes depends upon the circulation of the winds, the navigator always trying to take advantage of favorable ones. To do this he must know the general distribution of the barometric pressure areas, and in this connection a nonbarometric altimeter in addition to the barometric altimeter would be a great advantage. It not only enables the pilot to know his correct altitude above the surface but it also provides a method of determining the barometric pressure at the site in question.

Knowing the barometer at his own location, the pilot is better enabled to determine the wind changes to be expected, especially if this can be coordinated with radio reports from other stations.

Communications.

In regard to communications considerable mention has already been made of radio facilities in connection with terminals and navigation. The modern airship has weight and space available for efficient communication equipment. It should therefore have a long range receiving and transmitting installation and if possible a ship's radio compass. "Blind" flying is perfectly safe and practicable in airships, but depends of course on radio facilities for accuracy of navigation. Fog, rain and snow do not keep the dirigible from flying a straight course at undiminished speed as long as an occasional check of the position may be made. The radio set must be capable of quick reception of weather schedules, or perhaps television pictures of weather maps, and it may be desirable to transmit and receive at the same time, as the present weather schedules consume about three and one-half hours a day for complete reception.

Fire Prevention

Danger of fire from hydrogen is not feared by officers experienced in airships. Of course, all practicable precautions are taken, but hydrogen airships have even been struck by lightning several times without damage, because of the dissipation of the charge through the metal frame. This danger is eliminated in the use of helium, and it is considered mandatory to inflate with helium military airships liable to attack by incendiary bombs or bullets. Also dirigibles inflated with helium can valve gas freely during an electrical storm, which would be most inadvisable with hydrogen.

The danger of a gasoline fire is always remotely present, but general safety precautions and constant inspection for leaks, etc., minimizes the possibility of occurrence of this casualty. Heavy oil engines as a substitute for gasoline engines may become an actuality in ships now under construction, and this will reduce the fire hazard somewhat.

Parachutes

With a helium ship it is difficult to visualize a casualty which will bring the ship down more rapidly than a parachute descends, and opinion in general is against the equipment of airship personnel with parachutes. The present type of parachute is not adapted to airship use, as personnel have to move about and do certain work which would be much hampered by a heavy and bulky parachute. However, it would be practicable to develop a type of chute which could be stored at certain places in the dirigible and to which a person might attach his harness and escape in time of need.

Ballast and Fuel Reserves

All dirigibles carry water as ballast, and the amount required depends upon several considerations. However, water carried as ballast is not available for any extensive use for other purposes. Past practice for the provision of excess ballast was met in detachable fuel tanks which were dropped overboard intact. This has been improved upon recently by the installation of "dump" valves in certain fuel tanks, the valve being operated from the ballast board in the control car. With this equipment in operating condition it is possible to start a flight with

much less water ballast than formerly, as any emergency ballast necessary during the take-off is available in the form of fuel. If this emergency ballast is not needed during the take-off, it is then available as fuel and extends the cruising radius by that amount.

The question of fuel reserve has developed one prudential rule in general use in airships, which is: always have from 25 to 33 per cent reserve fuel for any trip. An accurate account of ground speeds in relation to air speeds kept on the "Shenandoah" showed that about 33 per cent reserve was necessary, although there was not that great difference between ground and air speeds. On the "Los Angeles," a faster ship, the difference between ground and air speeds for 60,000 miles has been only about 10 per cent, and a 25 per cent reserve is considered sufficient for an ordinary long flight.

International Standard for Mooring Masts

We in this country are already confronted with the arrival of foreign airships which desire to use our mooring masts and other terminal facilities. The U. S. Army is constructing masts, the Navy has five, municipalities and private airports are erecting them, the British are building them in Canada, Egypt and India. Argentina and Spain are planning an airship line. Our future commercial airships will want to use foreign masts. So far little has been done regarding the standardization of dimensions of equipment for mooring airships. Not only must the physical connection of the mooring mast and airship be of perfect fit, but the connections for fuel, water ballast, electric leads, mooring wires, etc., should be of the same type and size. This is urgently needed. The ships will be in operation before the terminals are available if action is not taken at once, and if the masts are not standardized international intercourse through airship transport will be delayed.

Meteorological Information

On any long distance route suitable weather information should be available so that the pilot may utilize favorable winds and avoid unfavorable ones. Also although modern airships are considered amply strong to withstand in the air almost any atmospheric disturbance, no prudent pilot would deliberately put his ship into a storm when he could easily avoid it if he were forewarned of its existence and location.

The United States Government issues very valuable weather maps twice each day from observations reported at 8:00 a. m. and 8:00 p. m., Eastern standard time, all over the United States. However, in some localities there are very few observing stations, and more reports are desirable. Any person can, after a little study, read the general signs from the U. S. Weather Map, but it takes long study and much experience to be able to forecast more accurately and discern from the lesser details the features not apparent to the untrained and inexperienced. There is an axiom among airship pilots that the pilot who is most successful in operating his ship is also the most weather wise, for he can take greater advantage of favorable conditions and avoid unfavorable ones. Therefore he must be thoroughly conversant with forecasting from weather maps and an expert at foretelling conditions from visible signs. He must also have a thorough understanding of the structure of storms and the variations in atmospheric conditions that they cause. Anything that can be done to improve the knowledge of meteorology will be welcomed by the airship officer.

Several improvements are at present desired. It has already been mentioned that it is necessary to have more reporting stations. The more reports there are

on the map the more the details of weather existing in any locality can be studied; hence the forecast can be made more accurately. At present the Weather Bureau receives reports from a few ships at sea, but these are meager, and for efficient transoceanic flying the Weather Bureau should have facilities for greatly expanding this service. Great improvement has been made in this regard in the last two years, but even now there is not sufficient information to draw any but the scantiest map of conditions over the oceans. Stations also have been established in Canada, Greenland and Alaska the information from which is most valuable in judging the extent and severity of storm areas. Further extension of this phase is desirable.

In England four synoptic maps are available daily and this augments the information for forecasting, for naturally with more frequent observations available unexpected developments can be discerned sooner, with consequent advantage to aviation. There are several reasons why the four map system has not been adopted in the United States, but they are generally included in the lack of funds to pay observers and the difficulty of engaging commercial wire lines for the prompt communication of reports. Both of these items are a question of Government appropriations, and the growth of aviation will undoubtedly develop a popular demand for financial means to establish this facility.

Another phase of weather observation which has been neglected until recently is the observation of the upper air. Within the last two years about a dozen stations in the United States have been equipped with upper air "sounding" facilities, but this service has only begun to furnish data which can be coordinated with surface observation and forecasting rules. Every aviator of any extensive experience knows that there are disturbances and storms in the upper air which are not indicated upon a weather map made from surface observations. The writer knows personally of several instances of these disturbances and of one case where, when the surface barometer record showed a slight "kink," an upper air sounding indicated a wind of over 100 miles per hour at 5,000 feet. No other indications of such conditions were apparent on the surface. As yet we have not obtained sufficient experience to combine the upper air observations accurately with the surface indications, but their use so far indicates that this data is of the utmost value in forecasting and there is a great demand among meteorologists for the expansion of this agency.

When it is realized that even the best forecasters consider that their average accuracy is seldom higher than 75 per cent, it can be seen how great the demand is for more information and observations. Weather is studied mainly by empirical methods—that is—observation has shown that a certain set of conditions usually develops into a subsequent set of conditions, and it is mainly by past performances that forecasts are made. It is admitted that we should know more of the physical reasons for changes rather than base our forecasts on past performance, but governments and scientific institutions have not in the past supported scientific research along these lines to a sufficient extent to develop the science as it should be developed. The scientist cannot bring to light and test new theories without data such as temperature and humidity of the upper air, and more data is the crying need of the meteorologist.

Another need that will become apparent with the growth of long distance aerial transportation is the necessity for international standardization of units used in observation of conditions. In the United States the barometric pressure is measured in inches, in England in millibars (an arbitrary unit) and in Europe in millimeters. For wind velocity we use statute miles per hour, the seaman sea miles per hour and the European meters per second. Temperatures are also

recorded by different types of thermometers using different scales. The international flyer will be at considerable disadvantage in assembling his data for formulating forecasts until one standard is used.

Airship flights are not impeded by rain, fog, snow, and even thunderstorms if they are local and not widespread. No aircraft of any description is safe in a thunderstorm and all aviators will pass around them. As a rule they may be safely approached within five miles, and as long as one can see and avoid them and does not get surrounded so there is no choice but to go through one there is no danger. However, a type of disturbance of great danger is a low barometric area of V shape which sometimes traverses the United States. These are called line squalls, because the main disturbance forms a long line of clouds along the center of the V, and these are sometimes several hundred miles long. In the United States these move in general from east to west, the wind on the east side being from the south and warm and moist, while the wind on the following side is from the west or northwest and cold and dry. Where these two air currents meet is a long line of atmospheric turmoil, the actual cloud itself having a rapid rising current on its front and a following descending current of great force. The meeting of air currents generally forms a roll cloud. This type of storm would keep an airship from making an airport and in some cases would cause a long detour to avoid its effects. Such storms force the establishment of more than one terminal for refuge in case one should be encountered just as a dirigible were arriving from a long flight perhaps faced with fuel shortage. We know enough about such storms to fly through them with comparative safety, but at the very least they are unpleasant.

Qualifications and Licensing of Aviators

Finally it may be stated that it is not too early to decide upon certain physical and professional qualifications for pilots and the form governmental supervision will take in licensing them. There must be some sort of governmental regulation, for the public already realizes that certain adventurous spirits have embarked on perilous flights which should never have been permitted. Regulations will therefore prescribe certain minimum equipment for aircraft as well as physical and mental equipment of the pilot.

Summarizing briefly, we may then say that the outstanding requirements for safety in airships are:

- (a) Proper terminal facilities.
- (b) Proper navigation equipment both on the ground and in the air.
- (c) Efficient means of communication.
- (d) Supervision to prevent casualties, especially fire.
- (e) Vastly expanded meteorological service.

The only further comment is that regarding the necessity for speed in adopting these suggestions. It is not too early *now* to begin international conferences and national preparation for their adoption. Five large transoceanic airships will be completed within two or three years! Aviation is developing faster than even the most enthusiastic ever dreamed it could. It is time for action!

CHAIRMAN FULTON: We are very much obliged to Commander Wiley for his very informative discussion of the operational requirements for safety in airships. Is there anyone who wants to discuss this paper?

S. TRUSCOTT (National Advisory Committee for Aeronautics, Washington, D. C.): Commander Wiley's paper is in a sense a progress report. In listening to it I found myself involuntarily harking back to the time when our interest in airships in this country first began to crystallize. Commander Hunsaker and Commander Fulton were first beginning the work on the construction of our first

rigid airship and were promoting the training of the first airship pilots. It is a long way back, even if the years are not so many, and while Commander Wiley has chosen to outline many things which he thought could be improved, it is the modesty of the man who has accomplished something which leads to that phrasing of his paper; because the people who are now operating our airships—particularly the Los Angeles—have come a long, long way in the past ten years.

I don't want to bore you with all the reminiscences which might come up as the result of listening to what Commander Wiley has just been describing; but I would like to call to your attention the fact that this necessity for improved facilities in connection with weather has been appreciated for a long while and that appreciation has recently crystallized in the formation of a special committee under the National Advisory Committee for Aeronautics, which is to devote its entire attention to the problems of aerial navigation. Subcommittees are to do cooperative work with the government departments and private organizations on the development of improved facilities and a study of the problems, of course, in navigation itself, in the instruments required, the weather problems, and in communication. That committee includes representatives of practically all of the interests which should be represented on such a committee and is just beginning to get under way.

It is true, as Commander Wiley states, that if airships should suddenly blossom, as it appears possible they may, the amount of facilities available appears at first to be rather limited. My own opinion is that our knowledge of what the facilities should be is rather more complete than the impression which he has given you, and that when they are really needed they can be provided in a very short time.

CHAIRMAN FULTON: Is there anyone else?

Lieut. Emerson, would you like to say something on the operation of airships? You have had a good deal of experience along that line.

LIEUT. R. EMERSON (Ex-Lieut. U. S. NRF, Strauss & Emerson, 307 N. Michigan Ave., Chicago, Ill.): Possibly as an older pilot and commander I am not today as proficient as I was in former days, so I hesitate to add anything to his remarks, with which I must agree completely.

I would like to add this one word as to the safety of airships as passenger carriers. It is not commonly known that in history there have been launched and employed in paying passenger service 14 large airships, either rigid or semi-rigid, and that in more than six separate years of commercial operation not a single passenger has been injured in these ships, and that the total passenger mileage exceeds 3,500,000. I am just contributing that small "statistic," as a Britisher would say, to the safety question as to airships. I don't happen to know of any airplane passenger carrying application that has quite that passenger mileage safety record; and I am not saying that as an airship proponent and an airplane opponent because my original interest in aviation was exclusively with airplanes. That is where I spent and lost most of my money, and it is still very vitally connected with the use and employment of airplanes.

CHAIRMAN FULTON: Is there anyone else?

LIEUT. COMMANDER WILEY: I might say, somebody remarked a few minutes ago about the time it took to moor an airship in a certain case as being two hours or more. The last time the Los Angeles was moored at Lakehurst, seventeen minutes was occupied in tying to the mast.

STANLEY Y. BEACH (Beach Engineering Co., New York City): Could Commander Wiley tell us something about the improvements that have been made with stub mooring masts, and so forth.

LIEUT. COMMANDER WILEY: We have been working for some time to simplify the terminal facilities for airships because the great criticism has always been

the matter of getting in and out of the hangar and the delays that occur, and so forth. Also commercial companies are not going to take up airships until some inexpensive and reliable terminal facilities can be provided. The high mast, which in complete operating condition costs about \$100,000, is more or less satisfactory, but we have recently experimented with and worked with and improved a short mast that keeps the airship only two or three feet above the ground. The mast holds up the forward end of the ship and the after end is held up on a wheel which runs around a path. That is the first installation, I may add; and the installation we have now is a little carriage that runs on a railroad track. In the case of the wheel, additional weights were tied to the ship so that the ship could not rise. In the case of the railroad track, the rollers are put under the rail so that the car to which it was attached could not rise. In either case the ship lies close to the ground, where it does not suffer to any comparative extent from the gusts and velocities that it does at the high mast. The stern is also unable to rise in case of sudden change in the loading of the ship or the lift of the ship, or from wind coming from the opposite direction.

With the installation which we now have, which has been worked out there with no money and not much time to experiment, I should say it could be duplicated for a very small sum of money, and it seems perfectly safe. In the last three months we have stayed on that mast nearly 200 hours and we have taken off and gone to it 20 or 30 times. We are improving it all the time. To my mind, if we work on all the faults that we find from time to time, it will be perfectly feasible to establish an airship terminal where the airship can land and remain, and can take off in a comparatively small space of ground.

A. W. FRENCH (Pan-American Airways, New York City): How small an amount of money is that as compared with the thousands of the other?

LIEUT. COMMANDER WILEY: I think you could put the total installation in complete, where you had nothing to start on; that is, where you had no path prepared nor any gasoline tanks nor anything of that sort, for \$50,000. If you had some of that equipment already, I think you could put it in for about \$10,000 or \$15,000.

Measures Adopted in Italian Civil Aviation for General Safety

By Dr. MANLIO MOLFESE

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Organization of Airports

A) Legal Provisions—

1. The legal control of airports is effected by Italian aeronautics legislation in such a manner as to reconcile the needs of commercial aerial navigation with the safety requirements over which the State has absolute control, and with the protection of fiscal laws.

The fundamental Italian law (Royal Decree-Law of August 20, 1913, no. 2207, converted into the law of January, 1926, no. 753) and the associated regulation (Jan. 11, 1925, no. 356) both define the idea of *airport* with the manifest purpose of establishing the scope of the application of the legal measures therein that relate to airports.

The Italian law is as follows: "by *airport* shall be meant any locality, on land or water, designed to be a place of departure, a landing-place, or a depot for aircraft, even if only temporarily. When it is designed only to permit the landing and taking-off of aircraft obliged to make a forced landing during flight, it shall

be called "*Campo di Fortuna*" (Art. 4 of the law; Art. 5 of the regulation.) And since other terms than that of airport are widely used in Italian, such as, for example, *aeroscalo* (aero-platform) and *idroscalo* (hydro-platform), the regulation adds that, for legal purposes, aero-platforms (fields for the landing of dirigibles) and hydro-platforms (for the landing [on the water] of hydro-aircraft) shall be considered as airports.

The immediate result of this precision in definition is that no ambiguity can occur concerning the application of implied legal standards to airports, since, as has been seen, this term comprehends any aeronautical establishment whatsoever that serves as a landing or taking-off place or as a way-station for aircraft, not excluding the "*campi di fortuna*," (emergency landing field) in which any aircraft traffic is quite accidental.

Principal Rules Concerning Service in Airports

The more important rules with respect to service in airports, and which have direct or indirect bearing on safety in flight, may be summarized as follows:

Public utility character of airports.

All State airports, and not merely all the establishments necessary for aerial navigation, are *works of public utility*, with all the legal consequences involved. Also, the private airports, under certain conditions, may be declared works of public utility.

Restriction in the matter of distance.

It is forbidden to build walls, houses, shelters, sheds, electric transmission lines, or any building or obstacle whatsoever, to build and maintain constructions, at a distance from the external limits of the airport, of less than fifteen times the height of the obstacle.

Construction of airports.

The construction of State airports and of all State establishments devoted to the use of aerial navigation, is entrusted to the Ministry for Aeronautics, which will take anticipatory measures, to serve as a basis for related projects, in collaboration with the Ministries of Public Labor, of War, of the Marine, or Finance, and with any other parties who may be concerned.

No private airport or other private establishment devoted to the use of aerial navigation may be constructed, except under conditions fixed by the Ministry for Aeronautics, the aforesaid Ministers being agreed as to the suitability of these conditions.

Admission of aircraft to the airports.

The airports open to civil aerial traffic are accessible to all national aircraft.

Foreign aircraft, to obtain the privilege of landing, are required to satisfy the following conditions:

- a) They must be duly registered in one of the countries with which Italy has made aviation agreements.
- b) They must operate in conformity with the standards established in the international agreements, in relation to all the laws and regulations in force in Italy.

Special temporary permits to land in Italian airports may be granted by the Minister for Aeronautics to aircraft belonging to countries which have not yet signed aviation agreements with Italy.

Safety standards for airports.

Airports open to traffic, and devoted in any manner whatsoever to public service, must be in perfect functioning condition at all hours of the day and night.

All airports must be equipped with all the instruments and arrangements necessary for the correction of compasses.

In every airport open for public service a sanitary first-aid service must be permanently established in places exclusively devoted to this purpose and provided with the necessary personnel and materials.

Access to State airport is by rule forbidden to all not attached to its services, or not possessing special authorization, or not present in the exercise of testing or inspection duties.

Supervision in the Airports.

Supervision over the aerial activities which take place in a State airport and in territory under the jurisdiction of the same, is exercised exclusively by the Commander of the Airport. The limits of the zone of jurisdiction of any airport are determined by the Minister for Aeronautics.

The duties of the Commander of the Airport are as follows:

- a) To exercise supervision over aerial navigation for the purpose of ascertaining that all aircraft, departing, arriving, and in transit, shall observe the regulations in force.
- b) To be informed regarding the various essential papers and documents.
- c) To examine the various flying papers of the aircraft, in departing, in arriving, and in transit.
- d) To exercise care that, in the limits of his own territorial zone, each aircraft owner shall observe the regulations in force. In this connection he should keep in touch with the proper local authorities.
- e) To report to the proper judicial authority, in due legal form, all infractions of the laws in force on aerial navigation, sending copies of such reports to the higher aviation authorities.
- f) To exercise care that all operating aircraft shall observe the prescribed standards for aerial traffic.
- g) To regulate departures and landings in the airport under his jurisdiction, and collect the taxes on landings, departures, sojourns, and shelter accommodations, and oversee the payment of rentals.
- h) To provide supplies of fuel and lubricants to aircraft in aerial traffic, and to receive payments made, issuing receipts therefor in due form.

Movement of aircraft in the airports.

Departures and voluntary landings must take place in the *State airports*, or in those built and maintained under its authorization (*private airports*).

Every user of a State airport must rigorously observe the requirements in force and conform strictly to all the rules of flying, and to the regular orders of responsible agents.

All aircraft, immediately upon landing in an airport and in a proper manner, shall be brought to the place designated for an inspection.

No aircraft may leave an airport before the Commander of the Airport or his delegate shall have made the prescribed visit of inspection and consented to the departure.

All aircraft upon being presented for inspection before departure, must be in perfect flying condition.

No additional cargo may be put aboard after the visit of inspection has been completed.

Landings and sojourns in the airports of the State are free for all State aircraft.

Taxes for landing, departure, and shelter accommodations, payable alike by national and foreign aircraft, are fixed for all private aircraft.

Furnishing supplies.

Aircraft landing in a State airport are permitted to obtain from the stores of the same, fuel and lubricants only in quantities strictly necessary for the completion of their flight.

Such withdrawals, made always with reference to the quantity of materials

stored, are made, in any case, upon direct and immediate payment therefor, and at prices fixed in the proper price-list which must be posted in every airport competent to supply the materials in question.

Shelter accommodations for aircraft.

In the State airports, whenever it is possible, special locations are set apart for hangars to afford shelter for private aircraft for a minimum period of three months.

The proper rental payable by every aircraft is fixed by the Minister for Aeronautics, and is based on the space it occupies in cubic meters. This is computed by measuring the maximum dimension of the aircraft (in length, height, and width) and taking the cube of the said dimensions.

The rental is reduced by one-third when the aircraft is sheltered in a canvas hangar.

For aircraft having wings that may be bent or folded back, the rental is calculated from their dimensions when the wings are so folded back.

Moreover, private companies engaging in aerial navigation may request from the Administration of the State the concession of a part of the grounds of State airports for the construction of hangars or other buildings of their own, which shall be devoted to aeronautic purposes. Responsibility for the care of aircraft in shelter always rests upon the owner of the aircraft or his representative.

The State does not assume any responsibility for damages sustained by aircraft in storage, or from faulty or defective care.

Likewise, the State assumes no responsibility for payment for personal services for any work done on aircraft for individual owners and agents.

The owner of the aircraft assumes full and entire responsibility for any damage whatsoever, proceeding from any cause whatsoever, that may be sustained by personnel and materials of the State through service to or sheltering of the aircraft.

Aid for aircraft.

On his own initiative, or in accordance with the request of interested persons, the Commander of an airport may make arrangements for sending aid to aircraft that have been compelled to make a forced landing away from the field. In such cases the owners of the aircraft are obliged to pay the costs according to current rates, and thirty per cent of the receipts from labor charges go to the workmen who have taken part in the rescue work.

Private airport establishments.

Any person intending to engage in any aeronautic activity on fields or plots of water of his own, should obtain permission from the Ministry for Aeronautics.

In the request for such permission there should be specified clearly, the given name, surname, and address of the applicant, the purposes to which it is intended to devote the field or plot of water, and if these are not in a condition for immediate use, a description of the work to be completed. To every such request should be attached a topographic map, on the scale of 1: 100,000, of the locality in which the field or plot of water is situated, and a ground-plan, on the scale of 1: 5,000, of the field or plot of water, with an indication of all construction work to be done.

The Ministry for Aeronautics takes the necessary steps to ascertain that the field or plot of water meets the required specifications, and issues permits for the functioning of the airport, the other Ministries concerned, agreeing hereto.

This duty, as a rule, devolves upon the Commander of the Airport in whose jurisdiction the new airport is located.

Except in cases of necessity, aircraft may not land in private airports without consent of their owners, unless these airports are operated for commercial purposes.

Free access to the private airports must be given at any time to persons authorized to inspect and supervise functions in connection with aerial navigation.

Customs Airports

The aviation laws of all countries, and, consequently, those of Italy, require that all aircraft from a foreign country or going to a foreign country, shall either land in or depart from airports in which a customs inspection service is operating.

This formality is necessitated by the fact that each country imposes customs duties on everything imported into and exported from its territory by air. Yet the same formality places evident obstacles in the way of free development of commercial air traffic, if the customs airports are few or not conveniently located with respect to the main currents of the above-mentioned traffic.

With such difficulties in mind, the Italian Government has established a very close network of customs airports made up as follows:

- 1) *Airports for the landing of airplanes.*
 1. Mirafiori (Turin) Customs collection district of Turin.
 2. Cinisello (Milan) Customs collection district of Milan.
 3. Boscomantico (Verona) Customs collection district of Trento.
 4. Campoformido (Udine) Customs collection district of Udine.
 5. San Nicolo di Lido (Venice) Customs collection district of Venice.
 6. Zaule (Trieste) Customs collection district of Trieste.
 7. Loreto (Ancona) Customs collection district of Ancona.
 8. Brindise (Lecce) Customs collection district of Bari.
 9. Capodichino (Naples) Customs collection district of Naples.
 10. Centocelle (Rome) Customs collection district of Rome.
 11. San. Giusto (Pisa) Customs collection district of Leghorn.
 12. Catania (Catania) Customs collection district of Catania.
 13. Cagliari (Cagliari) Customs collection district Cagliari.
- 2) *Airports for the landing of dirigibles.*
 1. Cinisello (Milan) Customs collection district of Milan.
 2. Ferrara (Ferrara) Customs collection district of Venice.
 3. Ciampino (Rome) Customs collection district of Rome.
 4. Augusta (Syracuse) Customs collection district of Catania.
- 3) *Airports for the landing (on water) of hydroplanes.*
 1. Genoa (Genoa) Customs collection district of Genoa.
 2. Marina di Pisa (Pisa) Customs collection district of Leghorn.
 3. Leghorn (Leghorn) Customs collection district of Leghorn.
 4. Orbetello (Grosseto) Customs collection district of Leghorn.
 5. Ostia (Rome) Customs collection district of Rome.
 6. Naples (Naples) Customs collection district of Naples.
 7. Brindisi (Lecce) Customs collection district of Bari.
 8. Ancona (Ancona) Customs collection district of Ancona.
 9. Venice (Venice) Customs collection district of Venice.
 10. Portorose (Trieste) Customs collection district of Trieste.
 11. Fiume (Fiume) Customs collection district of Fiume.
 12. Zara (Zara) Customs collection district of Ancona.
 13. Palermo (Palermo) Customs collection district of Palermo.
 14. Syracuse (Syracuse) Customs collection district of Catania.
 15. Marsala (Trapani) Customs collection district of Palermo.
 16. Cagliari (Cagliari) Customs collection district of Cagliari.

Thus there is a total of 33 customs airports, to which others situated in the territory of the Italian colonies (Tripoli, Cyrenaica, Erytria, and Somaliland) will soon be added.

Competition Among Local Bodies in the Establishment and Maintenance of Emergency Landing Fields

In connection with securing safety in flight a recent law (June 23, 1927, no. 1630) is very important. This law makes it obligatory for the Provinces to provide for the acquisition of land for the establishment, possible development, maintenance and control of emergency landing fields, those already in existence and operation being included.

In order that they may make headway in fulfilling the obligations imposed upon them by this law, the Provinces, in the event of their not having sufficient means, may be authorized to increase the land-tax beyond the normal limits.

As may be seen, the State by this provision calls upon local public bodies to help in the gradual development of an organic network of emergency landing fields which is absolutely necessary for safety in flight and not to hesitate to raise taxes in order to accomplish a purpose of such great common benefit.

B. Technical Conditions for safety in flight.

The technical conditions for safety in flight such as are in force in the Italian airports, are contained in the cited Regulation for Aerial Navigation, January, 1925, no. 356. These conditions are to a very large degree those of the international aeronautic convention of October 13, 1919. Some of the more important of these are as follows:

It is forbidden to do any stunt flying, such as involves dangerous evolutions not necessary for the proper operation of the machine, over airports open to civil traffic, in inhabited centers, and in other localities where people are gathered together in numbers.

In any airport, any aircraft forced to make a turn or a partial turn either in departing or in arriving, must, except in case of danger, turn to the left, that is, in a counter-clockwise direction.

An aircraft departing from an airport should not begin to make the turn before reaching a distance 500 meters from the nearest point in the boundary line of the airport, and the turn must then conform to the safety rules given in the preceding paragraph.

All aircraft flying at a distance of from 500 to 1,000 meters from the nearest point of an airport, must conform to the aforesaid rule, except when it is flying at an altitude greater than 2,000 meters.

Stunt landings are forbidden in airports open to civil traffic.

It is forbidden for any aircraft to perform stunts at a distance of less than 2,000 meters from the nearest point of said airports.

In every airport the normal direction of landing is indicated by a letter T and wind direction by means of one or more known methods.

Every aircraft in departing from or in landing at an airport should do so according to the direction indicated above, except in cases of necessity.

If two aircraft are approaching an airport at the same time for the purpose of landing, the larger aircraft must manoeuvre to avoid the smaller and in landing, should observe the rule in article 85.

The way must be left clear for any aircraft in the act of landing in an airport.

No aircraft may begin to rise before any aircraft which may have ascended before it, has completely left the airport.

The foregoing rules apply equally to night-landings in the airports. At night lights are placed on the field, as follows:

The airport is marked out with the greatest possible exactness by means of red lights placed on its boundary lines and on obstacles. The direction of landing, insofar as possible, is indicated by a luminous letter T, or lacking this, by means of three lights placed in the zone set apart for landing, in the form of an isosceles

triangle, whose base is about 200 meters long and whose height is at least double this length. The lights are so placed that the airplane shall land proceeding from the middle of the base toward the light in the opposite vertex; the base marks the position at which the flying machine should begin to touch the ground, and the vertex, the spot beyond which it is not wise to pass.

No captive balloon, kite, or anchored dirigible may be kept in the vicinity of any airport within a distance from the boundary line of less than ten times its maximum altitude, without special permission from the Commission for Aeronautics or from an official named by it.

All obstacles existing in the airports and, insofar as possible, all fixed obstacles dangerous to flying (such as towers, chimneys, radio antennas, etc.) within a radius of 500 meters from all airports, are so marked, both by day (when needed) and by night, as to be readily visible. Particular forms for these marks are to be determined by the Ministry for Aeronautics.

All aircraft manoeuvring in water under their own power, must conform, as far as possible, with the laws regulating navigation on the sea, rivers, and lakes, in order to avoid collisions, and for this purpose, they are considered as steam vessels but carry only the signal lights required in the regulations and not those specified in the maritime regulations for steam vessels. Also, they do not, except in special cases, use the sound signals indicated in the said regulations, nor can they be held liable for not receiving them.

C. Contributions by Italian Aviation on the problem of commercial airports.

Due to the shape of the Italian peninsula, and its geographical position in relation to the general configuration of the Mediterranean basin, it follows that commercial aviation in Italy has been developed and must in the future, continue to develop largely on the sea.

The problem of landing-places for hydroplanes is therefore more important for Italian aviation than that of terrestrial airports. It may even be said, as regards the latter, that no great difficulty has been encountered, and that the three military airports (Venice, Trento, and Milan) together with the imposing new airport, del Littorio, in Rome, which is, however, a private airport and was not built for the exclusive use of aerial lines,—are well suited to meet the needs of Italian commercial aerial traffic.

This cannot be said for the hydroplane lines which, for the reasons given, have a preponderant importance in the general picture of our civil aviation.

How shall we solve the problem of giving adequate hydro-airports to the aerial navigation lines touching such important mercantile ports as Genoa, Naples, and Palermo?

It is evident that a large outlay of funds would have been needed to reserve, in the aforesaid ports, zones set apart exclusively for commercial hydro-navigation. However, this would have been absolutely necessary as long as the old notion persisted that the coexistence of hydro-aviation services and maritime services, in ports subject to heavy traffic, is impossible.

The new idea introduced by Italian civil aviation, and the experience offered by it to the entire aeronautic world for the first time, have counteracted this old idea. The Italian hydro-aviation services have been in regular operation, for almost two and a half years, between the same ports, Genoa, Naples, and Palermo. It is hardly necessary to call attention to the fact that this demands strict and cordial cooperation between the port authorities and the aeronautic authorities, for the purpose of conveniently regulating the movement of water traffic during the hours in which the movement of aircraft is going on.

Another important experiment made by Italian civil aviation, and which has no precedents, consists in the use of mouths of rivers for purposes of hydro-aviation. The Genoa-Palermo line, which serves the Capital also, has a regular stop at the

mouth of the Tiber, near Ostia. Here, the difficulties in manœuvring aircraft and their safe sheltering caused by the changeable conditions of the water and the current of the river, were overcome by building suitable shelter-gates (wet docks) along its banks. In these, aircraft find shelter and complete protection from the violence of the current. Besides, this makes it possible to perform all the operations connected with departure while the hydroplane is still in the said wet-docks, until the time when, with its motors operating at the proper speed, it can move into the river and take off from it. The utilization of commercial ports and the adaptation of rivers for commercial hydro-aviation, as has been accomplished in Italy, constitutes an innovation which, evidently, has important results not only from the technical point of view but from the economic point of view as well,—that is to say, in connection with the determination of costs in the hydro-aviation services. The innovations made in Italy, which are followed closely abroad, show, indeed, that in many cases it is possible to eliminate from the economic picture, in connection with these services, the enormous sums expended in the construction of proper hydro-airports and their amortization.

Organization of Services

A) *Meteorological service.*

1) *Sending out forecasts.* The Ministry for Aeronautics has a meteorological department called the Forecast Department, to which are sent all the weather observations made in the civil meteorological observatories and the military aerological stations established in the various airports. The Forecast Department publishes a daily bulletin containing all the meteorological and aerological observations made at 7 A. M. (I. M. G.) and 18 hrs. (6 P. M.) of the preceding day, upon the basis of which the weather prevailing for the succeeding 24 hours is forecast. This is sent by the R. T. at 13 hrs. 35 min. (1:35 P. M.) and transmitted by telegraph to all Italian telegraph offices at 15 hrs. (3 P. M.).

At 24 hrs. the Forecast Department sends by the R. T. a second forecast of the weather prevailing for the following morning and at 11 hrs. (11 A. M.) a third forecast for the *Rotte Aeree* (Aerial Routes) service.

The Forecast Department is in a position to answer all requests for meteorological information and to issue special forecasts at various hours of the day by telephone, telegraph, or radio.

2) *Studies and researches.*

The Forecast Department with the aid of its experts makes theoretical studies on observation data gathered daily and performs experimental researches in the aeronautic station at Vigna di Valle, on lake Bracciano, making captive-balloon flights every day in order to explore the atmosphere.

3) *Meteorological signal services furnished by the telegraph offices.* Besides the meteorological service conducted by the Forecast Department, there is a special weather-signal service in connection with the telegraph offices conveniently situated along the various routes.

B) *Radio service.*

Closely connected with the meteorological services are the radio services which are required to perform a double function:

1. *Sending out notices.* Gathering and broadcasting all information regarding aerological conditions along the routes the aircraft must follow; and keeping in close touch with aircraft in flight, in such a manner as to be able to supply them with the aerological information they require, and receiving all requests for the interpretation of this information.

To collect and distribute the aerological bulletins compiled in the various aerological stations, a network of radio stations, made up of a number of "Meshes," is provided. Each of these "Meshes" embraces a fixed area.

The radio stations in each "mesh" send the aerological bulletins to a central radio station of suitable power, which gathers, coordinates, and broadcasts (by C. Q.) the material in such a manner that all aerological stations interested can receive it.

The broadcasts (by C. Q.) made by the central station of each "mesh" are received by a central radio station which checks, with the various means in its possession, all bulletins received. It also completes and corrects the bulletins, if necessary, by rapid wire communication, and then broadcasts a general bulletin covering the aerological situation of the country as a whole at a given hour.

2. *Inspection of the service.* The radio stations constituting the various "meshes" mentioned above, are carefully inspected in order to assure their regular and continuous functioning, and rapid telephonic communication is provided to replace the service of a radio station of the "mesh," when such station is not operating properly.

Special modifications in the work of the radio stations in a "mesh" are provided when the central station of the latter is not operating properly, so that the information is sent to the central station of a bordering "mesh."

3. *Communication with aircraft.* Besides the above function, each radio station of the network provides for:

a) Keeping in continuous communication with each other for sending signals in connection with the departure, passage, and arrival of aircraft.

b) Keeping in touch with the aircraft for the purpose of communicating important aerological information or other general notices regarding their safe flight.

4. *Radio compass stations.* Radio compass stations will be established very soon as a part of the general radio net-work. These will serve to give directions to aircraft traversing wide stretches of sea or having to cross difficult and rugged mountain ranges, such conditions, for example, as are encountered on the Genoa-Barcelona, Rome-Venice-Vienna, and Milan-Monaco aerial navigation lines. These stations thus function in an effective manner in order to aid aircraft in their flight.

5. *Further provisions.* Many other provisions are to be adopted in order to accomplish the aforesaid purpose with safety and continuous functioning. Among these the following are important:

a) The network of fixed radio stations devoted to the distribution of aerological bulletins will be constituted in such a manner as to permit the transmission of aerological bulletins every hour, to the great benefit of aircraft traffic.

b) Each of the important fixed radio stations devoted to the interchange of messages concerning the movement of aircraft shall have multiple aerials to enable it to listen in on various wave lengths and receive messages from various localities.

c) The fixed radio stations located on the routes of the various aerial navigation lines shall have a special aerial to enable them to be in constant communication with aircraft in flight.

d) The radio plants on the aircraft shall have the aerial so disposed that it will always be in operation, even when the aircraft shall be forced to descend to the ground or upon the sea.

In addition:

a) The aircraft belonging to the important navigation lines must have two radio sets, one having a normal aerial fixed to the plane, the other operating by means of a frame-aerial placed in the cabin of the aircraft. All air-craft must have two separate and suitably designed radio sets.

b) The radio sets on board the aircraft must use, to as large extent as possible, mechanical devices that will permit them to call the fixed stations automatically or to send short phrases. This in itself will insure the sending of a message, when,

by reason of possible physical disability on the part of the radio operator, transmission by hand cannot be done.

c) Radio sets on aircraft must use a special code for communicating with the fixed stations or with other aircraft. The code must consist of set phrases which will become perfectly fixed through practice.

d) Radio sets on aircraft that make long trips, must be equipped with radio compass equipment which will enable them to take their own bearings from the fixed and continuous signals sent out by the fixed radio stations. Such a result can be obtained by suitable construction of the apparatus.

c) *Optical service.*

Various optical devices are being adopted and developed to serve aircraft traffic in the best manner. These may be summarized as follows:

a) *Luminous signals.*

1) Luminous signaling devices of variable power are supplied to regular and emergency landing fields. These are so made as to be well adapted to aircraft in flight.

2) Special flares and luminous rockets for special purposes are given to aircraft, to be used in case of need.

The provisions indicated above meet satisfactorily the needs of commercial aircraft and make it possible for them to operate in a satisfactory manner.

As regards signaling with optical devices, it may be said that orographical conditions in Italy will not permit the adoption on a large scale of the high-powered luminous beacons used on some American and French aerial navigation lines.

b) *New luminous devices operated with neon gas.*

The use of optical characters for aiding the movement of air traffic, which is now being worked out, will be rendered effective:

1. By adopting neon gas illuminating devices generally for use on the ground. These devices will make the illuminated areas easily visible to aircraft.

2. By using in the aircraft optical signaling devices composed of neon tubes, so formed as to represent conventional signals.

Measures for Safety in Flight

A) *Instruments on aircraft, subsidiary routes, and various precautions.*

1) *Flying in fog.* All of the Italian lines do not encounter the same difficulties in meteorological conditions. The Genoa-Palermo, Rome-Cagliari, and Brindisi-Athens-Constantinople lines generally enjoy the best conditions of visibility; others such as the Milan-Monaco, Turin-Trieste, and Rome-Vienna lines may encounter dense fogs in the Valley of the Po and unfavorable atmospheric conditions over the Appennines and the Alps.

The companies are not yet able to make trips in a continuous fog, much less to make landings in areas covered with fog. But they are able to cross fog banks of limited extent with the aid of their navigating instruments and with information supplied by radio compasses on the earth. For this purpose pilots are taught to fly with the cabin closed.

2) *Instruments on the aircraft.* Instruments of this class which have been adopted, are: a flight indicator of the Pioneer type (manufactured by Bodin), a longitudinal inclinometer, and a Smith compass (Aperiodic).

When the routes and terminal airports are covered by fogs, the safety measure adopted is that of suspending flights. This is precisely the case with the Turin-Trieste line, crossing the valley of the Po, which, in winter, may be covered over its entire length and breadth by very dense fog.

3) *Secondary routes.* Some lines, as a safety measure, may use different routes. The Rome-Venice line, when atmospheric conditions do not permit the

use of the direct route, may choose between two secondary routes, one traversing the Tyrrhenian, and the other, the Adriatic Sea.

Machines leaving the airports at the same hour, like those of the Venice-Vienna line are kept constantly informed of the meteorological conditions along the way by the R. T., so that they may change to another route if necessary.

4) *Various precautions.* Engineer pilots are required by the companies to make frequent test flights on their own lines.

The pilots of the land-lines are required, during their flights, to observe ground areas in order to determine whether these are suitable for landing, and to keep the company informed concerning their observations. These areas after being inspected and approved by an engineer, are made known to all the pilots. This provision is particularly useful, as the network of emergency landing fields in Italy is not yet completed.

B.) *The testing and inspection of aircraft and engines.*

1) *Testing standards.* Standards for the testing of civil aircraft do not yet exist in Italy, but for the time being, the standards fixed in 1924 for military aircraft are followed. However, the matter of compiling standards for civil aircraft and motors is now being studied by a committee of which the following men are members:

General Crocco, Prof. Anastasio, Colonel Fiore, Engineer Caproni, Commander Magaldi, Prof. Panetti.

2) *Italian Registry Office.* Testing, inspection, and the granting of certificates of fitness (aircraft) for flying, which until a short time ago were duties of the Aeronautic Engineering Corps, are now exercised by the Italian Registry Office. From the first of July, the aeronautic division of the Italian Registry Office has been in charge of these matters and has taken the name *Registro Italiano Navale ed Aeronautico* (Italian Naval and Aeronautic Registry Office.).

Some of General Nobile's Ideas About Non-Rigids, Semi-Rigids and Rigids

Semi-rigid versus non-rigid:

As regards the non-rigid which has been adopted in some countries for many purposes, it has fully lost the advantage of being the most suitable type of airship for small sizes after Nobile's construction of the NR in the year 1924; in fact, the semi-rigid MR reached the same capacity of the smallest non-rigids, that is, 33,885 cubic feet, with the advantage of the semi-rigid type as regards the maintenance of the form of the hull and having consequently a higher degree of safety. But the MR had not only the smallest volume of all the present non-rigid airships but also a higher useful lift, that is, 990 pounds. Its maximum speed was 114 miles per hour, its length 105 feet, and its diameter 25 feet. During its flights the MR stopped its engine, landed in order to take on or to leave one of its passengers moored; inflated and deflated in the open country as the non-rigids. Sometimes the MR continued its flight with a very low gas pressure. Therefore Nobile says that there is no necessity to be preoccupied with the gas pressure in the hull. Its crew was composed of three men, but the airship could be maneuvered by only one man. Consequently, after this proof by a semi-rigid type, the non-rigids are considered quite useless.

Semi-rigid versus rigid:

As regards the rigid, General Nobile thinks that theoretically the semi-rigid may reach the same great capacity as the former. The great advantage of the semi-rigid is in local resistance, which the rigid lacks. The semi-rigid is an elastic, also a safe airship. The rigid, on the contrary, is a frail airship. A character-

istic comparison of Nobile's: The rigid is like an egg; the semi-rigid is like a rubber ball. If the precipitous fall which recently took place in the polar regions, instead of happening with a semi-rigid had happened with a rigid, General Nobile says we would all have been instantly killed, the airship would have been shattered in small pieces and sparks would have set on fire the whole mass.

If the rigid is lacking in local resistance and consequently is frail, one must nevertheless recognize that this disadvantage will diminish with the increasing of the dimensions, as the area increases with less rapidity than does the volume, and also because the lift is very high they can use heavier and stronger materials in its frame. Consequently, increasing in size the superiority of the semi-rigid over the rigid regarding local resistance is less evident. But with increasing size the rigid has another advantage and this is that even for the greatest sizes the same construction remains. On the contrary, with the semi-rigid, on passing from the present size to another much larger, it is necessary to change the frame construction. So General Crocco in designing some years ago a 4,300,000 cubic feet semi-rigid designed a new type of keel, and for even larger realizations he foresaw also a new type of the hull internally containing a metallic net.

In each case for the construction of semi-rigids of very large size, one must resolve at each following stage of size increase that new problems will be encountered and it is not possible to foresee to what extent and with what convenience these problems may be solved.

Concluding, the semi-rigid is in every respect preferable for the average sizes to the rigid. On increasing the size, only experience will teach us to what point its superiority over the rigid may arise.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Operation of Aircraft in Air Transport

First National Aeronautical Safety Conference

Under Joint Auspices of

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Promotion of Aeronautics and the
National Safety Council*

October 4 and 5, 1928

HON. WILLIAM P. MacCRACKEN, JR., Chairman

Assistant Secretary of Commerce for Aeronautics, Washington, D. C.

The session on Operation of Aircraft in Air Transport at the Seventeenth Annual Safety Congress was called to order at ten-ten o'clock by the chairman, Hon. William P. MacCracken, Jr., Assistant Secretary of Commerce for Aeronautics, Washington, D. C.

CHAIRMAN MACCRACKEN: We are a few minutes behind our schedule this morning, but I think we shall be able to make it up and finish on time.

The first paper under the heading of "Operation of Aircraft in Air Transport" will be one on "Control of Operations in Air Transport." This paper was to have been presented by Colonel Paul Henderson, vice-president of the National Air Transport. Due to the fact that he is unable to be present he has sent his assistant, Mr. Lester D. Seymour, who will present the paper for him.

Control of Aircraft in Air Transport Service

By PAUL HENDERSON

Vice-President, National Air Transport, Inc., Chicago

The control of aircraft in scheduled air transport services presents one outstanding requirement. That requirement may be translated into two words—"hard work."

This hard work is made up of a multiple of details. Some few of those details are interesting and obvious to the layman. The greater number, however, are uninteresting and may be catalogued as drudgery.

Surface vehicles—horse drawn, motor propelled, or those which run on rails,—will operate, perhaps not 100 per cent of their efficiency, but at least with some certain degree of success, with many minor things the matter with them. A leaky packing-box will not, unless it becomes very bad, stop a locomotive. One missing cylinder will not, of necessity, cause a motor truck to fail. One shoe off a truck

horse or a broken harness will not result in a horse-drawn vehicle being completely out of business.

Minor difficulties with aircraft and particularly with aircraft engines may result in 100 per cent failures. There are only two kinds of airplanes: Those in first class condition and those in bad condition. There are no airplanes in fairly good condition. Those that might be classed as fairly good must, from the point of view of Air Transport, be catalogued as unserviceable.

As a consequence, every little adjustment, every bolt and nut, every piece of fabric, every valve, valve spring, every bearing, every turnbuckle on an airplane must be exactly right before a scheduled trip is undertaken.

Because of the importance of small things the control of aircraft in air transport, if it is properly organized, becomes an intensive effort all directed at the job of making certain by frequent inspections and re-inspections, that every part of the ship is as it should be. These inspections must be carried on by men who know what they are about. Inspection by an uninformed inspector would be as bad as no inspection at all.

When the work of these inspectors indicates that repair work, adjustments or replacements are necessary, these must be done by mechanics of experience.

After every trip, no matter how short or how long that particular trip may be, each N.A.T. airplane is inspected in scores of essential details. These inspections are made by two men, each working independent of the other and each in a measure checked by the other. Inspection cards, listing the inspection and adjustments necessary, are used and when the job of inspection is completed, each of the inspectors signs the card and becomes responsible for the thoroughness with which the work has been done. It would be a mistake, I am sure, to attempt, in a paper like this, to try to cover the character of these inspection items. They cover the airplane from nose to tail.

Repairs on aircraft fall into two very definite groups. The first group might best be described as service repairs. The second group might be labeled overhaul repairs or periodical repairs.

Service repairs are those repairs which, because of minor accidents, general wear and tear, etc., are necessary from day to day to keep the airplanes in flying condition. The replacement of a broken or weak valve spring; the replacement of parts of the distributor head; the patching of a small piece of fabric on either wing or fuselage; the tightening up of a turnbuckle or the replacement of wires or struts all fall in the group properly labeled service repairs. The necessity for these repairs is brought about by the organized inspection previously discussed. Such repairs as these are made between runs. They are generally made in the hangars which are used for storage purposes between runs. They are made by mechanics who have a general knowledge not only of engines, but also of airplane construction. The prompt making of these service repairs postpones the necessity of making the more elaborate overhaul which, theoretically at least, occur at intervals of 150 to 300 hours, in the case of engines and in the case of aircraft themselves, at intervals varying upward from 500 hours. In the case of engine repairs, these periodical repair jobs or overhaul jobs, as they may be termed, consist of the complete disassembling of the unit, the accurate measuring of all of its component parts, the rejection of those which are worn beyond certain tolerances, a searching inspection for evidence of corrosion or change in the character of the metals and then a reassembling of these components with new parts to replace those rejected, which assembling really amounts to a job of motor building.

Two years ago it was thought that if Liberty motors could be torn down and rebuilt with sufficient thoroughness to insure their running from 25,000 to 35,000 miles without difficulty, that a good job had been accomplished. Today, due to the extreme accuracy of inspection and workmanship in the job of reassembling, and due to the substitution of a few parts, these same Liberty motors are serving

N.A.T. for an average of 75,000 miles between failures. (These figures are not to be confused with the time between overhauls which is from 150 to 200 hours.)

After aircraft engines have been used several hundred hours and have gone through one or more of these overhaul periods, it may be almost truthfully said that they lose their original identity. Cylinders from one engine may find themselves placed on another engine after the reassembling is completed. This practice requires absolute interchangeability of all aircraft engine parts. The fact that in N.A.T. we are able to do this work today on engines which were built over ten years ago, is certainly a tribute to the care and skill which was put into the building of these engines by the several manufacturers during the war, because, as is generally known, all Liberty engines are surplus war material. Each make of engine presents a different problem in the matter of tools for its disassembling and re-assembling. With this difference, the job of rebuilding one engine is much like the job of rebuilding another. In each case of engine rebuilding, inspection for worn parts, damaged parts, corroded parts, and chrystalized parts must be made with painstaking accuracy. Of course, after each engine is reassembled it is run for a few hours on a block. Accurate records are kept of the temperature of the motor, the speed of the engine, etc., in order to make certain that it has been reassembled properly. The continued doing and re-doing of this work of course develops little short-cuts and little tricks in both disassembly and reassembly, as well as in cleaning, which are short-cuts towards the end, which is, after all, the best engine possible with the least cost of labor and new materials.

The work of rebuilding or overhauling an airplane fuselage and the wings of an airplane may vary upward from the simple removal of the covering of the fuselage and wings, so that they may be thoroughly inspected, to the more complicated job of replacements of certain steel tubes in the fuselage and sometimes even ribs or spars in the wings. While the covers are off in this work, thorough inspection is made of all instrument control lines, wires, and small relatively unimportant "gadgets." Here again the mechanic doing the work must know his business. He must be able by visual inspection to determine whether deterioration has started in the tubes of the fuselage; whether or not the wooden ribs of the wings are good for another period of use or whether they should be replaced. The whole success or failure of the work depends upon the intelligence with which this man does his job.

Somebody has been quoted as saying that "There is a good deal more to aviation than flying." An hour or two spent around the repair base of the National Air Transport would convince anyone of the truth of this statement.

The actual flying of the airplanes, their dispatching, etc., is a relatively simple matter except for that part of the task entrusted to the pilot and no statement of mine can exaggerate the skill and intelligence necessary on the part of the pilots. They are sent off on their scheduled time except when the weather conditions make that impossible. They arrive on time or ahead of time or behind time, depending largely on the weather encountered enroute. Tail winds make for arrivals ahead of schedule. Head winds make for late arrivals. Fogs, snow storms and heavy rains result in delays and call upon every ounce of skill, courage and ability which the pilot has. The aim of every transport operator is to keep his flying equipment in such condition as will insure on time arrivals except for the unknown influence of the weather. In August just passed, in the flying of over 225,000 miles, N.A.T. ships adhered to the schedules set down for them with practically 100 per cent efficiency except where their flight was interfered with by wind or fog. In other words, we appear to have licked the mechanical job of schedule flying. We have gone a long way toward licking the weather, but still have an equally long or longer road to travel from that particular angle. A year from now I hope at a meeting of this chracter much progress may be reported in the matter of overcoming the obstacles brought about by rain, fog and snow.

This meeting is a "Safety" meeting. Every act of everybody seriously engaged in air transport is promoted by two things: (1) safety, (2) efficiency. How well we have been able to watch out for the safety of N.A.T. operations may be evidence by the statement that since May 12, 1926, N.A.T. airplanes have flown a total mileage approximating three million, and that we have had but two fatalities. Each of these fatal accidents was brought about by weather. Every indication is that in one instance either the pilot or the airplane was struck by lightning and the other—a very severe and unexpected late fall thunderstorm so confused one of our pilots as to result in his flying into the ground with his ship wide open. In each case the fatality was brought about by something over which neither the pilot or any of the personnel of the National Air Transport had any control whatever. Better weather reports might have prevented one of these accidents. I feel that nothing in the world could have prevented the other. However, 3,000,000 miles of scheduled flying, the greater part of it at night, with two fatalities is, I am sure at this stage of the development of this art, a commendable record from the point of view of safety.

CHAIRMAN MACCRACKEN: I am sure that the conference is very much indebted to Colonel Henderson and to Mr. Seymour.

We will now be very glad to have the paper discussed by any of you who are interested in doing so. May I suggest that the discussions confine themselves very much to the safety point of view in the operation and maintenance of aircraft in transport? That is the general heading of this subject and the thing that the discussion should point toward.

H. W. HEINRICH (Travelers Insurance Company, Hartford, Conn.): Mr. Seymour in his most interesting remarks refers to crystallization as a factor that enters into the inspection and the overhaul of the aircraft engines. I would be very much pleased to have him amplify, if he will, in regard to two phases of that particular point. One is whether or not crystallization has (I am referring to crystallization here as it relates to engine parts, all other incidentals of the engines are included) really been a factor of major importance in engine break-down. Second, whether the determination of crystallization in engine parts is still a matter of judgment and observation or whether some progress or development has been made in the way of a test to determine crystallization.

MR. SEYMOUR: The truth of the matter is that we have never had a failure that we could attribute to crystallization or metal fatigue. So far as I know, we have no way of mechanically determining when crystallization appears. What Colonel Henderson referred to was careful inspection rather than actual determination of crystallization. We have no record of it ever having occurred.

CHAIRMAN MACCRACKEN: Are there any other questions that you would like to ask of Mr. Seymour? Any discussion of the paper?

QUESTION: This question of weather control that he speaks of—

CHAIRMAN MACCRACKEN: Was there some particular question in connection with it?

QUESTION: Yes, the improvements they could suggest with reference to weather control.

MR. SEYMOUR: I don't know how successful anybody will be in controlling the weather. I think as time goes on, it will perhaps afford us an opportunity to make more use of the information that can be collected on the ground, because with the radio we can get the information to the pilot in the air, where it is most needed.

CHAIRMAN MACCRACKEN: I am sure that those who are interested in the insurance side of air transport are vitally interested in this particular subject. Perhaps we could get some comment from Mr. Brooks Parker.

MR. PARKER: Thank you for giving me the opportunity of saying that the experience of the National Air Transport and the Western Air Express and the work they have done toward safety, toward good housekeeping, toward the proper

operation and running of their air line, reflects itself steadily in the insurance rates, not only that they enjoy, but that all the operators enjoy. I congratulate them for the work they are doing, which is thoroughly constructive.

CHAIRMAN MACCRACKEN: While the conference, of course, is primarily interested in safety for the sake of safety itself, it doesn't hurt to stress sometimes a little more the economic advantages of safety. I wonder if Mr. Parker would enlarge upon that phase of it in connection with the insurance costs?

MR. PARKER: As applied to air transport particularly?

CHAIRMAN MACCRACKEN: Yes.

MR. PARKER: I will be glad to do that.

I was thinking over what would be of most interest to you people. Let us take the different forms of coverage—fire insurance. Your fire rate is governed largely by three things; your type of construction, which includes the hangar layout, the plan of it, which includes also the provisions which may be made for heating; the operation feature, which has to do with the fueling of the planes, the housekeeping and so forth; and the construction of the planes themselves. The position of a heating unit in relation to the hangar and the rest of the equipment has a very marked bearing.

Mr. Seymour is smiling, because he and I have had long and very painful sessions on the subject of what is the best way of heating a new hangar. We have come to agreement on everything and the effect is that the rates have come down very markedly.

In those hangars which are not properly heated, where an open stove or something like that is used, you can see yourself that there is constant danger of fire from gasoline fumes. A similar point is the tendency to heat hangars in any way they can. That is very important.

There are difficulties in starting, particularly air-cooled engines. They must be practically ready to go when the mail comes in. There have been ways worked out of heating airplane motors in hangars without increasing the rate. I would be glad to go into the detail of that, but I think it would take too much time. I will answer any questions that you have either inside or outside on that point. The fire insurance rates are entirely dependent upon the way in which a man runs his air line and the other factors that I mentioned.

In the operation of it, the fueling inside the hangar is extremely important. The larger the hangar the more concentration of airplanes, the more hazard. If there is a fueling arrangement inside, the underwriter immediately resists instead of trying to help you get the rate that you and your insured desire.

The fire insurance on the planes themselves: I have in mind one particular plane that had a 50 per cent decrease in its rates.

Tornado insurance: The operator should have his weather reports so that he can fly away from any tornados that seem to be coming along. Any attempts he makes in those directions will have a direct bearing on the insurance.

Public liability: If an operator is known to be a conservative, careful, business-like man, his rates will be reduced very markedly over the operator who is not so. On passenger lines, the safety factors that the operator works into his organization have a tremendous bearing. I can't stress that too much, because that liability is a very difficult form of insurance at the present time. Let us take the Western Air Express as an example. I was out there in August. I took a flight from Los Angeles to San Francisco and return. On one of those trips they had a full load. They took the precaution to ask one or two of the men in the ship to walk forward just a little bit so that the plane might be better balanced for the take-off.

In general, the use of safety belts has a bearing. If the men or passengers in the ship can be strapped in at the time of landing or taking-off, it reduces your rate. One underwriter told me the other day that he would make a big differential in the rate if they would do that. It does not cause resistance in the minds of

the passengers. He had seen that plan used in one line, which incidentally was the Western Air Express, and they all seemed to like it. The passengers felt that it was being done for their safety. It is things of that sort that help the insurance people. All the safety factors that you put around the operation of your airways are going to be reflected to you in your rates. If I can answer any questions, as I said before, either now or later, I will be happy to do so.

MR. SEYMOUR: I would like to ask Mr. Parker, if it is true that the Western Air Express uses safety belts in its passenger ships?

MR. PARKER: They are now using safety belts. They weren't being used when I rode in their planes. When this other man rode in one of their planes they were being used. That may be just the individual and the assistant pilot's way of running the ship. That may have been something that has been put in since this Puget Sound accident, because that happened after I was out there. The Puget Sound accident occurred in a plane of the British Columbia Airways.

CAPTAIN WILLOUGHBY: I had intended to say a few words about this terrible hazard that we have had for so many years past, that of fire. The machine would either get on fire in the air or in making a crashed landing, the gasoline would get loose on the top of the hot cylinder and the men would lose their lives.

In my nineteen years of building and flying airplanes (I am building my last one now near Philadelphia and hope to have her ready and in the air in two weeks) a good many of my friends have been killed, notably my dear old chum Steve MacGordon, who was stationed at Norfolk, Virginia. He was in the cockpit. He was making a crashed landing, at least the student behind him was making a landing. Immediately the gasoline was fired. In those generators, the gasoline tanks are only four inches from the hot cylinders. He breathed the flame and died in four hours. I have known of a great many accidents of that sort, notably in Europe and in this country.

From the very start, when I first began building airplanes in 1909—I assisted Wright in his first flight, and the next year I got all my patents out and got my first machine off the ground, the "War Hawk." Ever since then, I have always been particular about my gasoline tanks and their connection with the hot cylinders. I made up my mind from the start that gasoline should not be used under pressure. I believed from the very start in the gravity tanks, and invented my patent on safety gasoline tanks which I have put in all my machines ever since. I use two tanks, one on each side, well-distanced, so that I can reach that valve from my seat. There is very little head resistance. It is a narrow keel that goes right down. That keel answers besides carrying the gasoline to the carburetor in another way also. There is a certain amount of keel surface that is necessary. Years ago we used to put them out on the wings, as you know. That keel answers as a keel surface, which is necessary. The reason I object to gasoline under pressure is that you can't depend on a little fan, a little windmill to pump the gasoline up into your carburetor or into a small gravity tank. That little windmill may become clogged with ice or snow or something and it ceases to function. The pump at the dash is not always absolutely reliable. For these reasons I have always objected to using anything but the gravity tank.

A gentleman touched a few moments ago on the question of the safety belt. I was just going to say something about that myself, but the gentleman anticipated me and put the matter very forcibly before the meeting. The Navy safety belt is the best belt I have used. I believe in the use of the parachute with the land plane but not with the seaplane. With a seaplane, if you are landing in water, if you haven't a belt on, you are thrown out of the machine and invariably you will be drowned. But, if you have a belt on and you are at all a good swimmer and you have nothing around your body to catch in the wires—I have known several men that were drowned in seaplanes simply because they had a lot of life preserver stuff around them and they got tangled up in the wires and couldn't clear them-

performance. However, when these higher-performance airplanes were put into actual service in the field, the operators found additional weight was required to obtain economical operation. As a consequence, these models gradually became heavier until at the present time most of them do not equal and none exceeds the performance of the practical airplane originally referred to. Apparently, the lesson to be learned from this is that the lightest airplane with the best performance is not always best. On the contrary, additional weight in an airplane is desirable provided it is placed there for maintenance purposes and not as a result of poor design.

Presuming that the proper airplane and engine have been selected, it now becomes necessary to use equally as much care in the selection of personnel. From our limited experience it appears that proper inspection and maintenance can only be rendered by capable, experienced men. Since commercial air transport operation can only be carried on economically with the minimum of personnel, and since experienced men are rapidly becoming scarce with the sudden growth of commercial aviation, the commercial operator is at present faced with a serious problem. The greatest care must therefore be exercised in choosing men for the ground force charged with inspection and maintenance. Systematic methods and training must be developed by the commercial operator. A sense of responsibility in inspection and maintenance of equipment must be firmly implanted in each individual since the safety in flying rests largely on the shoulders of the ground force. Experience has proven that this same responsibility can be developed and maintained by requiring all personnel to take frequent flights, thus bringing them face to face with the entire problem. A few experienced, efficient employees have been found to be more desirable than cheaper ones in larger numbers.

The good results obtained in maintenance and inspection are in equal proportion to the conditions under which the personnel work. Even the most conscientious and thorough workman cannot deliver 100 per cent efficiency under bad working conditions. Proper facilities must be available for the work in hand. Convenient stockrooms, tool rooms, light, water, etc., must be provided. In cold climate, heated, well-ventilated hangars have been proven an absolute necessity. For hot weather conditions, fresh air and light are equally essential. Good sanitary facilities with adequate lockers and showers have proven an excellent investment. Cleanliness of equipment and hangars and shops is conducive to careful inspection and pride in workmanship.

After the proper airplane and engine have been selected, experienced personnel of the right type chosen, personnel organized with a definite responsibility from top to bottom of the organization, proper working conditions provided, our experience indicates that a carefully-prepared, written inspection form should be developed. The greatest care should be taken in the preparation of these inspection forms to cover all vital points of the airplane and engine. When a proper form has been decided upon, the inspectors must be impressed with the importance of adhering strictly to the form. It is believed highly desirable to have each point on the written form initialed by the man doing the work. In this way, should any trouble develop, responsibility can be quickly placed and if found the result of carelessness, severely dealt with. On the more important and vital parts of the airplane and engine it is believed desirable to exercise a double check. Since all inspection forms in use by our company are actually rechecked by the chief mechanic or crew chief, a triple check is therefore obtained of the more vital points. A completely detailed, written inspection form requires a longer period of time for inspection, and will therefore increase considerably the cost of inspection and maintenance, but our experience has certainly proved it to be worth while. Space on the inspection form for troubles that develop above and beyond the ordinary routine is necessary so that all work can be properly taken care of.

Careful, painstaking inspection and maintenance produces the reliability and safety that are demanded by the public. It is believed that accidents and losses are practically always the result of lack of care. Proper inspection and maintenance require a given amount of time. To reduce this time required reduces the safety and reliability which in the end will increase the cost.

It is well, therefore, to keep in mind the fact that enough airplanes and engines should be provided initially to insure sufficient time for proper maintenance and inspection. To give an example of this, in originally equipping our line, we purchased seven airplanes and three engines per ship, or a total of twenty-one engines. Daily two airplanes flew, two other airplanes were on the ground, completely checked and serviced, ready to go, and held in reserve, two other airplanes were arbitrarily marked "Out of Commission" and were undergoing inspection and repair. The seventh airplane was held out of the daily operation as an emergency measure, so that in the event of any major trouble developing in any of the six airplanes actually in operation, the system of one ship in the air and two on the ground would never be interfered with. The twenty-one engines were divided as follows: Seven in airplanes, seven completely overhauled and in reserve, ready to go, and seven in the shop, undergoing overhaul. Under this plan each airplane flew approximately only six hours out of each seventy-two and underwent inspection, repair and overhaul during the remainder of the time. Every effort was made to permit no airplane to leave the ground unless it was in first-class condition. This operation schedule produced very good results and proved economical in spite of the large initial investment, and in spite of the fact that the ships only flew six hours out of the seventy-two.

The equipment above referred to was the Douglass M-1 mail plane which was really the U. S. Army O-2 Observation plane converted into a mail plane. The engines referred to were the old reliable water-cooled Liberties. But with the advent of a commercial airplane designed specifically for commercial purposes and a reliable air-cooled engine, inspection and maintenance have been more than cut in half, thus reducing materially the number of reserve airplanes and engines required for a given operation.

It is believed very desirable for all operators to exchange information as to habitual and major inspection and maintenance difficulties. It is equally desirable that the operators work closely with the airplane designers and manufacturers in developing airplanes with good inspection and maintenance features. The same holds true between the operator and the airplane engine designers and manufacturers. From an inspection and maintenance point of view, the addition of extra weight in vital points of an airplane and engine is considered highly advisable in spite of the subsequent slight loss in performance.

The development of a closer relationship between operators, and between operators, designers, and manufacturers, combined with the development of an inspection and maintenance system that permits of no possible chance of human error, should make the airplane the finest and most reliable form of transportation ever developed.

CHAIRMAN MACCRACKEN: I think perhaps it might be courteous at least if we gave Colonel Hartney the first opportunity to comment upon this paper. He said he would like to do it from the floor instead of up here.

COLONEL HARTNEY: In the first place, that was an old trick of Moseley's, giving the sense of responsibility to the mechanic who made the inspection and looked after the maintenance. The mechanic likes to have that responsibility. If you will just give him the job with these forms that are not going over his head and see that he carries them out, he will really carry them out properly.

I want to tell you about the time out at Mitchel Field when Moseley was in

the Pulitzer race. He discovered that the mechanic had put the oil lead in the main bearing. He, however, won the Pulitzer race. When he was going after the mile record, evidently the oil wasn't going through, there was a suck instead of a pressure. The engine let go with a bang, but Moseley succeeded, as he always did; he was a lucky bird.

He stresses in his paper maintenance and inspection. He is absolutely right when he says that maintenance and inspection are very fundamental to safe operation. When he says that most accidents in the air can be traced to a lack of that, he knows what he is talking about.

MR. HUBBELL: I have been impressed with what has been said on the record of the National Air Transport Company in flying 3,000 miles with two fatalities. If that statement could be brought home to the American people with unmistakable emphasis, a great point would be gained in encouraging commercial aviation.

When we started flying two hundred and three hundred thousand miles, it was looked upon as a pretty fair record. The Army makes about five or six hundred thousand miles at the present time. The average of the whole country is near to a million miles. The Imperial Airways in three years has run nearly three million miles without a single fatality.

Something was said a while ago about crystallization. I have been in two forced landings, one in Vancouver Bay, when a bearing broke, due unquestionably to crystallization. The bearing caused a fire, which was quickly extinguished by a fire extinguisher while we were still in the air. The other was caused by a broken axle at Oregon. We hit a rock in landing and the axle was broken.

I have been impressed in my air travels to many airports by the care which is given to the overhaul. Air travel, in my opinion, is as safe as any form of transportation in this country. The accidents are caused in stunt flying and school flying. In the first six months of this year, we have killed four pilots in regular airway flying. We are flying twenty-five thousand miles a day. That is another thing that the public has to keep clearly in mind, that the formal flying, the standard flying, the regular passenger flying over established air routes is as safe a form of flying as any other means of transportation.

We are making wonderful progress in aviation. Every year the records are getting better. If that is the case, we owe it primarily to the Department of Commerce. In the few years you have been in the Department of Commerce, you have established a wonderful Department, charged with delicate tasks, that of harmonizing theoretical considerations of operations with the practical experience of men long in the flying business. There has been no needless red tape, no useless verbiage due to regulations. All the Department has done (so far as I know, and I am pretty well familiar with the facts) has had the endorsement of all those who are primarily responsible for the operation and maintenance of our air lines. What I would like to see is a like development in our State regulations. I wish that every State would adopt a statutory requirement that no pilot shall be allowed to fly a machine who has not a certificate, at least the equivalent of a certificate of authority that he is a pilot from the Department of Commerce, and that no one should be permitted to go up in the air without a certificate of reliability of structural strength and all that goes with it.

European nations are not ahead of us in this method, but behind, and European records carefully studied show no superior achievement in safety than our records show.

Our air transport managers throughout the country have the notion of safety so ground into their nature, so ground into their operations, that they are making creditable sacrifice of money and time and thought to secure the largest amount of flying without fatality, without accident and without injury.

I have been up in the air ninety times. I have had three or four forced landings. I haven't had any results yet. I am more than ever convinced that

flying under normal conditions as practiced in America at the present time, under the control of the Department of Commerce, is as safe a form of transportation to both pilots and passengers as any form of transportation that we carry on.

CHAIRMAN MACCRACKEN: Are there any others who wish to comment upon either of these papers?

MR. SEYMOUR: I would like to refer to a statement made by the gentleman who followed Brooks Parker. There may be too many insurance people here not to go a little farther into the fire problem. Almost all of the fires occur on the ground after crashes. In order to eliminate some of those fires, the Army advocates short exhaust stacks on the engines. Whether or not that is right, I don't know. If Colonel Pratt were here, I would like to hear him discuss that. Anyway, we use long stacks, and we have never had a fire after a crash. Perhaps that is due to our fuel system, which is entirely a mechanical pump pressure. I do want to say that we have never had any fires in the air and we have never had any after a crash on the ground. If I remember the statistics correctly from my Army experience, only one per cent of all the fires experienced with airplanes occurred in the air. I don't know any pilot that has any great fear of fire in the air. We take an extra precaution by packing Pyrene around so that it can be released instantly on pressure. These remarks are directed specifically so that those people who are interested in the room may know exactly what the situation is regarding fires in airplanes in commercial use.

COLONEL HARTNEY: If I might be pardoned for getting up again, I want to say that I absolutely agree with Mr. Seymour. I think that every fire in the air that ever occurred was due to one cause, and that was to a breaking of the fuel line. The last fire that we know of was Captain Courtney's plane coming across the ocean. In one way it was a blessing in disguise because it revealed that the ship can weather the ocean. He did not provide for vibration of his fuel line between those two major engines. You know what they are doing now, they are putting in as many vibrations as they can.

Take the Junker fires, for example. Every one was due to a broken fuel line. I think a reward should be given to anyone who knows of a fire that wasn't due to a fuel line. A fire after a crash is something different.

A. R. SMALL (Underwriters Laboratories, New York City): I am not such an expert in aviation as I might hope to be, but somebody will agree that I know something about the fire conditions. My first experience in the air was on a rebuilt Junker plane that Colonel Hartney just mentioned. I went up to see if it would burn again. I think the fires that occurred in those Junkers were due partly to poor design of the plumbing, too many rubber joints took care of the vibration. One other contributing factor was the poor design of the engine compartment so that gasoline could be retained in close proximity to the hot exhaust equipment.

Getting away from the real technical parts of aviation and aircraft design and getting down to the basic principles of fires, your real trouble in the crashes occur usually by the ignition of the fuel system. You must remember that the lot of aviation fuel is common to most other gasolines, and fuels will not ignite except in the presence of the spark or in being exposed to temperatures in excess of 500 degrees Fahrenheit. If it were possible to provide automatically a cutout at the time of a crash, practically all means of a spark would be eliminated, and I could be reasonably sure that no fire could happen in the case of a crash.

CAPTAIN WILLOUGHBY: The question of vibration has not been carefully attended to. They make a pipe directly connected and solid with the joint so close to the tank, and of course the vibration in time breaks that pipe line loose. The making of a rubber joint does not solve the problem. The rubber is partly soluble in gasoline. It would be ridiculous to put on one of rubber, it seems to me.

The way that I have always attached my pipes is this: Around the center I have always put a coil. That seems to solve the problem, because that coil prevents any undue vibration of the pipe or getting it loose from the solid joint where it attaches itself to the other part or member.

J. S. BRICKNELL: I will accept Colonel Hartney's reward. Five years ago in Army training, I had a fire in the air due to the following causes: I had a leaky carburetor in an A-B type engine. The wind blew a spark on to the hot exhaust manifold and the fire spread back to the carburetor. It was easily extinguished.

JOHN A. FLEMING: Are there any data on the difference between fires in air-cooled engines and fires in water-cooled engines?

CHAIRMAN MACCRACKEN: Can anybody answer that question?

MR. SEYMOUR: I personally was discussing with one of the officials of the company that manufactures air-cooled engines rather extensively last evening that very question. He told me that he didn't know of any fires that had ever occurred even following crashes with air-cooled engines; but unfortunately I was able to tell him of two that I knew of. There may have been others, but I could only think of two off hand.

MR. FLEMING: There has never been any in the air, has there?

CHAIRMAN MACCRACKEN: These have been right after crashes, not in the air.

I notice that one of the pilots of one of our first scheduled air transport routes is in the room and possibly something occurred to Mr. Miller in hearing these papers—he heard one of them, I believe, read—as to the changes that have taken place in maintenance and transport in air transport operations. Perhaps he can tell us of his experience in the early days that will be useful.

MR. MILLER: In the early days it was a one-man battle, you might say, in trying to interest people in aviation. The company that I have reference to is the Albany Airways that started operating out of New York. They had summer operations in New York and operated in the winter in the South. We had two or three bad crashes, and just discontinued operating on account of finances getting low.

As far as maintenance in the early days is concerned, we did not have the personnel that we have today. Also, we didn't take into consideration the factors that enter into the safety of carrying on aviation of the present time.

CHAIRMAN MACCRACKEN: There has been some suggestion that probably we could profit a good deal if we heard from somebody active in the military service at the present time. Is there anybody in the room who will undertake to give the conference the benefit of the experience gained in the military services on this question of maintenance and inspection of aircraft engines?

Apparently our military friends thought this was purely a commercial meeting. I notice that another of our insurance friends, rather a new one in the insurance field, has come in. He probably won't speak so much from his experience in the insurance field perhaps on this point as he will from his experiences as an inspector of aircraft engines. Mr. Jones! (He shakes his head, "no.") I once was able to give him orders.

MR. JONES: I don't know exactly what you want to hear about. I had a little experience with the Department of Commerce on inspection of aircraft engines. I have gone into all angles except the insurance end of it. As Mr. MacCracken just said, I am new in the insurance end of this game. I don't think I have anything to say at this time.

CHAIRMAN MACCRACKEN: Are there any others that would like to ask any questions or contribute something to this discussion? I am sure there isn't a more important subject dealing with safety of aircraft than the inspection and maintenance in our air transport operations. Dr. Hubbell in his remarks pointed out that in the air transport service during the first six months of this year they have made quite a remarkable record. I thought you might be interested to have

his statement supplemented by the fact that I think it was four per cent of the total accidents in aircraft engines occurred in scheduled air transport operations; the remainder was in other types of flying.

JOHN B. KOHLER (Chicago, Ill.): I am a railroad man, not an aviation man. I am just new at this game and I am trying to learn something about it. One thing that Mr. Moseley's paper brought out, I think, shouldn't be overlooked and should be given more emphasis, and that is the value of a complete system of reports with regard to records of inspection and maintenance. Railroad experience can't help but impress that on anyone who is interested in transportation work. There is nothing that can replace a full system of records on the matter of maintaining reliability of service. The point is so important that I think it should have full mention.

Another thing that Mr. Parker brought out—I don't know whether it was inadvertent or not—in his discussion was the fact that the use of safety belts might possibly have been left to the discretion of the pilots. I personally do believe that such matters as that can be left to the discretion of the individual.

BROOKS PARKER: May I say a word? I didn't attempt or didn't intend to create the impression that it was left to the discretion of the pilot. My point was that if they had the orders before that time there were certain pilots following them and others were not. From the experience I have had with the Western Air Express, I don't think that is the case. All their people follow their orders. I think it is probably a new ruling they have put through since I was there, since August.

MR. KOHLER: I thought the point should be cleared up.

MR. PARKER: I think the Western Air Express pilots do follow very carefully their instructions from the several inspections I have made of the line, not known to the pilots.

H. W. HEINRICH (Travelers Insurance Company, Hartford, Conn.): I would like to ask another question. It may not be quite pertinent to the two papers under discussion. I am interested in the use of parachutes, and the specific questions I have in mind are these: Is it the sentiment of the operators and pilots, at least those who are assembled here, that all pilots should be provided with parachutes, should wear them perhaps strapped to their back, and should the passengers be provided with parachutes? My second question is: Is it practicable to instruct passengers in the use of the parachute and to expect favorable results by such use?

CHAIRMAN MACCRACKEN: That is a question that is the subject of a conference that is going on now in another session. I don't think they have concluded that discussion as yet.

JOHN A. FLEMING: There is one note I would like to sound or emphasize that I think has been in the background here but has not been brought to the foreground, and that is the economic importance of what we call business interruptions. It is becoming recognized more and more in the general field of insurance, property insurance particularly. Probably the thing that holds back the completeness of the inspections in a good many cases is the cost of it. I am not speaking from experience. Very often the fact is lost sight of that the cost will usually be made up not only in reduced insurance premiums, as Mr. Parker has brought out, but in the long run by not having the plant out of commission for any length of time by disasters, such as fires or bad crashes or other catastrophes. We must not lose sight of that, I think, in aviation operation as well as in all other operations. We know of cases where they have had catastrophes and because of the keenness of competition in the immediate locality the firm was practically wiped out; although they have been financially sound, have been fully protected by insurance, that is, they have been fully compensated by the loss. But the fact that they do not maintain complete inspection service resulted in this immediate loss and resulted in the eventual wiping out of the company.

CHAIRMAN MACCRACKEN: I see that I was in error on that parachute question. It is going to be this afternoon. Major Hoffman, who is the inventor of the parachute that is used by the Army and the Navy is going to present a paper on that subject. I think it would probably be well if we didn't attempt to cover that in this session this morning.

Mr. Carroll, I wonder if you can't contribute something as a result of your National Advisory Committee work.

MR. CARROLL: I would like to stress one point that I think was finely brought out in Mr. Moseley's paper, and that is, that previous to this conference there has been considerable timidity on the part of the designers and manufacturers. The statement has been made rather fearlessly three times to my knowledge at different sessions of this conference, but Major Moseley's statement in regard to it is worthy of study on account of its source, that the operator prefers additional weight in his airplane providing it is put there not from poor design but to help the maintenance and inspection and repair. I think that that statement, augmented with the statement he makes, that even in view of sacrifice of the performance that they still prefer it is one of those things that many manufacturers should have mimeographed and put on everybody's desk in the factory. I think it is a remarkably good idea and it is particularly well brought out in Moseley's paper.

CHAIRMAN MACCRACKEN: I happened to be out on the field the other day when one of our men was checking up on a plane. I think it was about the eleventh plane that this particular factory had produced, and yet in that brief time, he said that he could inspect that plane in about half the time that it took to inspect plane number five or six, whichever it was.

Here comes Lieutenant Doolittle. We have been looking for you, Jim. You got just too close to the door to escape. This conference, as you probably know, has to do with the subject of the operation of aircraft and its maintenance and inspection therewith. While the papers have been presented by the men who are dealing with that subject in commercial air transport, we all felt that we ought to have some contribution from the Army.

LIEUT. DOOLITTLE: One of the gentlemen said that safety belts should be worn. I thoroughly agree with him on that. The use of parachutes, I don't think is so essential, because it would be very difficult in low altitudes to get all of the passengers out. But in 1921, when several Congressmen and Colonel Miller of the Army were killed, in an Eagle plane, it was caused undoubtedly by the fact that the chairs were loose in the plane and they did not have on safety belts. I think it is very important that the seats in transport planes should be made secure to the floor. The wearing of safety belts is very important in case of a minor crash.

CHAIRMAN MACCRACKEN: Any further discussion or questions?

MR. FLEMING: Do you bring out in the percentages the difference between a ship of a low center of gravity and a ship of a high center of gravity? The various type planes, of course, have various degrees of stability, according to the design. In relation to crashes, I think that there is less liability of crashes in planes of a low center of gravity than planes where the center of gravity is high.

CHAIRMAN MACCRACKEN: That is a question dealing primarily with the matter of design rather than of the operation of the plane. It really does not belong in this morning's discussion. The question you propound is one of design rather than of operation or maintenance.

Are there further questions?

I want to again express our appreciation not only to the National Safety Council for making these conferences possible but also to those who have taken part in the discussion this morning.

ADJOURNMENT

**SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL**



Weather Service

First National Aeronautical Safety Conference

Under Joint Auspices of

The Daniel Guggenheim Fund for the Promotion of Aeronautics and the National Safety Council

October 4 and 5, 1928

**PROFESSOR C. F. MARVIN, Chairman
Chief of Weather Bureau, Washington, D. C.**

The meeting of the Weather Service Session, Aviation Division, of the Seventeenth Annual Safety Congress was called to order at ten o'clock by the Chairman, Professor C. F. Marvin, Chief of Weather Bureau, Washington, D. C.

CHAIRMAN MARVIN: This session of safety in aviation in conjunction with the sessions of the National Safety Council marks a very important epoch in aviation. We are particularly concerned in this meeting with the method of meteorology in increasing safety in aviation, and we have two very important papers this morning; one of the objects of the session is to enlist as complete discussion of the papers as possible.

The first paper on the program is one by Dr. Carl Rossby, of the Daniel Guggenheim Fund for the Promotion of Aeronautics, on "Organization of Weather Service for Safe Flying on an Airway." Dr. Rossby has studied his subject very extensively and comes to this country from Sweden with an intimate acquaintance with meteorology as practiced in the Scandinavian countries. We shall be glad to hear what Dr. Rossby has to tell us in regard to his point of view on the organization of the weather service.

Organization of Weather Service for Safe Flying on an Airway

By PROF. CARL GUSTAF ROSSBY

Daniel Guggenheim Fund for the Promotion of Aeronautics, New York City

There are two misconceptions prevailing among a number of pilots and meteorologists which have somewhat retarded the development of an efficient meteorological service for the aid of safe flying.

Many pilots maintain that the weather reporting stations along the commercial airways have been established for their benefit and study, that the reports therefore should be given a character conforming with their own ideas and that the observation hours should be so arranged as to fit their particular flying schedule.

Meteorologists, on the other hand, have occasionally gone to the other extreme and maintained that the weather observations should be turned over to them for digestion and discussion; the finished product of this discussion could then be handed to the pilots in the form of airways weather summaries and forecasts.

At the end of a year devoted almost exclusively to discussions and conferences concerning meteorology and flying I have allowed myself to form certain opinions in this matter, which I, with your permission and patience, will attempt to set forth here.

It seems to me that in this case, as always, the truth is to be found somewhere between the two extreme viewpoints.

It is not difficult to see that the pilots' scheme would not work. Barring very short hops, every flight, to be undertaken with safety, requires a knowledge not only of conditions previous to the start of the flight, but also a guarantee that no radical or harmful changes will take place during the progress of the flight. Such a guarantee, if at all possible, can be furnished only by a trained meteorologist. It is true that a pilot starting out with reports of clear weather throughout his territory has, in most cases, an excellent chance of getting through while the good weather lasts. We must, however, remember that in most parts of the country and for more than half the year, flying has to go on with anything but ideal, clear weather conditions. Weeks at a time current reports will indicate that the ships can get through, but that already a slight change will be sufficient to close the airway. Especially is this true of mountain regions where a little sinking or lifting of an apparently innocent cloudbank is enough to close or open a mountain pass.

It is obvious that if air transportation is ever to be able to compete successfully with other modes of transportation, all these dubious flying days must be saved. No pilot can accomplish this saving without taking chances with his equipment and endangering the life of himself and of his passengers. Increasing competition between the various air transport companies, the necessity to keep, during the bad flying season, customers which have been acquired during the easily flyable summer months, will nevertheless force the pilot to do his utmost to get through. This is exactly where the weather man comes in to the picture: *only the experienced meteorologist knowing the weather conditions and knowing the pilots and planes with which he has to deal can accomplish a saving of flying days without giving up the primary condition of safety.*

It is equally easy to see that the other extreme would be unsatisfactory. We have at present five district forecast centers of the United States Weather Bureau, from which all the airways weather forecasts emanate. We have many thousand miles of commercial airways, touching probably every state in the Union. To give an adequate service, each of the five forecasters on duty a particular day will have to be able to describe accurately, for instance, the location and movement of all the principal cloud or fog banks in his district and to tell if the various mountain passes in his district will be open or closed to flying during the interval of time covered by the forecast. If we keep in mind that each district has an area comparable in size to that of England, France and Germany combined and that the airway work is just a small part of the forecasters' duty, the impossibility of this demand becomes apparent.

We are therefore led to assume that decentralization of the forecast work, detailed consideration of conditions in restricted areas and, whenever possible, personal contact between pilots and meteorologists are necessary features of a successful aeronautical meteorological service.

An acknowledgement of this latter viewpoint, which is by no means new, can be found in the fact that the Federal Government at a number of the more important municipal airports on commercial airways has established regular Weather Bureau Stations for the service of the air transport companies. Along

the more important of these air ways special air way weather reporting stations have been established, from which reports are sent to the Weather Bureau Stations at the terminals. It is this very gratifying development under the auspices of the Weather Bureau, and the Airways Division of the Department of Commerce, which shall here be made the subject of a more detailed discussion.

The airway weather reporting stations established by the Weather Bureau and the Department of Commerce are generally located on the airways themselves, and the report hours have been so arranged as to fit the schedules of the individual operators. In this respect the two government agencies have followed a practice which began with the Post Office Department, while the transcontinental air mail line was still operated by the government. As a result, the number of reports on many airways is very small and the time interval between them quite irregular. Naturally the pilots of the various commercial lines are quite anxious to fit the reports of the actual weather conditions as close as possible to the start of each flight, but this arrangement has several serious disadvantages which should be given full consideration.

Most of the airways are used by a single transport company engaged in regular scheduled flying, while the rest of the traffic over the same airway, by private planes or planes engaged in taxi or sightseeing service, may occur at any time of the day. Infrequent daily reports arranged to fit the few scheduled flights will therefore be of very limited value to this latter traffic. This is especially important to keep in mind in all discussions concerning flying on the Pacific Coast, where the number of privately owned planes is increasing by leaps and bounds, and municipal airports spring up by the dozen.

Even if the number of regular lines over a commercial airway should increase, the reports if arranged according to the present principles, would soon become crowded during certain hours of the day while at other periods no reports at all would be available.

Infrequent reports with irregular intervals are of very little value to the weatherman at the airport, when he sits down to the task of forming a clear picture of the weather changes in his territory. On the other hand, reports at regular, short, intervals, would help him to follow in detail and with great regularity the movements of the various phenomena which may affect flying in his part of the country. The importance of such a close touch with the weather can not be over estimated. I shall later show a few maps to better illustrate what can be gained by such a study. At present it may suffice to say that even if only a single ship flies over the airway every day, an adequate weather service for this ship would require the weather man to be in practically constant touch with the weather all through the day, much in the same way as if the traffic were twenty times as heavy.

The situation is in a way comparable with the one that arises when you want to forecast the weather for, say, the city of Washington, for the next day. To do so you need reports not only from Washington itself, but from a large area surrounding it and extending as far west as to the Mississippi, but once you have these reports you can without any great increase of cost forecast the weather for other adjacent localities like Baltimore, Pittsburgh and New York.

Thus it is almost as costly to organize a satisfactory weather service for one ship as for twenty, and this may explain why a new line, over a seldom flown territory, can not immediately expect a perfect weather service.

It is obvious that between the pilot's demand for weather reports fitting the individual flights and the meteorological demand for equally spaced report hours, there is a conflict which, if precautions are not taken, might even develop into potential source of trouble. It is well then, to see what has been done abroad to overlap this gap between the two viewpoints. In Germany, where the aeronautical meteorological development has reached a height unattained anywhere else, an arrangement has been made which aims to satisfy both parts.

The German meteorological service for airways protection is based upon a network of 65 first class stations, 32 of which are located at the principal flying fields. Each of these stations has at least two trained meteorologists and full instrumental equipment. The majority of stations in this net report at 5 a. m., 7 a. m., 9 a. m., 11 a. m., 2 p. m., 5 p. m., and a few at 2 a. m. The gap between 5 p. m. and 2 a. m. is due to the almost complete absence of night flying on the continent. In addition to the above report hours, the regular international stations, of which there are about 20 in Germany, report at 8 a. m., 2 p. m., and 7 p. m. In discussing these numbers, it should be kept in mind that all these stations are located in a country, about the size of California. The 32 stations at the principal flying fields are connected by a special cable and they are also equipped for regular pilot balloon observations.

The purpose of this net of first class stations is to enable the meteorologist to keep in touch with the weather developments on frequent local synoptic maps. These local maps are drawn at all of the 32 principal flying fields; a uniform set of symbols is used so that the pilots are able to read the maps without difficulty.

In addition to this first class net, there is another net of about 180 stations located along the various flying routes. These stations have only incomplete instrumental equipment and are manned by part time observers. Forty minutes before the scheduled departure of a plane from any terminal flying field, all the stations along the stretch to be flown take such special observations and send them in to the terminal for the benefit of the pilot.

Through this double arrangement an apparently very successful effort has been made to satisfy both pilots and meteorologists.

Turning our attention now to the location of the airway meteorological stations, we will find that the "single-string" type of distribution, although originally introduced to meet the immediate demands on the pilots' part likewise can be made subject to severe criticism. Flying conditions in southern and central California will serve as an excellent illustration.

California is at present far in the lead as far as number of airports is concerned. Even places of a few thousand inhabitants boast of their own municipal airports; these airports are not just open spaces but, on the contrary, often show a remarkable activity. Almost every town has a small flying school and a few privately owned planes. With this rapid growth of the number of plane owners and landing fields flying has necessarily assumed a zig-zag character, so that the actual flights, if projected on a map would form an almost uniform net extending from the high Sierras to the ocean. Many of the more prosperous towns, like San Jose, Monterey, Salinas, San Luis Obispo, and Santa Barbara are located in the coastal valleys and separated from the interior through mountain ranges which deeply affect weather conditions. It stands to reason then, that a single string of stations through the San Joaquin Valley, along the present commercial airway, will serve only a fraction of the traffic.

When we realize that it is the private plane owners and the numerous small flying schools that form the bulk of customers for the aircraft industry, it becomes evident that it is just as vital to the aircraft industry to secure a uniform meteorological protection of all aircraft as it is for the automobile industry to promote good roads.

But even the regular commercial lines are better served by a uniform network of meteorological stations, and this for various reasons. During the summer season the coast and the coastal valleys are frequently covered with high fog or stratus clouds, of oceanic origin. This fog forms or blows in during the afternoon or during the night and usually dissolves during the forenoon. In the winter time one or more of the inland valleys are often covered with a low radiation fog which may last for weeks at a time, virtually making impossible all flying in the particular valley where it occurs. To maintain efficiency in operations it is there-

fore necessary sometimes to fly in one valley, sometimes in another, in other words to maintain *alternative* courses. It is easy to multiply the number of examples of this need.

Southern California is separated from the San Joaquin Valley through the Tehachapi Range, through which there are two main passes. The highway from Bakersfield to Los Angeles goes through the Tejon Pass (through which also the lighted airway leads) and the Southern Pacific Railroad and the Santa Fe go through the Tehachapi pass. During the winter season this range is frequently covered with clouds, sometimes extending 14 to 15 thousand feet high, making

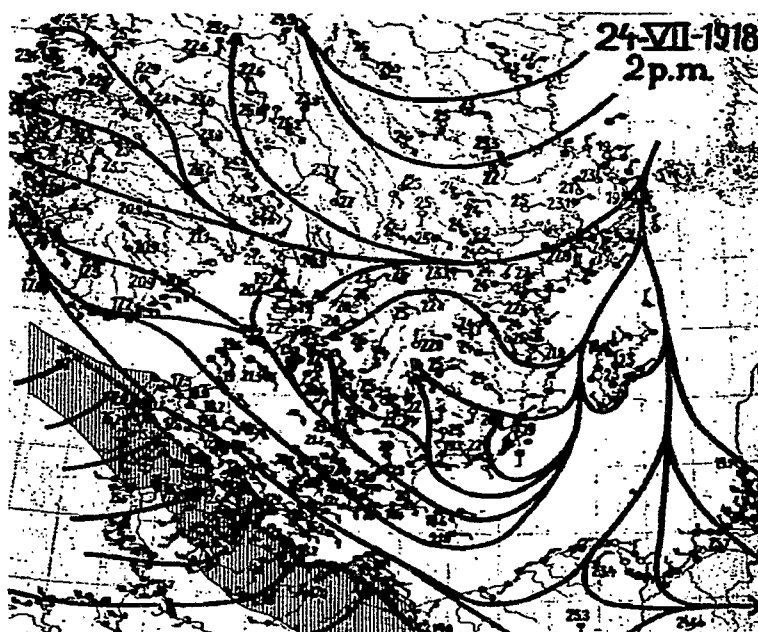


Figure 1.

flying on top impossible. These cloudbanks are usually due to disturbances off the California coast. Sometimes the clouds fill up and close the Tejon pass, but leave the Tehachapi pass open. To take advantage of this possibility to cross the ridge the planes have to leave the established airway and make a detour through the Mojave desert. Occasionally even the summer fog in southern California may extend as far north as to the ridge, completely covering the San Fernando and the Santa Clara River valleys. In those cases, Los Angeles planes bound for Bakersfield and San Francisco have to head southeast from Los Angeles, cross the San Bernardino Mountains at the Cajon Pass and then continue up through the Mojave desert and the Tehachapi pass to Bakersfield.

Finally, if all the mountain passes in southern California are closed by heavy cloud banks there is a possibility, at least for multimotored ships, to get through to San Francisco along the coast, although additional emergency fields would be needed on this route.

The principle of *alternative airways* means of course that the *airway weather* reporting stations should be distributed uniformly over an area rather than just along the main airway itself. In support of this demand we have cited the *net* like character of the actual flying and the necessity of serving all aircraft alike, regardless of whether it is engaged in scheduled flying or not, and finally the need for alternative courses of troublesome weather conditions.

However, even when in a certain territory, flying is confined to a single course, adequate protection is possible only with the aid of a network of weather reporting stations which completely surrounds the airway on all sides. This is easy to see from the fact that all stations on the airway itself may report favorable flying conditions, while fifty or one hundred miles to the side there may be a thunderstorm or a fog bank or a rainbelt which may drift across the course as a complete surprise to pilots who started out with reports of good weather. It is true that the present airway weather forecasts usually take care of the occurrence of such disturbing phenomena, but the observation material available for their preparation is so scanty as to necessarily make them somewhat vague. In the case of ordinary heat thunderstorms of the type that usually occur on summer afternoons, the airway forecast based upon the regular morning weather map will probably say, "thunderstorms in the afternoon and during the night." This may be a very good forecast, but the information contained therein is not detailed enough. Under the circumstances cited, if the airway stations themselves report favorable conditions, a great number of pilots will be inclined to go ahead regardless of the forecast. On the other hand, those heeding the forecast, may miss a perfectly good flying day since the thunderstorms may or may not cross the course. A dense local net with frequent report hours would by and by enable us to keep track of the individual thunderstorms, and thus to take full advantage of the good weather periods.

In order to better illustrate the intimate knowledge of weather conditions possible through dense local observation nets of the type here advocated, I have prepared a few lantern slides, some of which may be old acquaintances to my fellow meteorologists, but should be of a certain interest to the flying public.

Figure 1 and *figure 2* show the movement of a summer squall line of moderate intensity, extending over Denmark from the SE to the NW. This squall line is, as you see, accompanied by a very well defined rainbelt of almost constant width. The two maps, separated by a six hour interval, enable us to obtain a very good value for its velocity. If these two maps had been prepared before the war, before the meteorological stations in Europe were increased to many times their original number, it would have been extremely difficult to detect this squall line. The temperature difference between the air masses on both sides is not very great, and the change in wind direction could easily have been interpreted as a gradual change. It would simply have been speculation to connect the few stations reporting rain. However, the detailed analysis shows that we have a *continuous* narrow belt of rain, low ceiling, and poor visibility.

Exactly the same remarks hold for the next picture which shows the movement of a warm front rain, in other words a rainbelt along a line where cold air is displaced by a warm and moist air current. The detailed analysis has made it possible for us to recognize how distinct and well defined this rainbelt is.

Figure 4 shows a typical fog distribution in central California, a summer morning at 8 a. m. This map was prepared from the weather reporting stations organized by the Weather Bureau and the Daniel Guggenheim Fund in California last spring. Thirty-four stations were used in the preparation of this map, and it was possible to depict in detail the way the fog enters the various valleys.

Now a few words about the organization of this service. The two terminal stations are located at the Oakland Municipal Airport and at Vail Field on the southeast side of Los Angeles. These two stations were established by the Weather

Bureau and are manned by four and three men, respectively. They are fully equipped for pilot balloon work. The two terminals are connected by a telegraph printer line, provided by the Pacific Telephone and Telegraph Company. Two other printer sending and receiving sets are installed on the same line, at Fresno and at Bakersfield, both regular stops on the air mail line along the coast. There is one full time and one part time operator at each of these two places. The four stations Oakland, Fresno, Bakersfield and Los Angeles with the connecting printer line form the backbone of the service. These four stations collect reports from all other points by long distance telephone calls, arranged in sequences. Thus Oakland collects fifteen stations, Fresno three, Bakersfield four, and Los Angeles eight.



Figure 2.

The explanation of this seemingly uneven distribution of substations between the collecting points is trifold. In the first place, to get a clear picture of the fog in the San Francisco Bay District it was necessary to make the station net denser there than anywhere else. In the second place, big population centers like Oakland and Los Angeles necessarily have better telephone communications than the intermediate points. In the interest of efficiency they should therefore handle a larger share of the traffic than the rest of the stations. In the third place, some of the stations off the main airway, for instance San Luis Obispo, although geometrically closer to intermediate points on the airway itself, have direct telephone communications only with the terminal points.

Observations are made with ninety minute intervals six times daily, at 6.30 a. m., 8 a. m., 9.30 a. m., 11 a. m., 12.30 p. m., and 3.30 p. m. One report hour, 2 p. m.,

was for reasons of economy left out until the need for it becomes more apparent.

During the night the government observers on the airway report three times for the benefit of the two transport companies now carrying on regular night operations. There are two planes every night from Los Angeles to Oakland. Although these two companies naturally have to follow the lighted airway closely, it is evident, that their operations would benefit greatly if the whole net of stations were to report also at night, since this would help us to form a much better



Figure 3.

picture of the various slow moving fog belts which form the main obstacle to flying in this territory.

The airport situation in Los Angeles and around the Bay District is, as everybody knows, very complicated. Some transport companies are located at Oakland, others at Mills Field on the west side of the Bay. One or two more fields are in operation or being planned in the East Bay District. The Army uses its own field, Crissy Field, at the Golden Gate. Thus, in order to distribute the weather reports and forecasts as efficiently as possible, it was necessary to install printer receiving sets at Mills Field and at Crissy Field, connecting them with the Los Angeles-Oakland circuit. Another printer, both receiving and sending, has been installed in the San Francisco Weather Bureau office. Similar arrangements have been made in Los Angeles, where the operating companies use fields on different sides of the town. In installing these numerous printers we have attempted to keep down the number of sending and receiving sets and whenever possible use simple receiv-

ing sets. This was done in order to maintain discipline and avoid confusion on the printer line.

In this connection it should be mentioned that we have attempted to handle some of the dispatch messages for the transport companies on our printer line and apparently to their satisfaction. Departure and arrival of planes, number of passengers and express matters, gas and oil consumption, all of these matters are now reported over the printer line. These messages are sent by the Weather Bureau employees and it is understood, that weather reports have precedence over all other messages. Since the communication service is handled by the Weather Bureau itself there is no division of responsibility, and efficiency and discipline are therefore more easily maintained, than if two different departments had been involved.

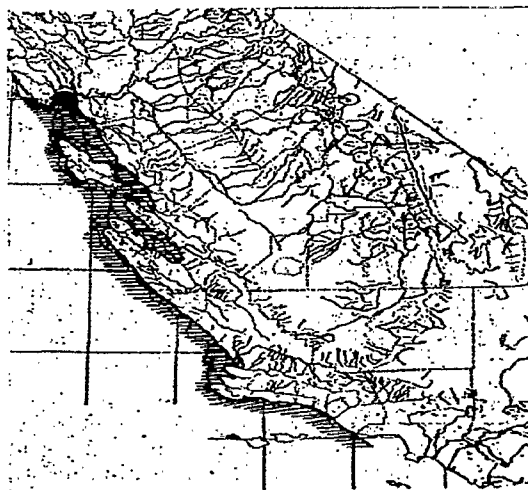


Figure 4. Shaded section indicates typical distribution of high fog in central California. (Early morning.)

It will not be denied, however, that traffic may ultimately become so heavy, that it will be impossible for the Weather Bureau to handle it. It may then become necessary to make other arrangements, but I think it is safe to say that we have already given proof that an efficient weather service requires that the Weather Bureau should handle its own communications.

The weather reports are plotted on local synoptic charts, a few samples of which I shall circulate among you. As you see, no isobars or lines of equal pressure have been drawn, although they are the most outstanding feature of regular weather maps. The reason for this is that the pressure readings from the various stations are referred to the altitude of the individual stations rather than being reduced to sea level. This was done in order to make the barometer readings more useful to the pilots.

Each pilot in scheduled flying receives, before the take off, a typewritten form containing the flying weather forecast, the last report from the whole net of stations and also the latest upper air data. In addition, he is supposed to visit the Weather Bureau office and look over the local map. Some pilots take great interest

in the maps while others are more lukewarm. However, after one or two troublesome experiences they usually find their way into our office.

In addition to the two government pilot balloon stations at Oakland and Los Angeles, three more such stations have been installed at Hollister, Fresno and Lebec. Each one of these stations is manned by one full time observer, who also has a maximum allowance of \$25 a month to hire local assistance. Thus we believe that economy has been demonstrated.

These additional pilot balloon stations have proved to be very useful, since the ocean fogs often prevent Oakland and Los Angeles from making any upper air observations, while the interior is always clear during the summer season. In view of the fact that the operation of the big transport planes in use between Los Angeles and San Francisco costs between one and two dollars a minute, the time saved by the selection of the correct flying level from their upper air readings actually means hundreds of dollars a month to each company.

The selection of California for this experimental weather service has been criticized, since, as everybody knows, the climate in California is too perfect to demand any weather service at all. In the first place, this is somewhat of an exaggeration. On my first visit to San Francisco from Los Angeles, sometime last February, we had five consecutive days of low ceiling and rain or drizzle. I might add that in spite of this, I still regard San Francisco as the most charming place in the world. In the second place, an experiment of this type, to lead anywhere and to gain the attention and interest of the flying public, should be undertaken in a part of the country where the public is air-minded and the traffic is heavy enough to justify the expense. In the third place, by locating the service in California, we avoided competition with already established airway meteorological services.

I have been asked about the scientific results gained. The service started about the first of May, the first maps were drawn in the beginning of July. Thus, we have only had three months experience and it seems rather inhuman to expect any results after so short a period, falling entirely within the season when California weather is most noticeable by its absence. However, a clear picture of the flow and frequency of the ocean fog, and the slope of its ceiling from one valley to another has been gained. This picture could never have been gained in any other way. I am confident that the young men who now handle the work on the Coast, once having been accustomed to a detailed analysis of weather conditions, would feel very much at a loss, if they had to go back to the old type of service.

The cost of the whole organization is somewhere in the neighborhood of one hundred thousand dollars, which must be regarded as comparatively reasonable taking the amount of traffic into consideration. Then, it should be remembered that the terminal station at Oakland also serves the airways to Seattle and Chicago, while the Los Angeles station serves the Salt Lake City and the San Diego airways.

Sir Napier Shaw, the grand old man of British Meteorology, in the preface to his *Manual of Meteorology*, makes the statement: "The study of meteorology has always been dependent upon the extent to which the community felt itself unprotected against the weather." The world war illustrates this statement vividly, since it led to a multiplication of meteorological stations in central and northern Europe. The immediate scientific result of this increase of the number of stations was the foundation of what may be termed modern synoptic meteorology. Thus, according to Shaw, meteorologists have had to be content with such crops as they could raise in other people's fields. Twenty years from now, flying may be independent of weather. Why should we meteorologists throw away this, perhaps the last chance to raise a bumper crop in the field of aviation?

The viewpoint here argued, namely the need for dense local nets of weather reporting stations with frequent report hours, is by no means new. It was set forth very definitely last year by an informal committee on aeronautical meteorology which included representatives from the most interested government departments and the Daniel Guggenheim Fund. The same type of organization has been advocated by Major Blair of the Signal Corps Meteorological Service for many years as a result of his experiences during the world war. The California experiment, however, is the first attempt to put the theory into practice.

Discussion of Dr. Rossby's Paper

CHAIRMAN MARVIN: Dr. Rossby's interesting and important paper is now before you and I hope we will have some discussion of the points presented. There were several features in his remarks that pleased me, especially where he contrasted the airways of the European governments, the operating, and the flying courses, as compared with the airways over the Atlantic States that we are organizing and supporting in this country. The Weather Bureau, under the present status of the law, furnishes aviation, civil aviation, with meteorological aid and to enlist and insure its safety it has to work over all this area, and we have to spread it out a little to do that at the present time.

Dr. Rossby has given us an ideal picture of the organization of a standard airway and if it could be employed over the entire country it might be all that could be desired. In the mean time, however, any available means to permit such a wide attention and such a close comprehensive net work has the advantages represented in his program. We in the Weather Bureau are building up a system that comes as near this ideal and is as impartial to all the airways as seems practicable.

PROF. A. G. McADIE (Blue Hills Meteorological Observatory): I think Dr. Rossby's ideas are more interesting to me than to any other individual in the United States, because I lived out there for nineteen years, and in my day there was but one plant in California and that was the weather man's and he had the right of way over everything, because human welfare depended upon him. I have a young nephew today, a mere baby to my eyes, and he has been jumping from planes, coming down through the air six or seven thousand feet. He stepped off the plane into space, counted ten, and pulled the string, and the parachute did the rest. Times have changed.

In my day and generation the main thought was to stay in the plane and not step off, and I don't know yet whether I exactly like that idea. I see one good feature to it, and that is if all the old timers, and especially the professor, were to step off a plane, it might deter those who are better saved than we are. This boy is a captain of the Reserve Officers and to me is a mere child. He is only twenty-four, and he told me that the maximum age limit for those fellows in the air course is twenty-two.

Now there is very little to discuss in Dr. Rossby's paper. He has presented it as a very comprehensive view of the situation. I know the folks used to call me the "poet of the fog" and Los Angeles people said I was the only one who could make capital out of the Obispo fog. But those summer fogs are usually about three hundred meters in depth, so if you want you can fly in the north or south, outside the coast, and get over that low fog. These extend about thirty miles and in winter the fogs that come down there are very dense but not higher than ten meters. This sounds like exaggeration, but you can usually get out of those fogs by climbing up about twenty meters, and as Dr. Rossby says, the inability to get

above that low cover of fog is the one difficulty. It can best be done by putting out sounding rooms in stations on the hills. You have to get them out of that low land and put them on the hill tops where you can look down and see the whole thing spreading out.

C. G. ANDRUS (Hadley Airport, New Jersey): The Guggenheim Fund suggested that I comment on Dr. Rossby's paper and I would like to do so, not in a critical way, but in a very complimentary way.

I think the dense local net work is something we can use very well here in the East and the Western district. I think Dr. Rossby said that sometimes there is difficulty in getting the pilots interested in the procedure of getting weather reports, but there is no difficulty in interesting them here. The difficulty is not to fan it to too intense a heat. The local net work would satisfy that demand. This demand in the field falls into two results. One doesn't deal with safety. It deals with the way the mail will fly and whether passengers can be carried. It doesn't deal with safety, but the other feature does.

It is a matter of whether a plane leaving in fair weather will be liable to a successful termination of the trip. A recent example is a hurricane that devastated the greater part of the southeast of America and passed northward along our coast, and contrary to the usual course made a slight turn to the northeast, as it was advancing.

Watching the Progress of the Hurricane

At Hadley Field we watched its progress from the North, South, East and West. The night the airway at New York first began to be closed was the night the turn toward the northwest was first made known to us. It seemed to us during the day, by what we consider our closest net work, the New York to Cleveland part of the line, that the approach would be to the westward and at night we were faced with the question: If a pilot leaves with a tail wind, can he negotiate, with one thousand pounds of mail, a trip to Cleveland, four hundred miles away? He is assured of a successful landing at that point of the airway, or if the same is closed, or bids fair to be closed during the first quarter of the way, he can be notified before proceeding; but the situation was not absolutely certain, as it very seldom is. Well, that put us in a dilemma. The officer said that if I can't get to Cleveland I shall have gas enough to go on to Toledo the next big stop.

The question was one which we would have been able to decide at once had we had a dense local net work between New York and Chicago, but we hadn't, so we discouraged the pilot, in the main moved by questions of safety. It happened that he could have arrived at Toledo safely, but under the conditions, we were forced to discourage him. That is an example where a local net work would have helped us. We are not thinking of current questions. We are thinking of one life. When we get to carrying passengers we shall have to look at it from the standpoint of several lives.

The other point in Dr. Rossby's paper is this: I believe Dr. Rossby is going to find, when he is about fifty years old, that aviation will be just as dependent upon weather conditions as it is now.

CHAIRMAN MARVIN: The time is getting short and there is one more paper; it might be a good plan to reserve discussion until the close of the second paper. At this point I want to introduce Dr. Gregg. He is the man in charge of the Aviation Department of the Weather Bureau in Washington, and he is here this morning to give us his little story of weather and the pilots.

Meteorology as an Aid to Safe Flying

By WILLIS RAY GREGG

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Washington, D. C.

The vital importance of an adequate weather service for aeronautics is no longer a subject for debate. It is universally recognized. Striking evidence of this fact comes in daily. Insistent requests—many of them in the form of demands—for more service are received with every mail from all parts of the country,—from the lowly hamlet as well as the mighty metropolis. Caustic are the comments when these truly air-minded people are told—as many of them must, under present conditions, be told—that no funds are available for granting their requests.

A leading air mail contractor is authority for the statement that all of the troubles experienced by his company in the course of a single year were directly or indirectly traceable to weather. And, more recently, the president of the Transcontinental Air Transport Co., has stated that, in the maintenance of schedules in the proposed rail and air service from coast to coast, "everything will depend on the weather."

Other testimony to the universal recognition of the need for weather service is the inauguration during the past two years, by the Government, of such detailed service as funds permit on all of the commercial airways; and, quite recently, the organization by the Guggenheim Fund of an experimental, very detailed and intensive, service between San Francisco and Los Angeles.

The importance of weather service for aeronautics may be considered from two points of view,—that of safety and that of efficiency. The latter will loom larger and larger as time goes on, but this National Congress is devoting its attention to *safety*, and this paper will therefore be confined to that phase of the subject. In it will be discussed briefly the following topics:

1. Present status of airway weather service.
2. Needed researches.
3. How the pilot can cooperate.
4. How the air transport operator can cooperate.

1. *Present Status.* Briefly stated, weather service for aeronautics, as now organized, may be said to be in the pioneer stage. We are trying out many different schemes. We hope and believe that some of them are along the right lines, but only time and experience can tell with certainty as to this.

Since 1926, when the Air Commerce Act was passed, service in greater or less detail, depending upon the amount of air traffic, has been organized along all of the commercial airways that have been established or recognized as such by the Department of Commerce. This new service is of course an extension of that already existing for the general public, which consists of twice-daily reports from all parts of the country and forecasts based thereon, these forecasts covering periods of 12 to 36 hours.

Although this service was very early found to be of a too general character to suit the needs of fliers, it did provide the groundwork or parent organization, and, as such, was capable of expansion at comparatively little additional cost. One of the first acts in making this expansion was to increase the number of what we may call "upper air" stations, that is, those at which observations are made of winds at flying levels. In all, there are now some 50 such stations, well distributed over the country, many of them being located at important points on the airways themselves.

Information regarding upper wind directions and velocities, although helpful in enabling the pilot to select the most favorable flying level, is not *vital* in the same degree as is similar information concerning conditions at the surface. It is this

latter information that determines whether or not any flight at all can be made. Fog, low-lying clouds, excessive rain, sleet or snow, severe thunderstorms and very poor visibility render flying hazardous and impracticable. Not always will this be so, but in the present state of the art it is. Therefore, particular attention is given to these conditions, not only at the upper air stations but also at numerous places where observations are confined to surface weather. In all, there are now approximately 150 stations, most of them on the airways, from which such reports are available, when needed. Naturally, the time when they are needed is just before the pilot begins his flight. Accordingly the reports are in general sent as short a time before the take-off as possible and still insure their receipt in time for use. Of course, the ideal system would be an exchange of reports all along an airway and from points on each side of it at frequent, regular intervals. But, at the present time, available funds do not permit this, and in some cases it is not yet justified, owing to the small amount of traffic that has thus far developed. However, there is now a three-hourly exchange of reports between the principal points on the New York-Chicago Airway, supplemented by special reports to fit the flight schedules from these and intermediate points on this airway. Moreover, as previously stated, an experimental service has been organized by the Guggenheim Fund between San Francisco and Los Angeles, and in this service frequent reports at regular intervals are interchanged between a large number of stations, both on and off the airway.

The reports themselves contain information regarding the general character of the weather, as clear, overcast, rain, snow, etc.; ceiling or height of low clouds; visibility; wind direction and velocity; temperature and pressure; and, when available, upper wind data. These reports go to the meteorologist who in many cases has his offices at the airport. They are used by him not only in giving out information concerning current conditions, but also as a basis for short-range airway forecasts for the following one to five or six hours, depending upon the length of the flight. The utility of these short-range forecasts is becoming increasingly evident. It is no exaggeration to say that, in the early days of flying, pilots in general paid comparatively little attention to forecasts, unless a very long flight was contemplated. For short trips current reports were deemed sufficient. Many experiences, however, some of them involving considerable hazard and a few of them resulting in accidents, have shown very clearly that a condition reported as existing at any given time may, and often does change decidedly in the course of so short a period as an hour or so. Accordingly, on nearly all airways, the current reports are now supplemented by forecasts of probable changes in existing conditions, with particular reference to type of weather, ceiling and visibility.

It should be distinctly understood that neither in the current reports nor in the forecasts does the meteorologist tell the pilots whether or not they should fly. His function is, and must always be, only to describe the weather itself and give his opinion as to what it will be in the next few hours, leaving to the pilot or to others in control of the airways operations the decision as to the favorableness or unfavorableness of that weather for flight. The wisdom of this policy is apparent when one considers that the appraisal of weather conditions in relation to flight is to a considerable extent a relative one, depending on the experience and temperament of the pilots, the type of aircraft and the character of the service. Some pilots do not hesitate to start out in weather that others regard as offering considerable risk. Again, a strong head wind is or is not serious, depending upon the speed and cruising radius of the craft that is to fly against it. Finally, greater caution should be exercised with a passenger-carrying than with a mail or express service. These considerations introduce uncertainties with which the meteorologist, with his usually limited flying experience, is not equipped to deal. He indeed has his own quite sufficient responsibility of saying what the weather *itself* will be.

In addition to the current reports and short range forecasts, the service to civil

aeronautics provides forecasts covering periods of 12 to 24 or more hours. These are the general forecasts, augmented to include upper winds. They are of necessity couched in more general terms than are the short period forecasts. In commercial aeronautics regular schedules must be maintained so far as possible. The operator wants to know today the likelihood of making a scheduled flight tomorrow. Particularly is this true in passenger-carrying service. If the probability is that no flight can be made or that there will be considerable delay, the prospective passenger can be informed and can then, if he so desires, make his trip by train or bus. It seems likely that these longer period forecasts will become more and more important as the service develops.

All of this service—current reports and forecasts alike—is of little use unless it provides up-to-the-minute information to those needing it. This type of service involves two requirements: First, close contact between pilot and meteorologist; second, prompt and dependable means of communication. For the former it has been found by experience that the most satisfactory arrangement is to have the weather service organized and furnished right at the place where the pilot starts on his flight. And that place of course is the airport. Not only does the pilot thus get the reports as soon as they are received but he also is able to discuss them with the meteorologist. This matter of personal contact looms larger day by day as a prerequisite for the best possible service. When the weather outlook is decidedly uncertain (and alas! there are many occasions of the sort to plague the meteorologist) it is tremendously helpful to the pilot just simply to talk the situation over with one who makes a special study of weather and its vagaries. It is now a regular part of the Government's policy to establish service at airports. This has been done in several cases and provides 24-hour service where flying is carried on both day and night. It will be extended to other important airports as the need develops and facilities permit.

But the meteorologist himself is handicapped unless he also receives promptly the reports from points along the airway and elsewhere on which he bases his bulletins and forecasts. And this means a dependable system of communications. Whatever the most satisfactory method may eventually prove to be—radio, telegraph, telephone, typewriter printer, or perhaps something unknown to us now, it will prove its adequacy for the purpose only by showing that it gets the information through more speedily and more dependably than does any other method. Very likely no one method will be used to the exclusion of all others, but one may be the principal, and the others auxiliary, means of communication. All types are at present in more or less general use in the service.

In addition to these ground communication systems there must be means of signalling to aircraft in flight. No matter how detailed a weather service, or how able the meteorologist, there will always be occasions (we hope their number will become progressively smaller) when conditions will unexpectedly change from favorable to unfavorable or vice versa after the flight has started. The pilot must then be warned,—by radio if the aircraft is suitably equipped; otherwise, by visual means. So-called panel signal systems are now being tried out at certain critical points in different parts of the country and much experimental work is also being conducted in developing suitable apparatus for ground to plane communication.

Such in brief is the present status of aeronautical meteorology, so far as its practical application is concerned. Although it is true that only a beginning has been made, it is believed that that beginning is along correct lines. If so, then future developments will be in the nature of marked extension rather than radical change. And that extension will include all sections of this country and its possessions.

2. *Research.* Much has been learned in the course of the past 100 years, concerning the general characteristics of the atmosphere. During the last 30 years our knowledge has been extended very considerably into the regions above the earth's

surface. The general structure of the atmosphere is fairly well known up to 20 miles, well above present-day flying levels. And yet it can truly be said that an almost unlimited field for research lies open before us. The surface has scarcely been scratched. We are not so much concerned with *general* characteristics. What we want to know more in detail are the special occurrences, many of them of small extent but of serious import to the flier.

Meteorological research has suffered greatly from indifference on the part of educational institutions and from the limited field available to those who might take it up as their life work. Happily the situation is materially improving. With the development of aeronautics there is a growing demand for thoroughly trained meteorologists. To meet this demand some of our leading colleges and universities are organizing courses in meteorology which will be of a grade similar to that of courses leading to degrees in other technical and scientific professions. It seems well, therefore, to consider some of the lines in which research is desirable as a means of increasing safety in flying. A few of the more pressing problems will be briefly discussed.

Visibility is the one great concern of the pilot. In proportion as it decreases his troubles increase. It reaches the vanishing point in dense fog. It is not for the meteorologist to try to get rid of fog. But he must study, in a detail that has never yet been attempted, the conditions that produce it and those that dissolve it. True, we have this knowledge in a general way now, but we can't apply it in individual cases. Otherwise, the forecasting of fog would now be a success; instead it is a failure, if we consider forecasting in anything like a specific way with regard to time and place.

Similar study should be made of the occurrence of haze which becomes at times and in some regions so dense as seriously to affect visibility.

Nearly all pilots ask first for information on two elements, visibility and ceiling. Low ceiling simply means that visibility is cut off except at levels which are dangerously low for flying. Studies should be made that will enable the meteorologist to forecast the formation of low clouds with a goodly degree of precision as to time and area. Probably for such forecasts information as to upper air temperature, humidity and wind will be necessary.

This leads to the subject of new and improved methods of procuring upper air data. At present our knowledge of wind conditions is derived for the most part from observations with small balloons, which can be used only in clear weather. There is urgent need of developing instrumental or other means for sounding the upper levels more or less continuously, and certainly at times when conditions are unfavorable or are becoming unfavorable.

This seems to be a requirement particularly in the forecasting of conditions favorable for the formation of ice on aircraft. In this connection it may be stated that a preliminary investigation of this subject will be made during the next few months.

Aside from fog, low ceiling and ice formation there are numerous subjects which are of less importance, but a better knowledge of which would nevertheless contribute very decidedly to greater safety in flying. Among them is the formation of the more or less violent disturbances, such as thunderstorms, line squalls, tornadoes, etc. These are usually not difficult to cope with, providing their occurrence is known, with a reasonable degree of precision, in advance. Much more needs to be known than at present is known concerning gustiness and vertical convection, both near the surface and at considerable heights. In fact, there is very little knowledge of the extent of vertical movements in the upper levels, such as those that were responsible for the destruction of the Shenandoah. Studies of this subject are of special concern in connection with the design and operation of lighter-than-air craft.

Finally, there is much work to be done along statistical lines. We have already gathered together an immense amount of data and we are adding to this supply daily. Most of this has been so compiled as to be quickly and conveniently available for study. There are many lines along which such study would be profitable. For example, an operating company must adopt a schedule that is as fast as possible and one that can be maintained a fairly large percentage of the time. There are two principal factors that determine what that schedule can be. One is the cruising speed of the aircraft employed and the other is the weather. The data concerning frequency of head and cross winds, fog, low clouds, heavy snow and sleet, etc., would determine what schedule could be kept, say 90 per cent of the time. Such studies have been made and published for two of the important airways. Data already available are sufficient for similar studies as to workable schedules for nearly *all* of the airways. Naturally, the results can not be used to predict schedule maintenance for a short period, such as a week or a month. But for periods of a year or longer they would be (and in the cases cited they have been) found to be very nearly accurate.

3. *How the Pilot Can Cooperate.* We have already stressed the value of close contact between pilot and meteorologist. Let it be said at once, and the statement is based upon abundant experience, that the benefit is by no means one-sided. The pilot, in his discussions with the meteorologist, gets help that is immediate and direct. He profits by it that day and is then through with it. But the meteorologist learns from the pilot, if the latter be a good observer, many things that enable him greatly to increase the value of his own service. For one thing he learns the pilot's viewpoint,—comes to know what he is most concerned about. In many cases in which the meteorologist is uncertain as to what the weather will be, the pilot tells him after the flight just what it was. This information often is available in no other way. The meteorologist finds out whether his prediction failed or succeeded, and is better equipped to handle the next similar case.

Oftentimes, moreover, a pilot brings in information which is of great aid to another pilot who is about to start in the opposite direction over the same route. This information supplements, in a most helpful way, the data obtained from other sources.

Accounts of experiences in particularly bad conditions, for example in a squall or while ice is forming, give the meteorologist valuable data not only for the day to day service but also for purposes of research.

In short, it appears that the pilot's contribution toward making the weather service play a dominant part in increasing the safety of flying will be more or less effective in proportion as he and the meteorologist discuss, frankly and sympathetically, their mutual problems. In this way each one profits and, more important, the safety and efficiency of flying are increased.

4. *How the Operator Can Cooperate.* In many respects it is the air transport operator who is most vitally interested in this whole matter of safety. He must be able to guarantee a reasonable degree of it in the service that he operates; otherwise, his ledger will very shortly show a balance on the wrong side. He knows full well that, every time a crash occurs and particularly every time a life is lost, the whole program of the development of commercial aeronautics suffers a setback, entirely out of proportion to the seriousness of that single accident. It is the operator, therefore, from whom we should expect to receive the most effective co-operation in helping to make the weather service do its share in increasing the safety of flying.

He can do this in several ways. For one thing, he can arrange to have the meteorologist accompany the company's pilots on some of their regular trips. Experience shows that in no other way does the meteorologist obtain so clear a grasp of the pilot's problems as through actual flights in the different types of weather in which flights must be made. Poor visibility and low ceiling are terms that

acquire a meaning then that they had not theretofore had. The two men learn, through these flights together, to talk a common language and can thus the more intelligently discuss their mutual problems.

The flights to which we have been referring are those in the operating company's regular schedule. Oftentimes, a pilot will start with less than a full load and it is then that provision might well be made for the meteorologist to go along. But, in addition, it is believed that *special* flights should be provided for during conditions of unusual interest. Such flights would not, as a rule, be cross-country, but would be made right at the airport, up to a certain desired height and down again. For example, suppose that conditions in late afternoon appear favorable for ice formation that night when a regular scheduled flight is to be made, but the meteorologist is uncertain because he doesn't know the temperature and humidity at flying levels. A short, special flight, 20 minutes in length perhaps, would secure these data and enable the meteorologist to tell with more certainty than he otherwise could whether or not a flight should be attempted. Occasional cooperation of this sort from the operator would, it is believed, contribute very decidedly at times to the safety of flying.

Finally, the operator can cooperate very effectively by instructing his pilots to give careful attention to the reports and forecasts that he receives from the meteorologist. He should also at all times be perfectly frank in his criticism of the service. If this service is not dependable, both the operator and the pilot owe it to themselves, to their patrons and to the Government to report that fact to headquarters in order that action can be taken to bring about improvement.

It is proper, and it is also a pleasure, at this point to say that cooperation on the part of the air transport companies' officials, pilots, operators and others, has been and is whole-hearted and most helpful. Probably more appreciative attention is given to the weather service than to any other feature of the aids provided by the Government. And in return the facilities of these companies, almost without exception, have been made available to the meteorologists, many of whom now make occasional flights without cost to themselves or the Government.

Summary and Conclusions. Meteorology can help make flying more safe in the following ways:

1. Through an intensification of the service already organized, so as to provide—
 - a. More frequent reports from a larger number of stations;
 - b. More frequent and accurate airway forecasts;
 - c. A prompt and dependable system of communications, including ground to plane.
2. Through research conducted by properly trained men in—
 - a. The conditions favorable for the formation and for the dissipation of fog, haze and low clouds;
 - b. The development of additional methods for making observations of upper air conditions in all types of weather;
 - c. The conditions favorable for the formation of ice on aircraft;
 - d. The conditions favorable for the development of gustiness, vertical movements and violent disturbances such as thunderstorms and line squalls;
 - e. Statistical data from which can be determined many useful facts, such as the approximate schedules that can be guaranteed for different parts of the country.
3. Through cooperation on the part of the pilot in—
 - a. Discussing frankly with the meteorologist the problems with which he has to deal;
 - b. Telling the meteorologist whether or not his forecasts are correct, and, if not, wherein they failed;
 - c. Describing to the meteorologist the conditions through which he passes that give him most concern.

4. Through cooperation on the part of the operator in—
 - a. Making suitable arrangements for the meteorologist to accompany the pilot in some of his regular flights;
 - b. Providing special flights during particularly interesting conditions;
 - c. Instructing the pilots to pay close attention to the weather reports and forecasts;
 - d. Criticizing frankly the service furnished, in order that it may be developed to the highest possible point of efficiency.

The Future. Those of us who believe thoroughly in the future of aeronautics, and the number is happily growing by leaps and bounds, foresee a development in the not distant future when it will occupy a prominent place in the commercial life of the nation, not supplanting but supplementing in a large way other types of transportation. This development means a similar expansion and intensification of weather service. Such a service is possible, but, to be most effective, it must have the whole-hearted support of pilots and operators, it must be made more nearly perfect through research, and it must be of the up-to-the-minute type through a fast and dependable system of communications. With such a service functioning on all of the airways, the hazards of flight which now unfortunately, and in large measure unjustifiably, loom large in the public consciousness will vanish, and aeronautics will truly "come into its own."

CHAIRMAN MARVIN: This is very comprehensive and this paper of Dr. Gregg's represents the best efforts of the government on meteorology. We should be glad to have the matter discussed. I have some written discussion here that has been sent me by some important persons who did not have the opportunity to attend this meeting, which I will touch on while you are waiting to collect your thoughts. It will not be possible to read the discussion in full as the hour is getting late.

Captain Hingsburg who is the officer of the Department of Commerce responsible for the maintenance of communication and other functions of the civil airways, has written a rather lengthy paper. He says that an adequate weather service and communication system, in addition to aids to navigation along the airway are essential for the full development of a dependable and safe air transportation system. He believes that radio-range beacons are essential to guide airplanes over the lighted route when the lights are not visible one from another. He discusses the present weather communication systems, and another topic is the radio telephone communications.

Also he tells us that an entire new system of weather communications service is under consideration to develop the greatest utility from the new radio telephone facilities now available, and it is proposed to introduce this system on the Transcontinental Airway, using the stations now under construction. This system promises the degree of safety required by air transportation on a basis that permits unlimited traffic. Timely and accurate weather and landing conditions will be made available to any airplane, airport, landing field, or individual, that cares to tune in. The information will be broadcast on hourly schedules. Any airplane equipped with a radio receiver similar to the apparatus installed for the reception of radio-range signals will receive weather information at any point within the sector. This is very desirable.

This development along these lines is going on in the Department of Commerce and the meteorological part in the Weather Bureau and I think we can look forward to some very important improvements.

Now, by way of discussion in writing, Major Blair of the Signal Corps, a prominent meteorologist has submitted quite a paper here. I just want to touch on a few of the things. In this paper he declares that he is afraid that in our zeal for meteorology in the service of aviation, we may perhaps over-emphasize this particular phase of meteorology and so to some extent defeat our purpose. This

is a different side of the picture, but he also believes that it is essential that the entire field of meteorology be developed and extended to include aviation rather than that a special organization for the service of aviation be built up. He says he has tried to give his ideas in a paper which he read before the American Philosophical Society last April, and of which he incloses a copy. This paper is being printed and there will be a limited number of re-prints for distribution some time in the future. What he has indicated as a possibility in the field of meteorology has already taken place in the field of communications. We have legislated and done already many things in radio without reference to communications in general. Radio as a means of communication has its place along with wire and other means of communication and mistakes are likely to be made when we take it out of its place and attempt to give it independent consideration as has been done during the last year or two.

Major Blair says here: "In connection with the paper on the subject of 'Safety of the Airship and the Airplane for Trans-oceanic Operation,' as Army representative on the Policy and other committees preparing for American participation in the 1929 conference on 'Safety of Life at Sea,' I have tried to bring into that conference the consideration of safety of persons in aircraft at sea. The Army Air Corps and the Bureau of Aeronautics of the Department of Commerce are both favorable to having the conference consider safety of aircraft at sea. So far the shipping people have not been favorable to the matter. This seems to me unfortunate because in two of the three sub-committees organized to prepare for the conference, namely, the committees on Navigation and Communication, the problems of aircraft and seacraft are almost identical. The Ship Construction Committee can of course consider only construction of water craft, but a fourth committee on types and construction of aircraft for trans-oceanic flying could easily be organized and would be the only additional committee needed to give the entire subject of safety of crews and passengers of aircraft as well as those of watercraft at sea complete consideration. Separate consideration of air and water craft in this connection has been proposed, and this appears to me a waste of time since there is so much in common in the safety of these craft at sea. The craft are mutually interdependent as far as their safety at sea is concerned and must ultimately have a common organization for this purpose. If you are interested in the subject we might go farther with it by way of securing its consideration at the forthcoming International Conference."

Major Blair has written another comment here on the safety of the balloon. The protection of the balloon in an electric storm is the subject of the comment. These comments all cover a little wider field than the papers presented this morning, but they all relate to great questions of safety in aviation. This memorandum is as follows:—

Protection of Balloon Equipment and Personnel in Electric Storms

1. Without going at length into the underlying theory, I am convinced that the safety of a free balloon in the air during thunder storm conditions would be greatly increased if the entire surface of the balloon were made conductive and this conducting surface bonded with conducting gas in the interior of the balloon as well as with the basket. If a radio set is carried in the basket there should be a flameproof grounding switch so that the antenna may be grounded direct to the conducting system formed by the balloon and the basket. For safety this switch should be closed except when the set is operating. The set should not be operated when the balloon is passing through a thunder storm and if practicable the antenna should be reeled in. Whether the antenna is reeled in or not the grounding switch should be closed during the storm. A loop antenna is more foolproof than a trailing antenna but either type should be safe if properly handled.

2. The above arrangement insures that the entire system is at the same potential except when under the influence of some exterior inducing charge. In order to facilitate the escape of an induced charge, in other words to facilitate the reduction of the potential difference between the balloon and the surrounding air at any time, a great number of points should be distributed over the conducting surface of the balloon and basket. A conducting net with frequent connections from the outside to the inside of the balloon, as well as to the basket, will probably answer the purpose for a conducting balloon surface.

3. In case the balloon and its equipment cannot be properly bonded, or as an additional precaution for the safety of the personnel, the latter should wear electrically conducting outside garments. If the helmet or head cover is not an integral part of the conducting garment, it also should be conducting and be bonded to the garment in such a manner as to provide an electrically conducting protection from head to foot inclusive. This garment furnishes electrical protection to the balloonist in precisely the same way as the bonding described in paragraphs 1 and 2 protects the balloon and its equipment.

(Signed)

WM. R. BLAIR,
Major, Signal Corps.

We are looking forward to trans-oceanic flights. There are three huge ships ready to start in a short time. The United States may be visited in the near future by one at least. I have submitted these papers from the gentlemen who have not been here and they will be incorporated as a part of the record of our discussion. Now let me enlist once more the open discussion of the paper by Dr. Gregg.

Before this, if you will permit me a moment I would like to inject another thought here. You are well aware that thunder storms are one of the menaces that the pilots have to face, and there has just recently appeared in the Monthly Weather Review an article concerning the upper rush of the air. It did not say anything about lightning, but it spoke of hail. We have affidavits in the weather bureau telling where perfectly enormous hail-stones fell this summer and Dr. Humphries of the weather bureau has computed the uprush of the air necessary to sustain these hail-stones. Some were seventeen inches in circumference, I have forgotten the weight. However, the density of the hail-stones was five times that of pure water. This is half the density of the solids. I think it is without saying that we must teach the airships and the airplanes to keep away from any portion of the atmosphere in which that is going on. The safety consists in turning tail and running as fast as possible.

PROFESSOR A. G. McADIE (Blue Hills Meteorological Observatory): That is a very proper attitude. One of the most important things we can do is to get some way of finding out when, and where and how intense these things are, these currents of the storm. I mean the thunder storm. And it is just as Dr. Gregg says. Then I was also glad to get a copy of the Monthly Weather Review with the very interesting article that was just mentioned. It may interest you to know that we have a record on the oscillograph of a lightning wave. The wave electrically induced on the transmission light rose to its maximum in about five micro-seconds. Then gradually it decreased to zero in about forty micro-seconds. This machine and this measure gives the exact time required for a cloud to discharge. The result is zero and the charge is non-oscillatory. I thought that this would be of interest to you.

CHAIRMAN MARVIN: This is very interesting. Is there any other discussion?

DR. GREGG: May I speak for just a moment on the subject of vertical movements. Just before I left Washington a report came in from an airport in Illinois from a pilot who had gone out two or three days previously in the face of a forecast of thunder showers. But since it was day time he thought that he could at

least get around it. Unfortunately the visibility decreased and presently he got with the thunder storm itself. He very soon turned around and headed back to airport for the reason that he found a condition that indicated an upward rush of air, almost of thirty-nine meters. His altimeter showed an altitude change in the course of twenty seconds that indicated that the upper rush of air was at the rate of eighty miles per hour.

Another case, indicating that a tremendous velocity of air that is experienced, or that occurs, in the midst of a thunder storm, was that of a pilot who was in a thunder storm and was unable to control his plane at all. Finally in desperation he turned it straight down with full power, which means that he was going about one hundred and ten miles an hour. Nevertheless, his altimeter showed that he was going up. Those are two authentic cases that have occurred just recently and are on the subject.

CHAIRMAN MARVIN: You know the theory of these hail-stones that are formed in a storm is that the wind and the rain and ice are mixed and carried up where the temperature is low, this makes them move up and down and form into great huge hail-stones. These are supported from falling by the up-rush of air and the currents must be from one to two hundred miles per hour. It is this condition of the upper air which the airships must keep out of, the currents especially. Is there any further discussion?

Well then, I think that this meeting will come to a close, and I think that the records of this meeting are a very important contribution to the work of the whole National Safety Council.

Comments Upon Professor Rossby's Paper

By J. E. WOODMAN
New York University, New York

Professor Rossby's paper presents so many points of importance and interest that it is difficult to resist the temptation to comment upon several. There is one, however, upon which I feel inclined to differ from the author. That is in his optimism regarding the degree in which the aviator of the future will be independent of the weather. If measurable independence is attained, it will result from two causes. One of these will be in aircraft development; the other in such increase in knowledge of the atmosphere as will enable us to draw more general and more accurate conclusions as to the behavior of the air aloft from its characteristics at the land surface. To many of us it seems unlikely that the first will ever become quite independent of the second.

Man's "conquest of Nature" consists in adapting his actions to her laws. We cannot break them with impunity; we seldom dare even to bend them. In transportation, as in other lines of activity, we are still more or less bound by natural conditions in spite of the power of our machinery and the skill of its operators. Our automobiles have attained a high degree of efficiency; but there are road grades still too steep for them, snow drifts that cannot be surmounted, and fogs that headlights cannot penetrate. Our locomotives possess great power; but snow and fog still disrupt train schedules, and floods and landslides bury tracks beyond use. Our steamships usually go where they will on the oceans; but icebergs, fog, gales, typhoons and currents are still determining factors in their movements. The Weather Bureau stations of such ports as New York practically control the local movement of shipping at many critical times each year. Finally, for permanent operations we still use different tracks across the oceans for full-powered and low-powered steamers.

If, in spite of the power and efficiency already attained by the vehicles of transportation on land and sea, we still are circumscribed somewhat by weather and climatic factors, is it not reasonable to believe that aircraft, whether heavier than air or lighter, will at least for a long and indefinite time be influenced in their movements by the exceedingly mobile medium through which they fly?

Looking forward to increased efficiency in aircraft design and operation, and to increased knowledge of atmospheric and greatly enhanced ability in forecasting at long range and aloft, certain trends seem probable. First, aircraft will continue to differ in size and power, just as automobiles and steamers do; and it is highly probable that the small ones will outnumber the large, and that they will be called upon to bear the chief burden of passenger and limited load traffic. This implies continued differences in degree of weather dependence, but not its complete elimination. Second, there will always be portions of the world where stability of atmospheric characteristics will contribute to ease of flying and of planning flights, and where "weather" need be considered but slightly. Conversely, there will always be other and large portions of the world where atmospheric variability will cause diversity of flying problems; and there will always be seasons of greater and of less disturbance of the normal primary circulation of the air, both below and aloft—for considerable distances. A fair illustration is the half-dozen areas of tropical cyclone storms and their seasons.

In other words, in different parts of the world, for different seasons and for different types, sizes and powers of aircraft, different atmospheric problems confront the flier; and it seems unreasonable to expect complete independence of these problems to be attained by any flying devices now known.

All this implies the necessity of increasing our studies and experiments in aeronautical meteorology, not decreasing them in the near or distant future. Granted, if desired, that the time may come when an airship *can* go anywhere at any time; commercial considerations are certain to dictate that the flying will be done along the routes and at the times that will result in greatest efficiency—that is, the greatest productiveness possible with minimum time and cost commensurate with maximum safety and dependability. The meteorologist, whether theoretical or practical, will not be thrown into the discard at any time by those interested in practical and efficient aviation!

Comment Upon Dr. Gregg's Paper

Dr. Gregg, following Professor Rossby's description of the special work in California, not only shows clearly the structure of the daily studies being made by the Weather Bureau in the interests of American aviation, but raises in my own mind a serious question as to the adequacy of those studies for the ends sought. The desirability of an expansion of this work was hinted in the paper, with mention of the need of more attention to the upper air. It is along this line that I should like to add a few words.

With all the aids to weather forecasting now available through the splendid, if undermanned and underpaid, work of the Weather Bureau observers, serious study of upper-air conditions simultaneous and co-extensive with observed and known ground conditions, has lagged behind. In other words, we have quite insufficient knowledge of the real *structure* of atmospheric disturbances. This is due largely to difficulties in securing and using a sufficient number of self-recording instruments attached to balloons and kites, to the scarcity of stations at which such observations can be made, and to the resultant lack of correlation between these and critical or characteristic lower-air phenomena. In considerable measure, however, certain observations have been seriously hampered by loss of visibility above cloud ceilings, or in fog, where movements of a balloon cannot be

traced. With all these handicaps we know far too little about what is taking place at times in the upper air, and we are not likely to increase this knowledge much with the means now at command.

One of the outstanding needs in aeronautical meteorology is a full series of observations, made at regular and frequent intervals above selected Weather Bureau stations, and maintained for a considerable length of time. These are designed to acquaint us with the conditions at different elevations above the ground-station, during the variations of weather marking the passage of alternate high and low pressure areas. The study of such an accumulation of data, from a sufficient number of properly situated stations, will acquaint us better with the atmospheric peculiarities aloft that accompany known variations below. And with the growth of a competent body of upper-air facts studied and plotted in their proper relationship to the daily weather map, we should reach a point where we can forecast to a degree of accuracy not now obtainable, the probable conditions of wind velocity, direction and steadiness, of humidity and precipitation, visibility, etc., likely to accompany any ordinary cyclonic or anticyclonic disturbances in the different seasons. The value of this is self-evident.

Such observations cannot be made by means used heretofore. It will be necessary to employ laboratory planes, capable of attaining considerable altitude rapidly, equipped with the necessary self-recording instruments, and sent up at regular and frequent intervals day after day and week after week from the chosen stations. Such studies are not within the financial possibilities of the Weather Bureau, and must be carried on, if at all, by a privately endowed research. But the results in a few years would be worth the considerable cost, and the value to commercial aviation, in increasing efficiency and safety of flights along fixed routes, would be incalculable.

Comment on Papers of Professor Rossby and Dr. Gregg

By F. W. REICHELDERFER
Lieutenant, U. S. Navy

I am greatly interested in both papers. They reveal a progress in the appreciation of the needs of an aviation weather service which is promising after these many years.

I do not have much comment about Dr. Rossby's paper. The California service represents as close an approximation to the ideal service as we have ever had in the United States. For that reason it is more or less epochal. If it proves its value, as I feel sure it will, it should receive the hearty support of the operators and other "consumers" to the end that Congress will provide funds not only for its continuation but for its duplication over other airways. In addition to its day to day practical value, it represents real possibilities in fog studies which will disclose more about fog formation and persistence and point the way to better fog forecasts.

Dr. Rossby's last paragraph overlooks the weather "nets" which the Army and Navy have operated over the most heavily travelled eastern airways for several years. True, they were *abbreviated* in comparison with the California organization, but they were the same in principle, as distinguished from the old Weather Bureau service organized on the basis of centralized forecasting centers.

Dr. Gregg's paper shows what decided progress the Weather Bureau has made in becoming air-minded. For a long time we have stressed the importance of this. A paper, read before the American Meteorological Society in 1925, emphasized

the necessity for local forecasts in detail, contact with the pilots, and other points as Dr. Gregg has done in this paper. Dr. Gregg states that the decision as to the favorableness or unfavorableness of the weather must be left to the operators. This may be an administrative necessity for civil airways. However, it puts the forecaster at a disadvantage at the same time that it relieves him of some responsibility. Frequently, weather conditions cannot be adequately described without the qualification, "Unfavorable," or "Dangerous," etc. Word description in the abstract often fails to convey to the pilot or operator, the condition in the mind of the aerologist. The latter is, after all, a technical adviser, and as such, should be in position to advise as to what he thinks is the best action under the circumstances.

Personal contact between the weather forecaster and the pilots is vital. Experience is the best proof of this need. The Weather Bureau's experience during the last year or two has convinced that Bureau of this fact. The forecaster must know operating conditions, and the operator must have personal confidence in the forecaster.

Dr. Gregg has mentioned the importance of the longer forecast in the development of passenger traffic. At present, operators are interested largely in the "duration of flight" forecast, as distinguished from the twenty-four to thirty-six hour forecast which may be called the "planning" forecast. The latter will certainly become of great importance as traffic increases. As you know, it is of much importance to the Navy. In order to improve the "planning" forecast, we need more weather maps daily, and especially, an earlier weather map in the morning which will permit the preparation of a fresh thirty-six hour forecast at six or seven in the morning, at the beginning of the working day, instead of at 9:30 or 10:00 a. m. as at present. Europe has these facilities now. We need them.

Dr. Gregg's remarks on cooperation between operators, pilots and aerologists are timely. His outline of needed research shows how much there is to be done to get the weather service in step with what is absolute necessity to successful and widespread commercial flying.

I have found both papers particularly interesting because, as you know, they cover things which we have been "harping on" for years, and many of the points which are emphasized are included in the program, or outline, which we sent to the Fund a year or two ago.

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



The Public and Flying

First National Aeronautical Safety Conference

Under Joint Auspices of

*The Daniel Guggenheim Fund for the
Promotion of Aeronautics and the
National Safety Council*

October 4 and 5, 1928

WILLIAM MAYO, Chairman

Chief Engineer, Ford Motor Company, Ford Airport, Dearborn, Mich.

The Public and Flying Session of the Aircraft Division of the Seventeenth Annual Safety Congress was called to order at ten-fifteen o'clock by the Acting Chairman, J. H. Doolittle, Daniel Guggenheim Fund for the Promotion of Aeronautics, New York.

CHAIRMAN DOOLITTLE: Mr. Mayo, Chief Engineer, Ford Motor Company, was to be here this morning, but has not as yet arrived. I think it advisable that we start the meeting and let him take it over when he comes in.

HARRY F. GUGGENHEIM: Can we interrupt you for just a moment, Colonel? Mr. Mayo has just arrived, and I know we will be very interested to have him preside at this meeting. Mr. Mayo, Chief Engineer of the Ford Company, needs no introduction to this audience. This particular subject, "The Public and Flying," is one in which he is admirably capable of presiding over. I think we are all indebted to Mr. Ford for making the public realize that flying is the coming means of transportation.

I take pleasure in introducing Mr. Mayo! (Mr. Mayo took the chair.)

Private Flying and Ownership

By **SHERMAN M. FAIRCHILD**

President, Fairchild Airplane Manufacturing Corporation, New York City

In any discussion of safety in aviation the private owner must be considered also. Opinions regarding the future of private ownership of airplanes have ranged all the way from abject pessimism to unqualified optimism. On one hand we have had those who held that the sale of airplanes to private owners had no future and that the airplane was exclusively a commercial vehicle. On the other hand we have had those who regarded aviation as another automobile business, and who therefore expect the whole development to come from sales to private owners. Most probably the true prediction will be found to be somewhere

between these two extremes, for while the airplane as a whole is *primarily* a vehicle of transportation, certain types fit themselves excellently into the picture of sport.

Interesting the Prospective Private Owner

First interest of the prospective private owner is almost invariably aroused by a flight in some one else's airplane. It may be simply a business trip on one of the air transport routes or it may be a pleasure trip in a "ship" owned by some friend. But, in either case, interest in flying is aroused once the first flight is made. The exhilaration of this trip usually shatters many preconceived notions about flying and stirs the ambition of the passenger to learn more about it. If he is one of the increasing number of those who take a natural interest in this as a sport, he does not rest long without some more flights and in a short time becomes bitten by the "bug." From then on nothing will satisfy him until he has his own "ship."

The Variations in Type and Price

There is no one type or price of airplanes best suited to private use any more than there is any one type of motor boat. Just as with the motor boat, the airplane in private use will vary with the fancy as well as with the pocketbook of its owner. So far as type is concerned the prospective purchaser will have both open and closed landplanes, seaplanes, flying boats and amphibians to choose from. The price range varies greatly, usually according to the comfort and power desired. On one hand we have the market for the low priced airplane of small power and—because of its lower cost—this is the type most likely to have the largest sale to those who fly for pleasure as distinct from business. On the other hand there is a definite market also for the larger types among private owners although their greater cost necessarily limits their sale to the wealthy. It seems most reasonable to draw a parallel with the motor boat market and, indeed, this field really offers a better basis of comparison than the automobile. For the automobile is a utility of a different type, it serves not merely as a pleasure vehicle but even more as a medium of transport over short distances,—to the homes of friends, the theatre, or to the shopping district.

Selecting the Type

The prospective private owner usually starts to make his selection with some fairly definite preferences or perhaps some preconceived notions as regards the price range. The personal activity of one man will make the flying boat or float seaplane the only logical type to consider. In another case the landplane or the amphibian may be the more desirable. So far as this part of the choice is concerned each case must be decided on its own merits. If an excellent flying field exists near his home, the landplane would seem to have a distinct advantage. If suitable water areas are available nearby the float seaplane will make a more direct appeal and, if he already has owned a motor boat, the trim lines of the flying boat may take his fancy. The questions of size, seating capacity, comfort, horsepower and speed are usually dependent more upon the pocketbook than upon other elements although this is not *always* the case. Many wealthy aviation enthusiasts have purchased two seater airplanes of moderate power because their personal preferences lay in that direction rather than towards the larger or the faster types.

The Importance of Factory Organization

The prospective purchaser should make his decision with care, for aviation is not yet in the position of the automobile industry and purchases cannot be made more or less blindly. The first point for investigation is whether or not the manufac-

turer is thoroughly well established, having adequate manufacturing and service facilities. Even a good airplane may be a bad purchase if its manufacturer is not properly equipped to follow up the sale with proper service facilities. Generally, the purchaser will do well to avoid the "fly-by-night" type of airplane builder who can give no assurance that he will be in business in two or three years from now. For an airplane which is well taken care of will last several years but, if its manufacturer has gone out of business in the meantime, its maintenance may become an expensive luxury. Furthermore, the well established factory organization usually has a better inspection system and exerts more care in construction as it has a valuable reputation to maintain, such as the newcomer has not yet achieved. All of these considerations have a very direct bearing on the question of safety.

Judging the "Ship"

Having satisfied himself as regards the particular type which best fits his needs and having reduced his consideration to products of the better established manufacturers, the prospect will find that he still has ample room for choice. If he has properly eliminated the "fly-by-nights," he will find that each of the types of airplane remaining already have been granted what are known as "approved type certificates." These certificates are to be made essential before a license can be obtained and they are granted by the Aeronautics Branch of the Department of Commerce after complete investigation of the structural design and safe performance. Hence the possession of a "type certificate" may be assumed to cover most questions regarding structural design and safety.

Flying Characteristics and Performance

The possession of a type certificate however, carries no assurance that the airplane lives up to the performance claimed by the manufacturer. For assurance on this point the purchaser must either rely upon an independent flight test or upon the good faith and responsibility of the seller. Here the purchaser must exercise caution and should inform himself upon the actual performance as to such outstanding points as landing speed, climb, stalling speed and high speed. If a pilot himself he would do well to make sure that the airplane considered takes off and lands properly and otherwise behaves normally in flight, that it does not "stall" suddenly or tend to fall off into a spin too readily when stalled or indicate other features of performance affecting safety in operation. If not an experienced pilot himself and not already familiar with its flying qualities, he would do well to hire some experienced, trustworthy and open minded pilot to investigate these for him before he makes final his decision to buy any particular airplane.

The Question of Hiring a Pilot

Some private owners prefer to hire a capable pilot rather than to pilot their airplanes themselves. While this is not at all essential, it may be desirable in cases where the owner feels that he is temperamentally or otherwise unsuited to make a good pilot or where the occasions of his own piloting would not be sufficiently frequent to keep him in proper practice. While the amount of flying necessary to keep in "proper practice" depends very greatly upon the individual it might be well to note that the Army and Navy Air Services require pilots to fly at least several short flights per month to draw flying pay and the Department of Commerce requires applicants for private pilots license to have had at least two hours solo flying within the 60 days just prior to date of application. Hence it will be obvious it is by no means necessary for the private owner to fly every day or two to keep in practice.

Selecting a Pilot for the Private Owner

The private owner who elects to hire a pilot instead of flying his own airplanes should carefully investigate the record of his man before taking him on. Just at present most of the experienced pilots are satisfactorily placed and it may be necessary to offer some added inducement to encourage a good man to change. Experience and care are the two essentials of a good pilot for the private owner. While difficult, if not impossible, to reduce these elements to hard and fast figures, the private owner should hesitate to hire a pilot who has not had at least 100 hours solo flying including some reasonable experience on the exact type of airplane which he owns. However, experience is not the sole consideration of safety as not all experienced pilots are as careful as they might be and his record for careful flying is just as important as his experience.

Flight Training for the Private Owner

If, as is usually the case, the private owner of an airplane intends to fly his own "ship" (and is not already an experienced pilot) he must go through a training course in some suitable flying school. There are many such schools now and they are so well distributed that it will usually be possible to take the course at some flying field nearby. On the question of the school, again the usual caution should be exercised. A proper course of training includes "ground school" work as well as the actual flying and this schooling is equally important although it may not always be so interesting. A good ground school course includes both instruction on the theory of flight and some training in maintenance of airplanes and engines. Flight Training may be taken simultaneously with or following the ground work.

The Time Required to Learn

The actual time required for flight training varies greatly with the individual but the student who is *properly and safely instructed* should spend at least 10 hours at "dual" flying,—handling a dual control stick while the instructor coaches him. It is quite possible for a student to be able to fly in less time but this has been found to be bad practice. The most dangerous time for the learner is usually between the completion of his "dual" flying and the completion of his first 60 hours of solo flying. At the end of this period he is usually sufficiently well trained to be considered a safe pilot for average flying. From this period on he will improve until his experience makes him a pilot capable of meeting all emergencies.

The Future of Private Ownership

With aviation undergoing such rapid development as at present, predictions regarding its future are very dangerous. It seems clear, however, that flying is destined to develop along at least three distinct lines: (1) Regular transport services flying on schedule, (2) Commercial flying of other types, (3) Private flying chiefly for sport. Just what will be the relative importance in the future of these three major groups cannot be predicted with any degree of accuracy. It seems probable that the first two will always exceed the third but this does not mean that private flying will be insignificant. Indeed, the probability is that the private owners of airplanes will, at some time in the future, be about as numerous throughout the country as the owners of motor boats now are on the coasts. The growth of transport and other commercial flying operations will undoubtedly develop an increasing interest in private flying and,—through this,—a corresponding increase in the number of private owners of airplanes. With this increase the question of safety must be kept constantly in mind and the manufacturer of air-

planes must continue to exert every effort to construct airplanes that depend less upon the skill of the pilot than upon inherent stability.

MR. PERRY (Somerset Airways, Somerset, N. J.): Mr. Chairman, the present type of airplane, of course, has proved very successful in many respects, but the knowledge of what it will be five years from now is very small. It all depends on future inventions and new wrinkles that come up. Doesn't the gentleman who just read the paper think that as time goes by, there will be some relinquishment of the regulations, or a decrease in the restrictions as has come about in the case of the automobile? Doesn't he think there will be a simplification of operation, and in time the general public will take to it better?

MR. PITLER (Mutual Life Insurance Company, New York): The company I represent is faced every day with problems of insuring people who do more or less flying at different times. Some of them are passengers on regular transport lines, and we occasionally get applications from people who own their private planes. We have been rather timid in insuring the latter group. It has been our impression that their planes are not subjected to the same rigid inspection tests before and after flying as those that are serviced by the regular transport companies. I should like to get some expression from some of the experts here as to whether or not we are on the right track in following through that idea.

COLONEL BAIN (Fairchild Airplane Mfg. Co., N. Y.): In connection with the remarks of the last gentleman, I think he is undoubtedly correct. The average private owner at the present time does not have the facilities for maintaining his airplane in the state that the commercial operator has. There is no use in predicting how that is going to be solved in the future but probably as airports spring up around the country, there will be facilities at these airports where the private owner can keep his airplane and where he can be assured of at least an equal kind of maintenance such as the scheduled operator gets. As long as the operation of privately owned planes is concerned in this interim before those things are established, I think the insurance companies are quite right.

At present, there are two or three airports that I happened to have visited which have facilities now where I am sure that the private owner gets equal attention. Does that help you any?

MR. PERRY: My question was, that the present requirements are very severe. That is quite just and right; but as time goes by, I believe the airplane will be simplified as much as the automobile has been, and the requirements will be lessened. There will be a general evolution in people's knowledge and their airworthiness. I hope that there will be a decrease in the restrictions and requirements for the pilot five years from now.

COLONEL BAIN: I quite agree, except in the decrease in restrictions for the pilot. The improvements in the airplane will make it easier to fly. Certainly, the modern tendency is to make a modern airplane (as we say), "foolproof." Everyone is working in that direction. After that is done, it will be well enough to consider cutting down the requirements for the pilot. At present, I would be in favor of just the opposite.

MR. PERRY: What is your opinion of the future development of the airplane; will it be in the hands of large companies as steamship companies control steamship lines and as railroad companies control transportation on land, or will it be more in line with the paper just read, a "happy medium" between the private owners and corporations?

COLONEL BAIN: You mean the manufacturing end of it?

MR. PERRY: No, the use. Will it tend to be in the hands of a few controlling groups or will it be as the automobile game is?

COLONEL BAIN: I think there will be no question of control involved in flying. I think that the scheduled operated lines will develop the one field, and private own-

ership and operation of airplanes will develop another field. I think it is a little early to predict anything now.

Of course, the airplane can't be compared with the automobile in its development. I think we shouldn't be overenthusiastic and assume that the airplane will follow exactly the expansion of the automobile. The airplane companies maintain their own premises. You see, you must have an airport, and that at once is going to be a feature that will more or less slow down development or large use by a great many people of privately owned aircraft.

MR. PERRY: From your experience at McCook Field and elsewhere, in your opinion, what fields should inventions cover which would tend to make the airplane available and usable in the man's backyard—having his own garage, you might say? Along what lines should the inventors of this country be putting their energy toward producing a machine which will be available to each individual? What would be the form of the machine? Of course, we don't know what gravity is. Is there some physical way of neutralizing the influence of gravitation on an object?

COLONEL BAIN: I am afraid not. I don't know anything about neutralizing gravity. I don't claim to be versatile in the art of predicting and advising the well-established and thoroughly competent engineers of this country in the direction of this development that the airplane should take.

I don't feel that we will ever be in a position to maintain airplanes in our backyards. I don't feel it will ever come in that direction. It will always require a more or less large place to get off and land on. And, in the interest of good maintenance and proper supervision, I think airplanes should perhaps be maintained at some central location where they can have expert attention. An accident in the air is a serious matter, whereas if something breaks on an automobile, they can stop until they get some attention and fix it.

The Commercial Airplane Not to Be "Stunted"

MR. LEMKE (U. S. Naval Academy, Annapolis): I am somewhat of an outsider, but in one of the meetings yesterday, a point was made that struck me very forcibly. This is a point in connection with safety consideration of a commercial airplane. The ordinary commercial airplane that will deal directly with this subject of private flying and ownership is not built to be stunted.

I don't know whether ten out of a hundred people today who are interested in flying know that. I doubt whether many pilots who operate those machines know it. At any rate, I remember this summer going to a commercial airport, and one of the standard commercial airplanes (of a somewhat smaller kind, to be true) was being stunted in a rather violent manner. That is a point that might be stressed. Incidentally, it was only brought out yesterday, and it struck me as being something that might consist very greatly in helping folks to become more air-minded by assisting very directly in the general program of safety.

MR. PERRY: The average airplane when it reaches the pilot's hands, I believe, is considered to be perfectly airworthy, not only for average use in travelling, but sufficiently so to stand overloads and strains in stunting. Stunting is used a good bit to draw trade, and while I am against all reckless driving in the air just the same as you gentlemen are on land, I believe that there should be a resolution drawn up in view of the safety campaign to disapprove of all stunting hereafter.

CHAIRMAN MATO: Are there any others?

MR. BRYNER (Consulting Engineer, Orange, N. J.): The question of what the future may bring in the way of private flying has interested me for quite some time. I have given it a good deal of study for eighteen or twenty months, anyway. I have really tried to reduce a good many of those things down to practice. There is one thing in regard to the public's interest in flying, that has stood out in my

mind very clearly. It is the fact that you will never be able to interest the public extensively or be able to entrust private flying to the general public until you are able to slow the airplane down.

In an article written by Mr. Stout some time ago in the *Saturday Evening Post*, he enunciated the doctrine of safety in flying rather clearly when he said that at present, safety depends upon speed. He said essentially that the airplane plus speed produced a solid on which you could rest the airplane. In all other forms of transportation, whether it be the motorboat, sailing vessel or the steamship, we have always needed to slow the thing down when it came to a matter of safety. In fact, most of our rules even in regard to the automobile, limit speed.

Along the line of what is required, of course, we know about preventing stalling and slowing down the speed, and as Mr. Ford has written, it is necessary to use the power of the engine in landing, which he evidently intends shall slow the speed down in landing. That is one of the critical points. Until that is done, I don't believe that you can entrust the general public with private flying.

Special Study of the Airplane Propeller

One of the things that I have spent considerable time on has been the control of a pitch propeller. At the present time at the take-off (which is a hazardous period) if it is not properly made, the machine might be stalled or it might go into some kind of a sideslip or a spin. At the present time, only about 65 per cent of the power is available on the take-off due to the fact that the propeller has a fixed pitch. It is, therefore, necessary that the propeller should be studied more thoroughly. More attention should be placed upon that part of the work so that the propeller does not have a fixed pitch, but should have a very slight pitch on the take-off.

A good many years ago, as a marine engineer, I found out that propellers which were suitable for towing (which represents a take-off condition where great thrust is demanded) were not speed wheels at all. The fact is, it requires an entirely different kind of a propeller to tow a fleet of barges by a tugboat than it does for a tugboat that can make good speed. In that, the two were not analogous at all.

I leave that as my thought, that more attention *must* be placed upon this point of slowing down the speed. I will give an illustration that was used yesterday. On the route between New York and Atlanta, one of the pilots saw a gray object in front of him. It was dark, but he said he was squarely on the airway. Everything seemed to be going fine when he saw this gray monster ahead of him. He didn't know what it was, and to avoid an unknown danger, he just pulled the stick back and went over it. He was so surprised at that condition that he wanted to know what it was. So he turned around and found out it was the Los Angeles.

So long as you have those conditions, so long as you are not able to slow up, a thing like that may result in a catastrophe, even when ships of that character are handled by the very best of pilots. When it comes to the general public, which means bringing in the layman, safety must depend on being able to slow down, and if necessary, (as in the case of the steamship or launch) in emergency, you ought to be able to reverse and then get out of the stall that might be involved in it. Of course, I know that is a good deal in the imagination at the present time, but that is what the conditions demand, and what we will probably have to meet.

CHAIRMAN MAYO: Mr. Stout is on his way abroad. I don't know whether he wrote a paper for this section or not.

J. F. VICTORY (National Advisory Committee for Aeronautics, Washington, D. C.): Before you came in, Captain Land handed me Mr. Stout's paper and asked me if I would read it:

CHAIRMAN MAYO: Will you come forward and read it, please?

Non-Scheduled Flying

By WILLIAM B. STOUT

President, Stout Metal Airplane Company, Division of Ford Motor Company, Detroit

Safety in non-scheduled flying does not involve perhaps any more problems than in the field of scheduled flying except that the problems go further in the unknown factors before and during the trip.

On a scheduled flight between regular points there is a knowledge of conditions ahead of the pilot that can be rarely had in non-scheduled flying as it runs today and the operation must be more of a hit-and-miss affair than would be considered on regular airline work.

For example a pilot has a commission to fly a load of passengers from his own airport to Anthill, Florida. First he wonders whether there is such a town. Is there a field there? Can he get gas and service? What is the country in between? What fields must he stop at on the way? What of the weather and wind conditions to be met? Are there lights on the field if he should be late in arriving? and so on; a score of questions immediately in his mind, and all of which should be solved in part at least before he takes off.

The list of airports and emergency fields issued by the Department of Commerce may be his first line of defense against dangers. Maps; phone calls; visits with pilots who have flown the route, collection of all the weather reports he can get before he departs, wires to have gas and oil at certain points, and a worry as to what kind of gas he will get, real aviation specification gas or the Sinclair variety so glibly advertised for motor cars under the misleading caption. Here alone is a danger the non-scheduled pilot has to face through misleading merchandising.

If a scheduled plane is leaving over an established airline the pilot has by many previous trips a knowledge of the terrain he is to fly over, he knows the idiosyncracies of the weather, the fields en route, the field equipment at each point, and gas and oil are already arranged for long before his flight is undertaken. All that he has to do is to fly and navigate over a well known route.

If bad weather comes up he still knows all the landmarks and can spot the packinghouse district of Chicago from a thousand feet in the air without even seeing it, so keen has his scent become for locations. The non scheduled flight on a trip to a new destination however is a different problem, and unknown factors multiply.

On the regular air route prepared fields are available so that a plane of fairly high landing speed, and with a sluggish take off can be used if necessary, that greater pay load may be carried, and more speed accomplished.

On the unknown trip however fields of any kind may be encountered and the safest plane is that one that can land in the shortest amount of space, on the roughest possible ground, and take off accordingly. This would specify for the unscheduled trip a different type of equipment, a type toward which all planes are drifting and including many new items unnecessary in military or private flying planes so far. These might be listed as in use so far, as items which this type of problem is bringing into aircraft design.

- (a) Forward placed landing gear
- (b) Stronger fuselages
- (c) Powerful separate brakes
- (d) Wider track wheels
- (e) Multiple engines
- (f) Enclosed cabins
- (g) Added comfort to interiors
- (h) Better vision to
 - (1) pilot; (2) passengers
- (j) Metal construction

Where landings have to be made in strange fields every precaution should be taken to make every stop with nothing sacrificed to safety. If a commercial plane or a private owned plane has not safety it is worthless no matter what its performance, nor what tricks it may be able to perform.

There is no danger in a plane in the air, unless it catch on fire or a piece fly off the engine or prop and hit you. The danger is when you touch the ground. The control of this one thing in the maximum number of emergencies constitutes the safest plane. The items just named have a very definite place in a variety of emergencies in which one might be caught, and any one of them far more important to safety than a parachute, except in military and test work where structural strength may be in question or fire a menace.

One of the greatest sources of danger is nosing over, especially if the gas tank, as in so many pre-war types, is placed directly behind the engine. Many a fire has meant death to pilots in minor crashes which would have meant nothing with the gasoline in the right place. Placing the landing wheels further forward eliminates much of the menace of nosing over, and thus starts a sequence of possible improvements provided the fuselage construction is solid enough to carry the new tail loads. If it is not, then brakes, of course, with any real kick to them cannot be fitted.

In the new Cessna light plane I notice the wheels even forward of the leading edge of the monoplane wing, and a take off that is very sweet in spite of what must be a rather heavy tail load. The test field this company uses is just 19 acres in extent surrounded by trees, so that the landing characteristics must be pretty good. With the gear in such a location I do not see how the plane could nose over with loads that would not wipe the landing gear off.

Once the wheels are placed forward the next thought comes: now we can fit brakes, and brakes are put on that can slide the wheels and still not nose the ship over. Another added safety item.

With the wheels far forward and the heavy tail load, the tail comes off the ground a little slower it is true, but a slight increase in the tail area and its aspect ratio can more than offset this, while if you want to hold the brakes, you can get the tail off the ground before the plane starts to move anyway. The heavy tail weight now causes trouble, digging up the landing field and playing hob with the grass. Add a wheel on the rear and the problem is solved. With brakes why not make a real rolling vehicle of it? There is no more rumble and rattle in taxiing.

With the brakes there is a tendency to ground loop if one takes hold more than another. Why not take advantage of it. Result—a wider landing gear so that ground looping can be done purposely in an emergency without rolling the plane over. Individual brakes now give the plane a control on the ground that a motor car has, and side winds do not swing you around off the runway between the trees that you may have to land in. Nearly all the new commercial planes have followed these new items and are proving their safety in the unscheduled flights of private owners every day, big ships and little ships.

First motor cars were used in summer and the horse brought out in winter. Airplanes have been the same but with closed cabins these craft are now an all year vehicle even for the private owner. There is an especial reason for closed cabins on airlines, for pilots fly with but a small percentage of the fatigue when in out of the weather. In private vehicles they are a sales necessity for the same reason that closed cars sell. Pilots will not agree perhaps but after all the sales of the future are to the public which will hire the pilots. The public wants comfortable travel—not a thrill, and the public, not the engineer or the pilot, will tell us what the eventual plane must be. Safety first, then comfort will be his rule.

Whether multiple engines will be the rule is only a guess. For airline planes it is my opinion that multiple engines will be the rule. For training and the bulk of

privately owned planes the single power plant will presumably dominate, particularly with the newer more reliable engines that are coming on.

Probably the greatest problem of the designer is to get better vision under all conditions. Some of our newer cabined planes are much better in vision in good wather but when rain or snow comes along one must fly with side windows open and the snow and cold coming in, in order to see. Particularly for the non scheduled type of flying over strange country part of the time at least, vision is a predominate necessity.

Not only is this due to the pilot but the passengers as well should be able to clearly see the horizon—if any—ahead as well as at the sides, if only as a preventative of seasickness in bad weather.

Metal construction will come as soon as costs can be brought down. There is the same reason for it that there is for steel rail coaches, and it will come in spite of cost for all of the better makes. As a safety item it is of real importance, and the drawbacks so often cited to metal are mere bogeys visioned from office desks and advertising departments rather than from experience.

But we have not gone far enough yet in the safety plans. The main problem of unscheduled flying will be the owner of the plane himself. This man with a few hours flying will start using the airways, and even before long follow the lighted lanes at night. Radio will be necessary for his steering and to control him as relating to scheduled planes using the route.

Planes chartered to outside parties for cross country work can be airline planes but if equipped as described have a greater chance at safety under the emergency conditions that will arise than if just the old type planes. An overpowered plane is certainly a great advantage for safety in a small field.

Navigation is also a problem to the unscheduled flier going over a, to him, new route. He must spend much of his time watching the ground, following his map, checking his route. New instruments can add to his certainty. An automatic pilot that could even for a few moments take the actual flying off his hands would help his navigation. A map table in front of him. A new type system of mapping that would give a different course in one direction than in the other might help prevent collision possibilities.

There will be a small amount of non scheduled flying by airplane companies. We have flown about 1,300,000 miles on our airline work so far, between Ford Motor and Stout Air Service lines, and have carried 55,000 passengers and six million pounds of freight. In all that time we have as an airline made probably not over 30,000 miles of non scheduled trips nor carried in this work over 500 persons. The real non scheduled operator will be the private owner of small planes, but since he will come in so great numbers to infest our airline routes he is a part of our problem. In fact we expect all of us to be one of the infestors, and to fly our own safe, stable, automatically flown and navigated ships about the sky starting when and why we wish and our destination the same.

The work that is being done by this group, under the inspiration of the Gugenheim fund has undoubtedly more value to the public mind than could be had from any other source. The thoughts in this paper I hope may stimulate some thought for new ideas, though the material be but straight analysis based on our experience of the past few years in airline work.

CHAIRMAN MAYO: Are there any comments on this paper?

J. E. RAGG (Inventor, New York): I have a few general remarks to make concerning both papers. The fundamentals of the airplane are the power plant, the controlling surfaces and the lifting power or lifting capacity, that is, the weight. It is inevitable that each one will examine these fundamentals and find adherence and specialize on one particular phase in the effort to produce safe aircraft. I am one who is stressing the importance of the lift capacity, or rather, the capacity control.

All of the arguments that have been advanced, for instance, for the necessity of high speed, for the variable pitch propellers and for the inherent control of balance are valid, but to my mind, none of them is so important as the one factor of being able to influence the amount of play which the wing gives. If a pilot can increase his lift, he can land slowly. If the motor cuts out, that is most necessary; that being a time when the reversible propeller is out of use. If a pilot under special conditions, such as on a very gusty day, needs to land fast (which is sometimes desirable), with the control of lift in the wing he has this capacity to do so, but if he is very heavily loaded just after the take-off and has to land in a restricted field without any choice of space, by increasing the lift capacity of the wing, he is enabled to do so.

If one thing, or any other thing, is necessary in this matter of speed, a slow machine is very unsafe. A fast machine is very unsafe too, but if you have a machine which can embody these two factors, it is absolutely safe under all conditions of flight, whether the motor is working or not. This feature has been provided, it is a simple lever control which enables the airplane to utilize what is equivalent to a gear box in an automobile. By moving a lever, an auxiliary wing can be adjusted which affects the lift capacity of the whole wing for any attitude of flight. This, I submit, is perhaps the most important feature that produces the safe aircraft necessary for general public operation.

W. C. POND (John Hancock Mutual Life Insurance Company, Boston, Mass.): I am encouraged to say a few words by reason of the fact that we have another life insurance company represented in the room. Whether there is more than one, I do not know. I speak with some timidity, because the profession or the institution of life insurance perhaps is not directly interested in the problems that many of the men here are interested in.

There seems to be an idea among some of the airplane manufacturers, or those who are most interested in it, that the life insurance companies are, in a way, standing against the progress or making it impossible for those who use the airplane to obtain life insurance at a reasonable premium. I am not holding a brief for all of the life insurance companies, in fact, what I say is entirely on behalf of my own company. I can only say and give you every assurance that it is my belief that the life insurance companies are anxious to cooperate to the furthest degree with the general public in offering life insurance at a premium which is relatively safe.

As you can imagine, a life insurance company is limited in many ways, as compared to a liability company. The liability company, when a risk is sought on a plane, can place in its contract all those restrictions which it cares to make at that particular price. In other words, they say, "Yes, we will insure this particular plane, providing it is flown by such-and-such a pilot, and you will keep a monthly record of your air hours and furnish us with that schedule at the end of the month. Your premium will be adjusted accordingly." And if for any reason whatsoever at the end of the month they decide to go off the risk, they are at liberty to do so by reason of their contract.

It must be borne in mind that when a life insurance company accepts a so-called "aviation risk," it is on the risk for life. We cannot and do not propose or have any desire to limit the activities of the person insured relative to his activity with the plane or motorboat, balloon or whatever. They can assume any hazard that they see fit without any restraining measures on behalf of the life insurance company, and for that reason, the life company has to receive adequate information.

I can give assurance now, that if the life companies had only to deal with the problem of those who are flying on schedule, on regularly established lines such as are described in Mr. Stout's paper, the added premium would be little or nothing as compared to a standard premium. The problem that we must face is a big, doubtful class, and when you consider those people in that class who come to us for life insurance, what can we do? Well, I have never been able to figure out

the standing of the reserve officer, the man who still retains his commission in the National Guard. I am not familiar with just what the National Guard requirements are, with reference to the number of hours that they are obliged to fly during a year to maintain their standing as a reserve officer in the Aviation Branch, but there seems to be some regulation. Whether that is lived up to, I don't know.

With such a man, what can a life insurance company know about the equipment that he is offered? He has been in business since the war. He is married, he is active every day in business. He is not supposed to be around the air fields and airports, knowing all the new things with relation to airplanes. He comes to the National Guard field once a year, and here is a plane for him to use. He will drive it. We have paid some losses in that direction.

We have been given here at the few meetings that I have attended, quite positive assurance that the equipment and the quality of the plane, the reliability of it, is a great factor in safety. That must be true. It is only natural that it must be true. I recall one accident, a marine plane, starting from Quantico or the field which is nearby, to fly to Nicaragua, making one stop at Miami. It was flown by a very competent flyer, Colonel Lutz and Lieutenant Busby, with a radio man and a mechanic. It was a three-engine Fokker plane. It was a very splendid and reliable plane so far as anybody could know. We assume that it was inspected most carefully. The take-off was at 1:25 a. m., and the plane was down in forty-five minutes, with an instantaneous loss of life of both Busby and Lutz, the pilots of the plane.

I can recall another instance where two of the most competent men in the Curtiss Field here in New York were sent to Buffalo to bring back Colonel Lindbergh's plane. When I say Colonel Lindbergh's plane, that is all I need to say about the quality of the equipment and the perfection of the plane. We will grant it must have been a hundred per cent plus, as far as that is concerned. Unfortunately, both of those men were killed and the plane destroyed somewhere in Pennsylvania, between Buffalo and New York City.

Now, in considering the thing, the life insurance company points to those. Of course, we can't say that that proves the equipment is the solution of the safety of the proposition. You still have the human factor to deal with. The only thing that we find difficult is to get the information which will enable us to safely authorize or issue life insurance to those who are interested in the planes. Now, that is only a matter of time when the statistics will take care of it. When you can show us a class of a hundred thousand private owners that have used those planes for a period of five years, then the life insurance companies will quote you an adequate premium, and there will be no hesitancy about it.

It isn't a question of how many are killed, so far as the insurance and the premium are concerned. However, at the present time, there are not enough statistics for life insurance companies to establish a definite premium. We are going to go along with you just as far as we can and just as fast as we can. But we are anxious for statistics which will enable the companies to offer the protection. I want to dispel the idea that the life insurance companies are in any way standing in the way or making it difficult to secure that protection. We are going to go along with you. That is why we are here. We are seeking information. We are going to seek it and chase it down as far as we can and offer the protection just as reasonably as we can for the safety of the company. Thank you.

CHAIRMAN MAYO: Any other remarks?

MR. PERRY: I would like to say, Mr. Chairman, on a well-known airplane route, air mail route from New York to Atlanta, one of the pilots took a machine out and for some reason or other, within a very short time after he left the field, he crashed. No one knows what caused it. It was in clear weather, and, of course, it might have been heart failure on the part of the operator. However, those

things from an insurance point of view, are protected by physical examination, are they not?

MR. POND: Yes, but that isn't a sign that they are protected, because a man may be able to pass an insurance examination some time previous to having heart failure in a plane. I think perhaps I would have heart failure in some planes.

MR. RAGG: From the viewpoint of the insurance, I submit this: If the insurance people in general who are investigating the matter of insurance of the plane make particular inquiry as to the maximum speed and minimum flotation speed, and they find the ratio is five, it is a safe risk.

MR. POND: We can make inquiry before we write the policy, but after a policy is written, it is all over. We have no control over the gentleman then. He may fly with a ratio of five, or minus one. We can't control it.

CHAIRMAN MAYO: Anybody else? The question of insurance is quite an important one. If anybody has any ideas, we would like to have them.

MR. PERRY: Can you tell me how Henry Ford and Mr. Stout control their facilities?

CHAIRMAN MAYO: Well, as far as the Ford Company go, they carry their own insurance on the plane with the exception of damage to other people's property. In the Stout Company, they carry full insurance, which covers the passenger from crash.

MR. PERRY: Their own insurance?

CHAIRMAN MAYO: They don't carry their own insurance, they take it.

MR. PERRY: Henry Ford carries insurance?

CHAIRMAN MAYO: Only for the plane itself, but for damage to other people's property, they must take out insurance with an insurance company. I have had quite a good deal to do from time to time with insurance companies. I have always thought that they were very backward in taking on risks for air insurance. Most all other companies, in particular, industrial companies, are always reaching out and taking a great many risks in pioneering different things, and it always seemed to me that insurance companies should do likewise.

However, as I see it, they sit back and want statistics. Of course, those are not obtainable in a new industry. When an industry is young, small, I don't think the old time insurance company (if very large) is taking a great deal of chance when they take a risk, small in volume, that doesn't perhaps appear very sound at the time. The best way to get experience, in my opinion, is to take some risks and get it all first-hand rather than cast around trying to get statistics. It is very easy, it seems to me, for insurance companies, life, accident, liability, or whatever you like, to place around the policy they give, a certain restriction. I think the insurance companies should take some chance to sort of help the game along. It isn't as though it was a flash in the pan. Here is something coming. We all know it has grown to very large proportions, and the only way to safely help it along is to get into it with both feet, and get the experience first-hand.

When the Ford Company went into the manufacture of planes, we wanted to get our experience first-hand, the same kind of thing I have been talking about. So we started freight carrying, a line to Chicago, Cleveland and Buffalo. We felt that if we were going into the building of planes, we didn't want to try out what we built on our customers. We have gotten our own experience and it has been a very profitable one. The result is, we have plenty of recommendation on planes we have handed out to the public. That experience would have come to us a great deal more slowly had we not operated our own lines and found out what a good plane was through experience. We found out the weak points in construction more quickly than we could have in the hands of our customers. We found what made up a good or poor pilot. We found out what kind of weather was suitable to fly in, and what wasn't. We found out what kind of fields we should have. We built our own air ports. It is like any other thing you pioneer, you can't

get a true picture from going out and talking to people, no matter how much experience they may have in the particular thing you are talking about.

I remember distinctly when we built the first planes with closed cockpits. Practically every pilot told me it would be impossible to fly in them, but today, by preference, most every pilot likes enclosed flying.

Mr. ROGERS (American Airports Corp., New York): We have been informed lately on the question of insurance, that some of the accident companies are planning to issue at the airports (like we do at the railroad station) accident policies for one day. One of the big problems we have in putting on air meets, is to get proper insurance to cover all the risks that come up of one kind or another. It takes a great deal of time and correspondence, and the answers you get from different insurance companies or agencies are quite varied. There does not seem to be today, any real definite thing that one can depend upon.

This new thought was brought out lately that many people hesitate to fly because when they are just going to take a taxi or pleasure trip, they are afraid that their insurance policy may not cover them if anything happens to them. Their families may lose out on all the insurance. To obviate that, the insurance companies are going to have the one, two, or three day accident insurance, the same as the accident companies sell at our railroad stations.

As Mr. Mayo said, it is one of the very important questions of this day in aviation because when the novice goes into passenger flying, they must take that into consideration to a great extent. You have to figure, "Suppose there was an accident, what risk am I taking?"

At a very large air meet which we directed at Lowell, Massachusetts, I watched carefully to see what the effect was upon the people who lined up to take the short taxi flights. To protect ourselves and the company for which we were putting on the big air meet, we had everyone sign a release. Whether that release will be of any great value when it comes to court or not, I don't know. However, we took the Government release that they have people sign who ride in Government planes at times, and used the basis of that as ours.

To everyone who lined up to pay their money to take the taxi ride, I had a man say to them, "You are taking this ride entirely at your own risk, and you will have to sign a release." Out of several thousands of people who took the rides not a single person turned away when they were told that. The taxi boys hesitated very much at first. They said, "You will drive away customers, Mr. Rogers, if you ask them that."

I said, "We don't want anybody to ride with the wrong impression of the local airport corporation or the American Airports Corporation (the people who owned the airport), in thinking that they would be in any way responsible."

In our release, we covered not only that, but we covered the taxi company that did the taxiing.

There is a question whether the insurance companies will cover it in that way so that people who are taking trips maybe from here to Chicago, can cover themselves against any accident that may happen so that their families will be protected if their regular insurance policies do not protect them.

Mr. PERRY: Mr. Chairman, can some gentleman who is conversant with the conditions in foreign countries such as Germany, in the insurance line give us some idea of how they handle it over there?

CHAIRMAN MAYO: Do you happen to know how they handle it abroad?

W. C. POND (John Hancock Mutual Life Insurance Co., Boston, Mass.): With reference to Mr. Roger's remarks on the accident problem, he speaks of a man who is going to fly from New York to Chicago. There you have a definite proposition. Your accident company knows the equipment, the quality of the pilots, and you have a definite proposition. It is different with the life insurance company.

Perhaps I left you with the wrong impression, Mr. Chairman, with reference to life insurance companies, I think most all the companies have some aviators' risks. I know my own company has several millions of dollars involved in that type of insurance, and we have paid a very considerable amount in claims. We are going along with you. We want to go along faster, but we want to go along surely.

With reference to the thought that the life insurance companies have a duty to go on and assist and take their load in the pioneering, I should like to say that if the life insurance companies were all stock companies and the losses sustained would be borne by the stock holders and their pocketbooks would be the ones that would be affected, then I agree with you. But the majority of the larger companies today are mutual companies. We are not dealing with our money or with stock holders money. We are dealing with the money of the policy holders, of which we are simply custodians. We are placed in the position of having to answer the question, "What right have you to take chances with our money on an unknown problem?"

Be that as it may, we still say we are anxious to go ahead with you just as fast as we can.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Flying and Ground Personnel

First National Aeronautical Safety Conference

Under Joint Auspices of

The Daniel Guggenheim Fund for the Promotion of Aeronautics and the National Safety Council

October 4 and 5, 1928

HARRY F. GUGGENHEIM, Chairman

**President, The Daniel Guggenheim Fund for the Promotion of
Aeronautics, Inc., New York City**

The Flying and Ground Personnel Session of the Aviation Division of the Seventeenth Annual Safety Congress convened at two-five o'clock, Chairman Harry F. Guggenheim, President, The Daniel Guggenheim Fund for the Promotion of Aeronautics, New York, presiding.

HOMER E. NIESZ (President, National Safety Council; Commonwealth Edison Co., Chicago): Ladies and Gentlemen, it is my very great privilege to introduce the presiding officer of this meeting. But before doing so, I would like to express, on behalf of the officers and members of the National Safety Council, its very great gratification and pleasure to have with us at this Seventeenth Annual Congress such a fine representation of the newest industry connected with the National Safety Council. You have had prepared for you a program of sixteen separate and distinct sessions, covering every branch of aeronautics. The credit for the preparation of this program, the obtaining of the speakers and other work in connection with it, is due to Mr. Harry F. Guggenheim, president of the Daniel Guggenheim Fund for the Promotion of Aeronautics. I have very great pleasure in presenting Mr. Guggenheim!

CHAIRMAN GUGGENHEIM: It is indeed gratifying to find such a splendid attendance at this technical session. If we have the usual percentage of discussion after the papers are read, we will indeed have a great volume on this subject of the Training of the Commercial Pilot.

In the Smithsonian Institute at Washington there is an exact model of the sailing ship "Santa Maria" in which Columbus made his historical voyage of discovery to America. In the same museum is the actual airplane in which Lindbergh made his historic voyage from America to Europe. In different fashion, but with equal daring, both these achievements were adventures in pioneering. The first one discovered a New World; the second united it more firmly with the Old. Each was a herald of a new phase in civilization.

The epoch-making flight of the "Spirit of St. Louis" marked the end of the pioneering period in aviation. The experiences of this period have taught us that the safety of airplane operation has until lately been almost wholly dependent upon the training and skill of the pilot. Those of us who are fortunate enough to be in close touch with the extraordinary developments that are taking place in aerodynamic design, construction, and airplane operation are justified in the belief that the present day great dependence upon the extraordinary abilities of the pilot will gradually disappear. The universal use of the airplane will follow.

Today, under the right conditions and within certain limitations of operation, there is no safer vehicle of transportation than the airplane. Based on the developments taking place, one is further justified in the conviction that the airplane will soon compare favorably with the automobile in ease of operation, and will become, even in common use, the safest vehicle for fast travel. Fundamentally the almost limitless unobstructed air above the treetops, without intersecting highways swarming with traffic, offers the safest travel lanes.

In the meanwhile, the training of a commercial pilot is the most vital factor in safe aircraft operation, and I know of no one in the world who can speak with so much authority and wisdom on this subject as Colonel Lindbergh, whom it is my very great honor and pleasure to introduce to you!

... (The audience arose and applauded.) ...

Requirements and Training for a Commercial Pilot

By COLONEL CHARLES A. LINDBERGH

The commercial flying school is one of the most important problems confronting aviation today. Most of our pilots in the past received at least a major portion of their training in military schools, but with the rapid advance in commercial flying the supply of these men is no longer adequate. Consequently it is becoming necessary to draw from pilots who have not had the opportunity of attending military institutions, but who have received their instruction in commercial schools.

These schools, in the past, have not been particularly well organized. In many instances, the practice has been to advertise flying courses for their low cost rather than their high quality. It has been very difficult for a student to obtain enough instruction and solo flying experience to fit himself for a pilot's position. The number of our flying schools has increased greatly and as a class still leave a great deal to be desired. However, several have organized quite complete courses of flying and ground instruction. It is possible for a student, with sufficient capital, to attend one of the latter and graduate with sufficient training to enable him to become a commercial pilot with a limited flying experience.

Many of our present schools, however, are still advertising on their low cost. Students are graduated from flying courses with ten hours or so in the air. These men can not operate under federal licenses, but in a number of states they can carry on commercial flying with passengers provided they do not cross the state boundary.

A majority of the accidents in flying are due to faulty pilotage. There are two methods of decreasing these accidents. By training and regulation of pilots, and by advance in aerodynamic design of aircraft so that less is required of the operator and more of the airplane.

Accidents due to improper training will continue to an excessive degree as long as federal inspectors have no control over intra-state flying activity.

In so far as the first method is concerned, one of the essential steps is to obtain a standard of flying instruction. Our flying schools should be rated by their stand-

ing and patronized on account of their excellence as are our universities and colleges. State regulation of flying activity is of utmost importance, but not individual state legislation. Individual legislation which would create different regulations in the various states would seriously hamper the growth of an industry whose product cover a number of states in a few hours. Uniform regulations should be obtained throughout the country by the individual state adopting the federal flying regulations of the Department of Commerce.

As the interest increases in aviation, more and more people are wanting to learn to fly. Some desire to enter aviation as a profession. Others wish to use the airplane as transportation in their business. Many are interested in flying merely as a means of pleasure.

The first or professional class can devote a large amount of time to training and fly constantly both during the training period and after entering the profession. The man or woman who uses an airplane at irregular intervals is confronted with an entirely different problem. The professional student enters flying training, completes it as soon as possible and begins commercial work. The other type is often unable to train regularly and frequently long intervals elapse between flights after training. Training and irregular flying require a different type of airplane than that used in commercial service.

We have not developed a satisfactory commercial training plane. The military planes used for this purpose are too costly and overpowered for use in commercial schools if flying training is to be placed within the reach of the average student.

A training plane does not require high performance. It must be rugged and able to withstand the rough usage of an inexperienced flyer. Vision is of paramount importance as there are usually a number of machines in the air around a training field. A great deal of attention should be given to designing the training plane for possible crash. By sacrificing a little performance, a plane can be so constructed and its cockpit so arranged that a crash will result seriously only in extreme cases.

Another problem now confronting us is the location of fields for flying training. Air traffic is already becoming congested at some of our major airports. It certainly is not advisable to have a number of student pilots operating from the same field with passenger transports. A number of flying schools have been located near a small town in order to escape the air traffic of the large city. Others fly their students from the airport to some field several miles away and return after the training period. It is certain that regulations will be enacted against student training at many of our airports in the near future.

It is difficult to state what a flying course should consist of. At present we must base our training largely on the experience of military schools and incorporate changes in order to place training within the financial reach of the average commercial student. As time goes on and our flying schools become better organized, a great deal more efficiency in training will be attained.

The use of light planes with engines of comparatively low horse power for preliminary instructions and the building of aircraft on a production basis will greatly reduce cost of operation and the price of good training.

The Department of Commerce requires a minimum of fifty hours of solo flying for an "Industrial" or "Limited Commercial Pilot" and two hundred hours for a "Transport Pilot." In addition, a general knowledge of many subjects pertaining to aviation is necessary to pass the examinations for these ratings. A pilot's real training begins in flying as in other professions after he has left school.

Ground school training should include such subjects as Aerodynamics, Airplane construction and assembly, Inspection of aircraft, Engines and Accessories, Instruments, Aerial Navigation and Radio.

Flying training should be divided between dual instruction and solo flying. Even after the student has completed a number of hours of solo flying, he should undergo dual instruction in acrobatics, cross country, night and instrument flying.

In summing up, the safety of flying training may be advanced in the following ways:

By a Definite standard of flying instruction, State adoption of Federal flying regulations, Development of commercial training planes, and Suitable location of training field.

CHAIRMAN GUGGENHEIM: You have heard the paper, and like any statement from Colonel Lindbergh, it is straight to the point, and meets the issues with which we are confronted today. We would like to have free discussion of this paper, and I would like to call on anyone who wants to talk on the subject, so please give us the benefit of your experience and views. We would like you to confine yourselves to the subject, which is, "Requirements and Training for a Commercial Pilot." Please remember this is a safety congress, and we are discussing the papers from the point of view of safety.

ALEXANDER McADIE (Blue Hills Meteorological Observatory, Harvard University, Cambridge, Mass.): I only venture to rise because you asked for a volunteer, Mr. President, to start the discussion, and I feel that I have a right in a very small way to talk, because I am the oldest instructor in Meteorology in the country. Some forty-three years ago, I began to work in the Weather Bureau, and that has led up to our study of this subject.

Colonel Lindbergh's paper, of course, was straight to the point as has been said. All I could add to it would be to say that progress goes on very rapidly on the scientific side of our knowledge of the structure of the air. The commercial pilot must know all he possibly can about the conditions of the air, particularly with relation to fog flying, thunder storms, lightning, hail, and that ice coating which perhaps has brought disaster to so many flyers. He must not neglect the scientific side of the problem relating to the structure of the air.

CHAIRMAN GUGGENHEIM: Professor McAdie has brought up a vital point in the requirements for the training of a commercial pilot. Professor McAdie is extremely well qualified to talk on this subject because of his long and honorable career in meteorology. He has devoted much time in recent years to meteorology in aviation, and the discussion that he has initiated should be very valuable.

D. H. LAYTON (New York): I will appreciate an expression from Colonel Lindbergh on his attitude toward teaching the new flyer stunts before turning him loose for solo flying. Of course it is done in military circles, but I am wondering what he thinks of it from a commercial standpoint.

COLONEL LINDBERGH: I don't believe that can be answered without very careful analysis. At the present time, as you know, the practice is to solo at most schools without teaching acrobatics. In some instances, students are taught to come out of spins before they are allowed to solo. I do believe that any student should be able to do acrobatics and that acrobatics should be a part of his training, but how much should be given before solo flights, I am not prepared to say at this time.

CHAIRMAN GUGGENHEIM: One point in Colonel Lindbergh's address impressed itself particularly on me. It was his statement that flying schools should have rating and standing. I believe that it might be advisable to go perhaps farther than that at this time and say that *all* flying schools should be under supervision and not be granted licenses to teach flying until they had come up to certain qualifications. I think that subject is a moot one. I would like very much to have some expression of opinion on that particular phase of the flying school with which we are confronted in this country today.

MR. WILD: Mr. Chairman, I recently took my wife for a flight across the continent to the Los Angeles Air Meet. We stopped at about ten places along the way, gassing up. At some places the students seemed to be well satisfied. In coming back here to New York, down through Ohio and Pennsylvania, how-

ever, you find that in many places the students do not seem to be satisfied. They don't seem to be getting what they think they are paying for.

I am one of the old timers in this air game. Thirteen years ago I flew from the Palisade Park grounds around the Flat Iron Building, and landed out in Central Park. I have done quite a bit of airplane flying, and have watched the growth of student training come up. There have got to be many changes, for example, Mr. Guggenheim's intimation that these schools be placed under Government supervision. Any schools which are going to train pilots or accept applications or take money for payments should be thoroughly looked into. A great many schools are trying to teach students how to fly by mail and one thing or another. A great many good pilots are going to be made if they have the proper schools to go to.

WOODY HOCKADAY (Aeronautics Division, Department of Commerce, Washington, D. C.): I would like to ask Colonel Lindbergh if it would be possible for the Department of Commerce to regulate the airplane schools in the same manner that they license a pilot. You can't go out and fly around without a license. Would it be possible to do something along the same line in having the Department of Commerce regulate these schools?

COLONEL LINDBERGH: That is a question concerning the authority of the Department of Commerce. I think that Secretary MacCracken could give you that information. The Department is only able to regulate pilots engaged in interstate traffic. Pilots operating within their own state, or intrastate flying, are not subject to the Department's regulation unless the individual state they are flying in has adopted the Federal Regulations. The flying school, of course, may operate entirely within a state. I believe that any further information would have to come from the Department.

LIEUT. COMMANDER WICKS (Lakehurst, N. J.): I was very much interested in hearing Colonel Lindbergh's talk on this subject. I think it is a vital one.

I can say that I have been in the Navy going on twenty years now, and I think for nineteen years of that time I have been going to school. Going to school doesn't mean necessarily just sitting behind a desk and reading books or studying them, or making out theoretical answers. Going to school has its practical side as well as the other.

I sincerely hope that Colonel Lindbergh's remarks about schools for transport pilots will be well taken. I hope everybody will bear it to heart and carry it out so that it will be considered more of a university course than something to get through with in a couple of hours in order to earn a precarious living at it.

LIEUTENANT BERTRANDIS (New York): I think the commercial flying school is one of our most serious questions. There are out on the Pacific Coast (as I have seen) a number of schools that we might say, "fly by night." They have no set instructions or program to follow out. You go out and climb into a ship. You don't know who your pilot is or what sort of aircraft you are flying in.

I think commercial flying schools should be recognized in the same way that military schools are recognized, whether they be recognized or registered with the Department of Commerce or some other department. The equipment of these schools should be of the type approved by the Department. The instruction should start out as it does in other schools, with classroom work. That would give the student the foundation of flying; then next would come the air work; and third, the finishing training. That should take in the usual amount of solo work and acrobatics.

The schools that we now have do not come into night flying. They should have further advancement and training by carrying out, maybe, a hundred hours of that. Today, it takes only fifty hours to make a pilot, but it really takes years to make a good pilot.

I can remember a pilot back in the days when I started with Art Smith, in 1915, at the World's Fair. That man is dead today. He was flying between Chicago and Cleveland over the air mail route. He was killed because there was not that control from the two points as to whether he should go through or not. He sacrificed his life for the development of aviation.

I warn everybody that the course you get in commercial flying by correspondence will not fit you as a transport or good commercial pilot. The schools you find out in the country that have a sign, "Learn to Fly with Bob, \$5," are dangerous. I hope that enough pressure is brought to bear to establish some set rules for commercial flying schools. Then, I think we will have some more Lindberghs.

CHAIRMAN GUGGENHEIM: Thank you, Lieutenant Bertrandis. You have spoken right out on this subject.

I think that is the sort of speaking we want to have. He has spoken in no uncertain words about some of the pitfalls that are before us in aviation. I think we should take them to heart. He says that it takes years to make a pilot. I most heartily agree with that. I would like to add that it only takes a short while out of the game to unmake him. I am talking from my own personal experience.

MR. BEARDSLEY (Brooklyn, N. Y.): I would like to ask a question, as a non-flying civilian, in regard to the regulations or safe practices which have been developed in the flying schools concerning the minimum limit above the level of the terrain for flying. The question comes up somewhat on account of my residence in Brooklyn. A great many flyers come over the house, some so low that we feel it is dangerous. The airmail planes maintain a very high elevation. It comes up also in night flying and in fog as to whether these limits are established by practice. Are there any devices being made which will warn a flyer in fog or at night about his getting down to a dangerously low elevation, or the proximity of some projection like mountain ranges, high buildings and so forth?

CHAIRMAN GUGGENHEIM: I must remind you that this discussion must be limited to the subject, The Safety Requirements of Commercial Training. As a matter of fact, the point you bring up in regard to legislation is a very important one, and we are having a session, under the Chairmanship of Assistant Secretary of War Davison, which is going on now in this hotel. The principal speaker is Assistant Secretary MacCracken, of the Department of Commerce. I am sure that any matter pertaining to legislation would be very welcome if brought up for discussion at that session.

MR. BEARDSLEY: In explanation, I didn't bring it up as a matter of legislation, but warning during the training period, as to what a safe level might be, not a legal level.

MR. STOCKMAN (New York): Is it conducive to safety to teach pilots with such safety devices as slotted wings and others which may add to safety?

CHAIRMAN GUGGENHEIM: The question put is whether it is advisable to train with slotted wings and other devices. Will you answer that, Colonel Lindbergh?

COLONEL LINDBERGH: A great many instructors hold that a student should be trained on a machine similar to the OX5-Jenny type. That is a machine which might be called "able to take to the air, but not to do very much more." Others hold that all devices such as slotted wings should be used in training. While there is a great deal of controversy along those lines, I don't believe that any one person is capable of deciding whether such safety devices as slots should be incorporated in the training plane or not. As I stated before, the safety may be increased very greatly in either case by constructing a training plane which is able to go through an ordinary crash without serious injury to its occupants.

MR. RIDGES (New York): I think we are all impressed by the fact that there

is such a thing in industry in general as a character basis of safety and efficiency. I think we are all impressed by the wonderful character of most pilots. I would like to ask Colonel Lindbergh a question having to do with a specific point of requirements in training—whether anything is being done specifically, or can be done further, to get at the development of pilots on the character standpoint purely from the standpoint of safety. Is anything being done along the line of character development?

CHAIRMAN GUGGENHEIM: Colonel Lindbergh feels that is a little bit outside of his province. He would prefer not to answer that as he is confining his remarks purely to the technical subject of training.

MR. CHAPIN (Philadelphia): I am not an airman, I am an engineer, but I have gone to school, and I wonder where we are going to get teachers who will be of the type capable of giving these men the training they should have. If we can find those men, how many schools and what distribution should there be through the country today or ten years hence? I am looking to the development of an educational system which will take care of the problems you have here today. I think now is the time to begin to train the teachers who are going to try to train the flyers in the next generation.

MISS WARNER (Washington): In view of the fact that a great many young pilots now get licenses after ten hours of solo flying and immediately start out in cross country flying, their friends are lucky to be so optimistic as to be willing to fly with them. They should be required to know how to get out of tail spins, and so on. Those things should be part of the examination for private licenses. I have never had a tail spin, and I don't think I want one.

CHAIRMAN GUGGENHEIM: The lady who just addressed us is a pilot, and the sister of the Assistant Secretary of the Navy for Aeronautics. She has made a very valuable contribution to this discussion. She raises an important question.

COLONEL LINDBERGH: The requirement for a private pilot's license at the present time, as most of you know, is that the pilot must have completed ten hours of solo flying in addition to the instruction he has received. Ten hours of solo flying, of course, will not make anyone a pilot. We can not require, however, as much experience on the part of the private pilot as we require on the part of the pilot who carries passengers or property for hire. Personally, I am entirely in favor of more rigid requirements for private pilots than we now have. It was a very short time ago, however, when we had no regulation whatsoever, and it was not advisable to begin with too rigid regulations for our pilots in this country. I believe that in the not distant future, the requirements for this type of pilot will include such things as acrobatics and dead stick landings.

CHAIRMAN GUGGENHEIM: I think that is very clearly answered, Miss Warner.

DR. FRANCIS (New York): One of the gentlemen asked a question a little while ago (I have forgotten just how the question was put) on the moral hazard or something like that. I want to say this, before a person is permitted to even study aviation or to go into any school, it is necessary for him to visit the flight surgeon. That flight surgeon is supposed to sit and talk with him anywhere from one-half to three-quarters of an hour and to try to learn all of his private affairs in order to size up the man and to see whether he is an individual whose nervous system and whose psychic system are such that he can stand up under the stresses of the air. Many of these flight surgeons are Army-trained, and it is the custom in the Army to have the same Army flight surgeon appointed by the Department of Commerce. Regarding schools, I certainly believe that something ought to be done to classify them or to regulate them and see that the students get a fair deal. Most of the students starting in, of course, know nothing about aviation. Many of them have wild ideas about it.

I talked with one student who was supposed to have been studying for a while

who told me that an airplane ran entirely by electricity. If you ask many of the students where they expect to fly, they would say, "Well, within the city limits." If you asked them where the field was, they wouldn't know. If you asked about the people, they would probably tell you they didn't own a plane yet. About all they had gotten was a bunch of promises. Of course, that naturally occurs during the early days of most anything, and I think that many such schools have passed away now.

I might say that I have talked with some six hundred or more, and the students seem to be getting pretty well grounded, so that the matter of education, I think, is getting fairly well settled, but I do think that is a matter for careful consideration.

LIEUTENANT McCAGUE (U. S. N.): The two years of flying which I had during the war will never be forgotten in the sense that the parachute at that time was not used to any extent. Of course, it was the regret of everyone concerned that we weren't using the parachute at that time to save the lives of the student pilots and those who were training them oftentimes, but since this parachute has come into its own and is a very valuable asset in the way of safety, I am wondering, from a point that Colonel Lindbergh brought out this afternoon, whether the parachute could be brought into another use.

He said that a training plane could very well be built strong enough and in such a manner that if the pilot or student while training crashed, he very likely would be nothing more than crippled temporarily at the worst. I would like to ask from the standpoint of safety with the parachute, whether it is the plan to use, along with the student plane of today, the parachute in any form. I think it could be done. We have different sized parachutes and have different capacities. In that way, we can train pilots for both commercial and transport work or anything of that kind with the assurance that if something does get beyond them and crash is inevitable, if they have any altitude at all, they can save themselves by means of the parachute.

CHAIRMAN GUGGENHEIM: That question of parachutes is of such importance that a whole session has been devoted to it. I am afraid if we opened up that subject here, we would probably become involved in the whole parachute discussion. But, it is recorded that you have thought it important in the training of pilots. Any further details will be contained in the parachute session of this conference.

MR. NORBY (New York): I believe schools should have more rigid examination of pilots. Also, in the actual tests, I think the regulations are too lenient. In the Navy regulations at Pensacola, when you get just beyond the boundaries of the field with not sufficient altitude, they will tell you to cut the gun and try to get back into the field. The Department of Commerce inspectors don't have you go into tail spins or any of those things at all.

A great many have airspeed meters, but unless the inspector is a good man, he doesn't know himself unless he is equipped with instruments, so the student is allowed to spin and slide and turn, and nothing is said about it. In making these various tests, I believe the student should be turned down by the Department of Commerce and sent back to school for another ten hours or so of flying if he fails to come up to the proper standards. As far as the theory of flight and all that goes, it is a mighty good thing for the pilot to know, but the air test is the main thing.

MAJOR HARTNEY: On the subject of the requirements for training of a commercial pilot, there is one point I certainly would like to state very definitely. There should not be any stifling of the possible supply of students by stringent regulations on schools.

In other words, there might be some little boy probably away out in the Rockies who has the urge and private initiative and desire to learn to fly, and

he might be our next Lindbergh. If we place regulations on flying schools which are going to stifle the chances of that boy getting in there and learning, we are going to lose another good man, absolutely.

We have certainly done better than other countries did when they established similar regulatory powers. But, we are not always going to have the present Assistant Secretary with us, and we must be very careful when we establish any regulations that limit schools and thereby stifle private initiative. When I speak of that, I mean not only of the student coming in, but also the man who is running the school. It is interesting to note that in the development of the technical side of aviation, the Army, by bringing out motors and planes, has done its part wonderfully. That holds true also in the Navy and other Government departments. But when it comes to operation of the plane, it is always interesting to note that it is the private initiative in competition with individuals not connected with the Government that brings out what the airplane can do.

As an illustration of that, who in this country would not have been called crazy three years ago if he had told you that nine planes loaded like those nine planes were two or three weeks ago, taking off for San Francisco or Los Angeles, could take off in a twenty-five mile an hour side wind? Everybody would have said that person was crazy. It took private initiative to do that. You might say the Department looks askance or overlooks the danger of the thing, the Department of Commerce, which might have stopped that. It took that initiative, and that competition coupled with it, to bring out the fact that you could take off with a heavily loaded ship in a twenty-five mile an hour side wind, as those nine ships did, and get away with it. It was absolutely remarkable. It is true that the equipment developed by the Government did it, but it took private initiative to do it.

That same thing applies in schools. Every school that can buy enough airplanes to attract students surely should be given that responsibility, and surely the regulations applying to them should be placed on the machines and the pilots. That may give a basis for some discussion, but I certainly am for keeping the regulations of the schools to a minimum and not shutting out these young boys who might come in.

CHAIRMAN GUGGENHEIM: That is an interesting point, and it really brings up the fundamental decision that will have to be made within the next few years. We want to get some more light on it. We are all agreed that pilot training should be safe. How are we going to make it safe? Are we going to gradually raise the standards by private initiative (which is one point of view and very ably expressed) or are we going to have some Government regulations? Those are the two important issues, I think, in this whole problem. We are all pretty well agreed on that. Discussion on that particular point by those who have had experience (and there are many of you in this room) will be very heartily welcomed.

COLONEL LINDBERGH: I am speaking now purely from the point of view of the layman. From the discussion I have heard here, it appears to me that the chief difficulty is competition. The schools that are not fully prepared to give the student proper training are running the better schools out of the market. It appears to me that the proper way to carry on the proper training of the pilot would be to organize good schools, set up safety principles, see that the planes and pilots are licensed and that the students have had a medical examination before they enroll, and that their records are kept right from the start by the Department of Commerce. By so doing, I believe that we will control without undue regulation and without interference, the proper training of pilots. If the best schools band themselves together to run the mediocre schools out of the market, the proper standard of safety will be maintained.

Mr. DONALDSON (New York): I would like to know if there is some way

by which a person interested in taking up flying can ascertain where the proper schools are and the merit of those schools. Naturally, if they write into the school they see advertised in different places where they can pick up aviation, they are assuming they are going to get a course in flying. If they ask for the qualifications of that particular school, they are going to send back the best report possible. Is there any possible way in which the younger generation taking up flying can have an assurance when they finish that course that they have taken the best course to fit them for the future in aviation?

I ask this question because, being a flyer myself, I have had a number of inquiries come to me within the past year as to the best place to take up flying, both from the point of paying for the tuition and also in working one's way partly or entirely through. I think it is a very difficult question. I would like to get some more light on the subject. I think it should be handled in some way so that the public would be able to know the answer to those questions as well as the people already in the flying game. Is there any place where that information is available—the list of schools and the method of training courses that they give?

CHAIRMAN GUGGENHEIM: Some of that information is available and some of it is not. Nobody will take the responsibility of branding any school as the best in the country or the worst school in the country for a course in flying. The Department of Commerce will give you a list of all flying schools, and they will give you as much information as is available about them. From that point on, you have to make your own inquiries in the locality in which the school exists. That is something which everyone can probably do better for himself than through some other agency. It is not as satisfactory as we would like to have it. If there was some method of rating these flying schools, it certainly would add to the safety in the training of pilots.

MR. LOENING (New York): There should be a positive rating of the schools by the Department of Commerce on the score of their effectiveness. There is no reason why the Department of Commerce couldn't have a statement, that each school has graduated so many pilots and is graduating so many others. They could then get out a quantitative statement based on the record of the school, which in turn right now would tend to make these schools establish a better record if they knew their record was going to be subjected to considerable scrutiny.

This question is brought up to me many times in New York. It is very difficult to say what are the good and the bad schools. There are lots out West that sound good. We don't know whether they are good or not. There ought to be some authoritative ranking of schools on the basis of past records which would help to make them get good records.

CHAIRMAN GUGGENHEIM: That is a very interesting contribution. Is there any further discussion before we pass on to the next paper?

QUESTION: I would like to know what Colonel Lindbergh's opinion is relative to the advantage or disadvantage of a course in gliders in connection with training a pilot in flying.

COLONEL LINDBERGH: We have no practical experience upon which to base such a comparison in this country. Consequently, I am unable to give any answer.

CHAIRMAN GUGGENHEIM: I might add that gliding has a great historical interest in aviation, because the pioneers learned to fly in gliders. That was all there was available to them. I don't think that in any other country but Germany, has gliding been taking up to a great degree in recent times. I think that the gliding enthusiasm that took place in Germany shortly after the war was brought about, to a large extent, by the restrictions imposed after the Treaty of Versailles.

CHAIRMAN GUGGENHEIM: The next paper has been prepared by Commander E. E. Wilson, U. S. N., who is Chief of Staff, Aircraft Squadrons, U. S. S. Langley. This fleet is now operating in the Pacific, and it is impossible for Commander Wilson to be with us today. Commander Wilson is an aircraft engine specialist, of very great reputation, throughout not only the Navy, but also in the industrial aviation world. He, also during the war, established a system of training for ground personnel, which stands today as an example of what ground training should consist of. We are very fortunate in having this paper, and unfortunate that Commander Wilson is not with us. Lieut. Commander Wicks has kindly consented to read his paper.

LIEUTENANT COMMANDER WICKS (Lakehurst, N. J.): Mr. Chairman, Ladies and Gentlemen, I took this job with considerable misgivings, as I know what Wilson is and what he has done and what he could do. I also have a slight acquaintance with my own ability, so I feel rather reticent to take his place, because I know I can't fulfill it the way he would have done. However, it seems that the airplane can't fly across the continent in a couple of hours yet, so Commander Wilson couldn't get here.

Requirements and Training of Ground Personnel

By COMMANDER E. E. WILSON, U. S. N.
Chief of Staff, Aircraft Squadrons, U. S. S. Langley

A fundamental requirement for safety in aviation is an efficient ground organization. Broadly speaking, the ground organization includes all of the organization except that which actually flies. For the purpose of this discussion, however, the ground personnel will include the technical staff of the ground organization. This technical personnel will fall into three classifications, Operations, Maintenance, and Communications. In the task of insuring dependability and safety the technical staff will find its profession to be what has been termed "Preventive Engineering."

Experience in all transportation has demonstrated the importance of preventive engineering. A defect which can be located and corrected in advance of a journey eliminates a potential accident. The character of the inspections to be made is largely a matter of experience with the type of apparatus employed. The preventive measures taken are likewise matters of experience. In the operation of a Liberty engine, for instance, we know that an examination of the ignition distributors in advance of a flight may prevent ignition trouble during the flight. An operations department must, therefore, establish a routine of inspection and correction calculated to prevent trouble enroute. The efficacy with which this system functions is in turn dependent upon the training of the personnel which operates it. How shall these men be selected, and how shall they be trained?

This question has no doubt been answered by a number of organizations. It will pay us to look into the history of the matter. My personnel experience covers the Navy's solution to the problem, and for that reason I will outline this experience.

At the close of the world war the demobilization of the war-time personnel threatened to leave the Navy without any trained enlisted personnel. Unlike the other branches of the Service, Naval aviation had been almost entirely recruited from civilian life. If operations were to be continued it was necessary to develop a new staff. During the war the Navy Department had called upon Doctor Charles Edward Lucke, head of the Mechanical Engineering Department of the Columbia University, to organize the aviation mechanics training system. Doctor Lucke was peculiarly fitted by virtue of his personality to perform this colossal task.

Bringing all his energy and executive ability to bear, he established a large

number of schools at the different naval air stations and at the factories of certain industrial organizations supplying material to the government. For example, a school for engine mechanics, known as the Liberty Engine School, was established at the plant of the Packard Motor Car Company, which company was then building large quantities of Liberty engines. This aviation mechanics training system developed its own text books, trained its own instructors, purchased and installed its own equipment, and, having educated itself, proceeded to educate its students. Although the schools were widely scattered, they were none-the-less standardized, both in theory and in practice. They were sound in their methods of instruction, and were administered with a vigor which reflected the personality of their leader, Doctor Lucke.

The post-war demobilization might have resulted in the abolition of these courses of instruction, save for the foresight of Captain E. L. Bennet, then head of the Training Division of the Bureau of Navigation. A decision was reached to concentrate at the Naval Training Station, Great Lakes, all of the aviation mechanics training schools then established at the different air stations and industrial plants, and to build them up in such a way as to permit expansion in the case of another emergency. It was decided after having established the schools there to utilize the training of the new recruits as a sort of service test of the new installation. The necessary orders were issued to cover this situation. Doctor Lucke kindly remained in the Service long enough to get the transfer well underway and to turn it over to the author of this paper.

Early in 1919 many carloads of apparatus had been transferred to the Naval Training Station at Great Lakes and had been installed in working order. A number of selected wartime instructors remained in the Service to instruct the new staff. Many of them are still in the Service. As soon as it was apparent that the schools would be ready, an intensive recruiting drive was begun. Men were selected especially from the nearby manufacturing centers, and all recruits were required to meet the standards of entrance to the Navy. Aviation duty, by virtue of its appeal to the youth of the country, attracted a very high class of men. These were, to a large extent, students or graduates of high schools, with or without mechanical training, but in all cases with a fine spirit and attitude toward the Service. After the usual preliminary recruit training period these men were introduced into the schools. Certain outstanding ones were immediately selected as instructors in certain of the periods of the different courses. Before very long the machinery was in operation, and when the school reached its peak it was receiving men at the rate of from 50 to 100 per week, and graduating them in about half these numbers. Nearly 3,500 men completed the course in the two years it operated to capacity. This was an early application of American production procedure to education. The numerous graduates of the schools went out to the different operating stations, where after a reasonable amount of experience and familiarization they replaced the wartime personnel very satisfactorily. Hundreds of these men are now in the Service, occupying the key positions of the Navy's aeronautic organization.

One of the interesting aspects of this training system was the preparation of the text books. Doctor Lucke selected from among the best instructors of the wartime system men who were peculiarly competent to prepare text books. It was his desire that the experience of the war be made a matter of permanent record and not lost with the release of the personnel. There was established at Great Lakes a Text Writing Detail, consisting of from 75 to 100 people. This Detail was under the supervision of an editor-in-chief. It was thoroughly well organized into its writer, editorial, and art departments, with all the other ramifications of the sort. Thirteen courses of instruction were covered, and for each course of instruction there was prepared a book covering the syllabus of the courses, a book covering the details of the courses and the allocation of time, and a text book from which

the instruction could take place. A total of 39 volumes were prepared. After the preparation of the text and the illustrations the volumes were printed by contract with a well-known publisher of technical literature. They constituted the basis of instruction in the schools, as well as at numerous stations throughout the Navy. They were so carefully prepared in the beginning that even though new types of engines and new types of aircraft have come into service the instruction books are still of great value.

The Aviation Mechanic Schools at Great Lakes, applying the systems outlined by Doctor Lucke and utilizing the text books prepared by the wartime personnel, furnished the Navy with a full complement of well trained mechanics. These men, working throughout the aeronautic organization, are now the key men. Among their tasks is that of training the new recruits in the operation and maintenance of naval aircraft. Whether these men be employed as a part of the large number on one of the large operating bases or on a large carrier, or whether they be one of two or three members of an aviation crew of a small vessel, they function under the same method of training and with the same degree of efficiency.

The courses established at Great Lakes fell into three categories; (a) the apprentice courses; (b) the intermediate courses; and (c) the advanced courses. The apprentice courses were intended to take recruits with little or no mechanical training and instruct them in mechanical principles. The intermediate courses were intended to take men of practical training and instruct them in the aviation specialty to such an extent that they might become the rank and file of the operations departments. The advanced courses were intended to take men of operating experience from air stations and train them in the advanced phases of aviation, with a view to qualifying them as leading men and instructors on the stations. In addition to the above classifications, the courses of instruction were divided into; (a) heavier-than-air; and (b) lighter-than-air activities, the one pertaining to airplanes and the other pertaining to airships. In each of these two major classifications four main trades were developed; (1) the aviation machinist's mate, or engine mechanic; (2) the aviation carpenter's mate, or woodworker; (3) the aviation quartermaster, or rigger; and (4) the aviation metalsmith, or metalworker. The latter rating was developed in anticipation of the arrival of metal aircraft.

The principles of wartime training were based on the fact that men from civilian life could be trained in a specialty in a comparatively brief period. They could not be trained to take the place of the regular soldiers and sailors, who by virtue of years of training and experience could be classified as more or less all round men. The sub-division into four specialties outlined above was largely predicated upon this premise. The same principles were employed in training the post-war recruits. As time has passed and the men have remained in the Service for long periods certain changes have taken place. There is no longer a separate rating as quartermaster, or rigger, and all the men so trained have been transferred to other ratings, for which they have first been required to qualify. Metal construction has changed the situation to the extent that carpenters are less necessary and metalsmiths more necessary. The limited number of men available for service and the limited space available aboard ship has brought about the development of the all around mechanic, who, as a leading man, is capable of supervising the operation and maintenance of the whole airplane.

Our engine men fall into three classifications; (1) the Plane Captain, who is responsible for the routine service and inspections; (2) the Leading Chief for top overhaul; and (3) the Shop Chief, for major overhaul. In normal operations the Plane Captain takes care of routine maintenance. When the airplane goes to the hangar for routine inspection, check and minor overhaul, the Leading Chief supervises the work. When the plane or engine has reached the state requiring major overhaul it is transferred to the shop, where the work is done by the shop men.

Sharp lines of demarkation are not drawn, and men exchange duties as the service permits. The shop qualifications, however, require special training in the use of machine tools, jigs, fixtures, etc., so that our aviation mechanics can be said to fall into the three classifications. As it now works out, the newcomers are assigned as plane mechanics, and after experience and training move up to shop men in the hangar. After further experience and training in special schools they find their places in the shops. As a result of the foresight of responsible officers the Navy has never lacked for trained aviation mechanics, and the quality of men now employed is very high. The Navy's experience in this regard may be valuable to commercial aviation.

Commercial aviation is today in the midst of tremendous expansion. Factories for building airplanes, engines and accessories are being rapidly organized. Air lines are being rapidly expanded in numbers and in territory. This tremendous expansion must carry with it the corresponding increase in personnel. If safety is to be obtained the personnel must be adequately trained and highly dependable.

The source of supply of trained personnel is something of a problem. Fortunately, expansion in associated trades has greatly increased the available supply of partly trained men. Ten years ago, when the Naval aviation mechanics' training system was functioning, automotive mechanics were comparatively rare. This situation has changed enormously, and the automotive trade alone is a potential source of supply for aviation mechanics. The metalsmiths' art as applied to the automotive practices, as well as practically every other mechanical line, furnishes a source of supply of metalsmiths. The wide-spread knowledge and application of radio telegraphy and telephony throughout the country should furnish a supply of well trained material for the establishment of proper communication systems. Ten years ago these men had to be trained from recruits. Now numerous skilled men are on call. Woodworkers are available from the numerous woodworking trades. There is no allied art to rigging, and training in this capacity will be necessary. In general, however, it may be said that an adequate supply of men trained in the fundamentals of the art is available. The training in the specialty is the factor which will determine their suitability to aeronautic activities.

Here again we may take a leaf from the booklet of our own experience in the case of engine mechanics. For instance, even highly skilled men experienced in the inspections and maintenance of one type of engine must receive training and experience in new types in order to handle them properly. With the passing of the war-time water-cooled engines and the advent of the modern air-cooled engines this factor was appreciated, and steps were taken to provide for it. The cooperation of the engine builders was immediately forthcoming. It was to the interest both of the purchaser and the engine builder that dependable operation be had. Our engine builders therefore trained in their shops selected Service men of proper personality, who went out to the operating units and instructed the operating personnel in the specialized maintenance and operation of their product. Engine builders likewise rendered this service to commercial purchasers of their engine. As the instruction has been completed, these Service men have taken over the service activities in a manner similar to that of the automobile trade. Thorough training of engine mechanics is largely responsible for the dependable operation of the modern engines.

This same principle has been applied to a certain extent in the Navy in the case of airplanes. Our different manufacturers have assigned service men to the units operating their aircraft, and these service men have lived with the units. In some cases the service men have gone on long cruises with the Fleet to distant places. As a result of their assistance operations have been made more certain, and as a result of their reports manufacturers have been able to incorporate changes and improvements of incalculable value. As production increases, the same procedure may follow commercially.

Over a long period of time the Navy has been making a very careful analysis of accidents of all kinds. Complete information is submitted to the Bureau of Aeronautics in the case of every trouble, no matter how minor. These reports have been analyzed from every point of view. The outstanding conclusion from this analysis is that every accident is preventable. The real problem is to so apply the experience as to preclude the possibility of accident. It can be confidently stated that good aeronautics material today is more dependable than the personnel that operates it. Given adequate inspection, intelligent administration in the correction of faults before they develop, material failure can be prevented. Manifestly, the degree to which it is prevented is a function of the adequacy of the training of the personnel and adequacy of the administration.

For example, a commercial air line operating with modern aircraft equipped with modern engines will or will not give dependable service, depending upon the skill of its operators. This has already been conclusively demonstrated in the operations of existing air lines. Even the briefest analysis will show that certain air lines operating under certain conditions are absolutely free from material failure. Certain other air lines operating under similar conditions are singularly subject to these failures. The difference is entirely in the skill of operations.

The analogy is complete in the case of military units. Our squadrons which have been organized over a period of time, in which the men have been selected with some care and trained with even more care, are singularly free from material casualties. On the recent cruise to Hawaii three squadrons of airplanes, totalling forty-two, operated from the "Langley" out over the Pacific Ocean. They were using Boeing fighters and Vought Corsairs, with Pratt & Whitney Wasp engines. The personnel of these squadrons had been carefully selected, had worked together over a long period of time, and was thoroughly dependable. During this period over six hundred flights were made, for a total distance over the sea of at least 60,000 miles, and not a single forced landing occurred. By contrast, certain new units in process of organization have not such a clear record. It takes experience and training to attain this degree of excellence. The rapidity with which it is attained in any unit is a function of the character of instruction and the quality of administration.

In so far as operations are concerned, the nature of the weather will govern to a large degree. No doubt, numerous aviation accidents result from the failure to properly estimate the situation in advance of a flight. Frequently, weather conditions indicate the hazardous nature of a projected journey. Frequently, the voyage is undertaken in spite of this. In any problem of this kind, it is necessary to make an analysis before the take-off. Rear Admiral Hutch I. Cone, a member of this Fund, many years ago coined a phrase which is of continuing value in all operations. In discussing destroyer maneuvers which were hazardous, he said "While the Department does not desire to discourage the taking of intelligent chances by young destroyer captains, it cannot too strongly condemn foolhardy operations." The expression "Intelligent Chances" can be applied to every airplane flight. Before the flight takes off the question may be asked, is or is this not an "intelligent chance." In other words, is the expected gain commensurate with the risk involved. If the necessity for the flight in spite of the hazards is sufficient, then it should be undertaken of course. If the gain is not sufficient to compensate for the risk, it should not be undertaken. The judgment of the director of the whole ground personnel will govern here.

To summarize: We may say that every aviation accident is preventable. Eliminating the errors of judgment on the part of the pilot and referring to the mechanical troubles, these are certainly preventable. The degree to which dependable operation is had is a function of the skill of the operating personnel. There are three circumstances under which this skill is tested. First of these is in the normal operations on the line, when routine inspections and preventive measures

are taken, not only with regard to the power plant and aircraft installation but with regard to such rudiments as insuring clean fuel, an adequate supply of lubricating oil, etc. The second phase is in the top overhaul and detailed inspection in the hangar. Every airplane and every aircraft engine should be given a thorough routine inspection at the end of an interval determined by the character of the operation. The skill and thoroughness with which this inspection is made will determine the dependability of operations. The third phase is in the major overhaul of the airplane or engine. The degree of skill displayed in the shop and the quality of the inspection therein will again control dependability.

In the rapid expansion that is taking place great care must be devoted to the training and selection of ground personnel. Fortunately, a source of supply of men reasonably well grounded in basic education is available. From these men those of the highest character and educational attainment should be chosen. They should then be properly trained in the basic training of aviation specialty. This may take place in operating units, with the assistance of technical representatives of the producers of the material. It may further take place, and probably will take place, in trade schools, as in the case of other trades. These men must have special training with *special emphasis on dependability*. They must be taught to realize the seriousness of failure and the effectiveness of success. This is a problem for each and every operator of an air line. It should be completely solved before any passenger carrying operations are undertaken. The records of organizations now in operation are a measure of the degree to which these principles are carried out. The rapid expansion of aeronautic operations today makes this one of the most important subjects for consideration. Future development and expansion will depend largely on the degree to which the requirements are met in the immediate future.

CHAIRMAN GUGGENHEIM: Gentlemen, that is an admirable paper, written by a man who knows his subject thoroughly. The airplane's ability to fly in the air is entirely dependent on the ground personnel and their training. The paper is now open for discussion.

WOODY HÖCKADAY (Aeronautic Division, Department of Commerce, Washington, D. C.): I am not versed in this subject, but it is my impression that in a good many cases where accidents occur, they say "it happened on account of a faulty gas line, the gas line was clogged or the oil line was clogged."

Does that happen because the station or airport where they ought to have funnels and chamois skins to drain the gasoline, do not use them? How do they protect their oil in the majority of instances? It seems to me that they certainly could guard against dirt and trash in gasoline and oil, and they could guard against water getting in, too. For instance, I know if just the least bit or drop of water gets into the gasoline in an automobile, sometimes it will stop it instantly. It seems to me they certainly should guard against those things somehow. Do they drain their gasoline and lubricants?

CHAIRMAN GUGGENHEIM: That is involved in the maintenance of aircraft. That gets back to this question of adequate training, proper training. If that is done, those difficulties should not exist, and incidentally, they do not exist on properly organized air routes operated under the right sort of management.

Is there any further discussion of this paper? Gentlemen, we certainly are very grateful, I am sure, to Lieutenant Commander Wicks for his kindness in reading this paper.

ADJOURNMENT.

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Passenger Safety

First National Aeronautical Safety Conference

Under Joint Auspices of

*The Daniel Guggenheim Fund for the
Promotion of Aeronautics and the
National Safety Council*

October 4 and 5, 1928

CAPTAIN EMORY S. LAND, Chairman

(C. C.) U. S. Navy, Vice-President, Daniel Guggenheim Fund for the
Promotion of Aeronautics, Inc., New York City

The Passenger Safety Session of the Aviation Division at the Seventeenth Annual Safety Congress, was called to order at two-forty o'clock, by the chairman, Captain Emory S. Land (C.C.), U. S. Navy, Vice-President, Daniel Guggenheim Fund for the Promotion of Aeronautics, Inc., New York City.

CHAIRMAN LAND: The first paper on our program this afternoon was prepared by Major Mayo, who is the British Representative of the Daniel Guggenheim Fund for the Promotion of Aeronautics, and who is an aeronautical engineer of great experience. He is with the Croydon Aerodrome, is on the committee to investigate accidents, and is one of the best rounded men, particularly in connection with passenger traffic that there is in the world today.

He was recently over here in connection with commercial aviation, both engines and aircraft. But unfortunately he was unable to remain for our first National Aeronautical Safety Conference.

During some of his tours around New York, he came in contact with a number of our representative people in aviation, and upon one of those who gave him most able guidance and assistance, we are calling to read Major Mayo's paper.

He has been an aviation enthusiast since he rolled out of the cradle. He took an aviation course in college. He has written a book and done everything there is in aviation. And this summer he learned to fly.

I take great pleasure in introducing, Mr. Grover Loening, who will read Major Mayo's paper.

GROVER LOENING (New York City): I wish before reading the paper, I could describe Major Mayo to you. He is very eager, extremely intelligent, and active minded, very quick (very un-English in that regard) and has every aspect of flying right at his finger tips, as you will readily see, after hearing this paper.

Safety of Passengers**By MAJOR R. H. MAYO****British Representative, Daniel Guggenheim Fund for the Promotion of Aeronautics, London, England**

The subject of safety will be reviewed from so many different angles by the various contributors to this Congress, each a specialist in some particular aspect of air transport or aircraft design, that there must necessarily be some difficulty in dealing with the safety of passengers without encroaching on the ground which is the proper domain of other contributors. No attempt will be made in this paper to review the whole subject of safety in passenger air transport, as it will be assumed that all possible precautions making for safety in the aerodynamic and structural design of the aircraft, in the installation of the power plant, and in the methods of operation have already been taken, and the paper will deal only with certain particular features affecting the personal safety of the passengers carried. Some of these features are so closely interrelated with the design and operation of the aircraft as a whole that a certain amount of overlapping will probably be unavoidable.

It will be necessary to consider the subject from two different points of view. First, there is the question of the safety of passengers under normal conditions of operation on the ground and in the air, and secondly there is the question of the safety of passengers in case of accident. On the one hand there are certain precautions which must be taken to secure the safety of passengers even when the aircraft and its engines are functioning perfectly, and on the other a good deal can be done to minimize the risk of injury to passengers when, as must happen on occasion in all forms of transport, there is failure resulting in accident. Although the requirements for safety of passengers under normal and abnormal conditions may be at variance in certain respects, it will be found in general that there is little divergence between them. The most convenient way of dealing with the subject may therefore be firstly to trace a normal passenger carrying transport flight through from start to finish and secondly, to consider the various forms of failure which may result in interruption of the flight or accident.

Preliminary Stages

It is to be assumed that the aircraft will be taxied to a convenient position, so that it can be approached by the passengers without risk by the passengers. In the case of land airplanes this presents little difficulty, but as air transport develops some care will be necessary to ensure that passengers can reach their particular airplane without having to cross the path of other airplanes which may be moving in the vicinity. Special care will be necessary if the use of taxi airplanes develops considerably. In the case of marine airplanes greater difficulty may be involved. The docking of marine airplanes is by no means so easy as the docking of ships owing to the large wing span, and the embarking of passengers is correspondingly more difficult. One of the chief requirements is that the start must be made from really sheltered water, so that the passenger is not required to perform gymnastic feats in order to get on board.

On reaching the airplane the passenger must be properly protected against certain risks which may be summarized as follows:

1. All risk of walking into a rotating propeller must be eliminated. Airplanes in which the propellers are definitely out of reach have a distinct advantage in this respect. Where propellers are within reach, guards should be provided either as fixtures on the airplane or as part of the field equipment; in the latter case special care is needed when a start is made from an unorganized base.

II. Passengers must not be called upon to pass through the blast from a running propeller in order to get into the airplane. Any engine whose propeller slipstream may interfere with passengers getting into the airplane, should be stopped while the passengers enter, and the means of starting must be such as to ensure a quick and certain start afterwards.

III. Access to the airplane by passengers must be easy and safe. Wide doors properly secured in the open position must be provided, and no climbing on slippery steps or ladders must be involved. Airplanes providing easy access from ground level without the use of auxiliary steps have a distinct advantage, as the auxiliary steps may sometimes not be available. This requirement has often been grossly neglected, especially in the case of taxi and touring airplanes. Passengers have sometimes been required to clamber up into the airplane in a manner which they would not tolerate in any other form of transport; such efforts involve not only inconvenience but also risk to passengers. In the case of marine airplanes easy and safe access is of even greater importance as steps, etc., are more liable to be slippery.

The closing and securing of the door after passengers have been embarked is a matter which presents some difficulty. The door should be positively locked for security, and it is desirable that the locking should be controlled from the inside. In the case of large airplanes carrying a steward in the passengers cabin no difficulty is involved, for the steward can be made responsible for locking the door immediately after embarkation of passengers. If a steward is not carried some other member of the crew must be made responsible; this involves the inconvenience of the pilot or other member of the crew passing through the cabin after the passengers are seated or the complication of remote control. In general it is not feasible to place the cabin door within direct reach of the pilot's cockpit. There is scope for the development of improved types of automatic locks for cabin doors.

Taxying and Taking-Off

Under this heading it is necessary to emphasize the importance of providing against jolting of passengers. The essential requirements are ample provision for shock absorption in the undercarriage and tail-skid system, and a proper fixation of the passengers' chairs. In cases where rough ground surfaces have to be dealt with, belts should be provided for passengers; such belts must be strong but with a certain amount of elasticity. It is, of course, compulsory to provide belts for passengers carried in open cockpits. The seats must be well padded and so placed that the passengers are not liable to injury against sharp or projecting objects while the airplane is taxying. The backs of the seats should be designed with this end in view. Taxying, taking-off and landing are usually the most uncomfortable phases of air transportation from the passengers' point of view, and risk of injury may be involved if proper precautions are not taken. In the case of marine airplanes, where there may be no provision for the absorption of shock except through the elasticity of the hull or floats, it may be necessary to provide shock-absorbing seats; this will obviously depend to a considerable extent on the particular design of hull or floats.

It is important that all passengers should be seated when taxying starts and remain seated til the airplane is well in the air. Two precautions are necessary, viz., (1) every passenger must have this brought to his personal attention by notices or otherwise, and (2) the pilot should if possible be provided with a view of the passengers in the cabin.

One obvious but important precaution affecting both taxying and flying should be mentioned here, namely, that no open windows must be so placed as

to involve risk of any passenger being struck by a propeller if he leans out or puts his hand out. Where any such risk might be involved a guard such as wire netting must be employed.

It will be convenient to deal here with the question of smoking. Provided no part of the fuel system enters or comes into proximity with the cabin, and provided the cabin is of non-inflammable construction there appears to be little risk involved in smoking. The question as to whether it is desirable to permit smoking from the point of view of passengers' comfort is outside the scope of this paper. If smoking is permitted it should take place in a separate compartment, and in any case passengers must be warned to cease smoking and extinguish lights on receiving a signal from the steward or pilot.

Every passenger should have placed immediately in front of him a notice of instructions embodying the obvious precautions mentioned above and others such as the danger of throwing objects out of windows, etc.

Flying

There is little to be said in regard to the safety of passengers under normal flying conditions. Certain general precautions which apply from the time when the passengers enter the airplane have been mentioned above. It is only necessary to add to these certain precautions to cover exceptional weather conditions. In conditions of extreme bumpiness passengers may be thrown out of their seats and this may not only involve some risk of minor injury but it may also in some cases cause shock and strain. Fortunately such conditions rarely occur except in particular regions, but in all regions where they are liable to occur passengers should be provided with strong shock-absorbing belts, and every object in the cabin should be properly secured. It is desirable that the pilot should have some means of communicating with the passengers, so that he can reassure them in case of such conditions of bumpiness, and should he decide to alter course or land at any time he can notify the passengers accordingly. It is reassuring to passengers to be able to see the pilot through a window, but it is not always possible to provide for this.

Under no circumstances should the pilot of a passenger-carrying transport airplane be allowed to indulge in any form of stunting. Some passengers enjoy stunting but others not only dislike it but are scared by it.

Landing and Completion of Flight

Landing under normal conditions and taxiing in present little or no risk to passengers, but the same precautions as indicated in the case of taking-off are of course required. It is important that all passengers should be seated before the landing is made and remain seated until the airplane comes to rest. Instructions to this effect should be communicated to every passenger.

Causes of Accident

It is not possible within the limits of this paper to analyze in detail the possible causes of accident to passenger airplanes but it may be useful to refer briefly to some of them with a view to indicating the precautions which should be taken for the safety of passengers. The following are some of the more important causes of accident:

1. **Structural Failure.** Provided the normal strength requirements are met and proper care is taken in the maintenance of aircraft, structural failure is a remote contingency and it may be ruled out as a serious factor in organized air transport. Major structural failure will in general result in disaster and nothing can be done to mitigate its consequences.

2. Fire in the air. This again is a practically negligible risk, provided all reasonable precautions are taken in the installation of the power plant.

3. Loss of control. Although steady improvement in control-ability of airplanes has been effected during the last few years, loss of control still occurs occasionally and it remains a potential cause of major accident. Fortunately loss of control is less likely to occur as the size of airplanes increases owing to the slower rate of change of attitude in the larger airplanes; it may be said in fact that loss of control such as to cause major accident is an extremely rare occurrence in the case of large passenger-carrying airplanes operated by organized transport companies. In the case of smaller airplanes loss of control is more liable to occur, although there is good reason to hope that this possible cause of accident will be eliminated before very long.

Accident resulting from loss of control is, of course, liable to be serious. The airplane will probably hit the ground nose first, the amount of damage done depending of course on the height at which control was lost. Precautions which can be taken to safeguard passengers will be summarized below after enumerating the causes of accident.

4. Collision in the air. Up to the present time there have not been many collisions in air transport but as traffic develops it will become increasingly important to guard against this risk by providing pilots with unrestricted fields of vision and carefully regulating traffic. The precautions to be taken to avoid collision will no doubt be dealt with by other contributors to the Congress. In the case of head-on collision in the air the results must almost inevitably be disastrous, while in the case of less serious collision there may be complete or partial loss of control resulting in more or less serious crash on reaching the ground. Nothing can be done to mitigate the effects of head-on collision, but the precautions for the safety of passengers referred to under "Loss of Control" are equally applicable in the case of accidents resulting from the less serious forms of collision.

5. Accident arising from forced landing. There are various possible causes of forced landing such as engine failure, fog or other unfavorable weather, the pilot losing his way, etc. With the development of multi-engine airplanes, and with improved meteorological services and navigating instruments, forced landings are becoming comparatively rare and the time has already arrived when they have ceased to be a serious risk in organized passenger air transport. In the case of single-engine airplanes, however, the forced landing still remains a potential cause of accident. The risk involved varies, of course, very widely according to the nature of the country, the weather conditions and the cause of the forced landing, but the precautions which can be taken to safeguard passengers will be found to apply in the case of most accidents of this kind. It may be said in fact that accidents resulting from forced landing are of the same general class as those resulting from loss of control and the risks involved to passengers are similar.

6. Accident arising from bad landing. Bad landings due to error of judgment on the part of the pilot are comparatively rare and they seldom cause risk to passengers. Collision with other airplanes or obstructions after landing, or a bad landing due to exceptional weather conditions may result in damage to the airplane and possible injury to passengers. In all such cases the results so far as passengers are concerned are similar and similar precautions are required.

Precautions for the Safety of Passengers

Before summarizing the safety precautions which may be taken it may be useful to dispose, or attempt to dispose, of a supposed safety measure which

has frequently been proposed, namely, the use of parachutes. There is one important factor which is common to all the classes of accident summarized above, namely that unless there is a complete disaster such as structural failure or head-on collision in the air, neither the pilot nor the passengers know until the last moment whether a crash is inevitable. In the event of disaster parachutes could very rarely be used successfully by passengers, and their use while the issue is still in doubt is undesirable. The pilot's attention should be concentrated on avoiding accident and it may be dangerous to saddle him with the responsibility of instructing passengers to leave the airplane. It would obviously be undesirable for passengers to decide for themselves. The carrying of parachutes would involve a considerable sacrifice of paying load which cannot be afforded, and, even if provided, they would seldom if ever be of any value. This so-called safety measure must therefore be ruled out.

The provision of a parachute to sustain the whole airplane must also be ruled out for similar reasons. After all, the occurrence of major accidents in organized passenger air transport is extremely rare, and safety precautions must be considered in relation to this fact.

Apart from the question of disaster in the air, the risks to passengers involved in the various classes of accident fall into two main categories: (1) shock or injury on crashing and (2) fire arising out of the crash. There is in addition one particular case of forced landing which should be mentioned, namely, the forced landing of a land airplane on water. In all cases where a land airplane has to pass beyond gliding distance from land special precautions must be taken for the safety of passengers. The forced landing of a marine airplane on land is an extremely rare occurrence and the risks involved in such landing are generally similar to those in a minor accident to a land airplane.

Precautions Against Risk of Injury

Risk of direct injury to passengers in a crash may arise from the breaking up of the cabin structure as a whole, local damage to a part or parts of the cabin, or passengers being thrown forward through momentum. The following are some of the precautions which can be taken towards the reduction of such risks:—

The airplane body structure, and particularly the cabin portion of it should be made as robust as possible and with special regard to its ability to maintain its form in a crash. Metal construction of the main structure must be regarded as an almost essential requirement for the large passenger carrying airplane; but there is not much to choose between steel and duralumin construction provided due attention is paid to robustness as apart from strength under flying conditions.

The cabin should be so placed in relation to the airplane as a whole that the risk of damage is a minimum. Passengers placed in the extreme nose of the airplane, although provided with an excellent view, have the minimum of protection in case of a crash. The wings and undercarriage will take up a very large amount of shock, and passengers should be placed behind rather than in front of them.

The cabin structure should be strengthened locally at points where heavy loads are likely to be imposed in a crash, such as points of attachment of undercarriage members. Strong, robust flooring should be provided.

No engine or other concentrated weight should be placed so that it is likely to be thrown forward into the cabin in a crash. A luggage or freight compartment placed behind the cabin must be very robustly constructed. A

freight compartment placed forward may be an advantage as it may act as a buffer in case of crash.

Passengers' chairs must be strongly and robustly built, and must be positively and rigidly attached to the floor. This is a point requiring special attention in view of the fact that chairs are usually made removable for purposes of cleaning, etc.

The backs of chairs should be padded and should have no sharp projections which might cause injury to passengers thrown forward from behind. The backs of chairs must be strong and rigid enough to give support to the passenger behind at the moment of impact in a crash. Alternatively, separate handrails should be provided to enable passengers to take some of the shock.

There should be no hard or sharp cabin fittings which can cause injury to passengers, and all fittings should be firmly secured.

The provision of belts for passengers cannot be considered essential except under abnormal conditions of operation as indicated above.

Precautions Against Fire Risk

Fire risks will no doubt be dealt with fully in the papers bearing on engine installations and it is therefore unnecessary to refer in this paper to the causes and prevention of the outbreak of fire after a crash. The disposition of the fuel tanks is usually included in the term "engine installation," and other contributors will therefore no doubt emphasize the importance of placing the tanks properly, not only in relation to the engines but also in relation to the passengers' cabin. Apart from the question of power plant installation the most important precaution for the safety of passengers is the provision of ample facilities for passengers to get out of the cabin after the crash. Except in the case of a very bad crash the airplane rarely bursts into flames immediately; there may be in fact an appreciable interval before the fire breaks out and a considerable time before any fire reaches the cabin. Reliance should not be placed on the main door alone as this may be blocked or jammed. Two or three emergency exits should be provided in the roof, and every window should be large enough to permit of the exit of passengers in emergency. Cabins should of course be properly equipped with hand-operated fire extinguishers of a kind which does not generate poisonous fumes. Clear instructions in the use of extinguishers should be posted with them. Automatic fire extinguishers of the sprinkler type are of little value as they are not sufficiently directive.

The special precautions referred to above in the case of a land airplane which has to pass over large stretches of water may be summarized as follows:

(1) The cabin should be at least temporarily watertight provided all windows and doors are shut. If a steward is carried he will be responsible for shutting, before the landing is made, any windows or doors which may be open. Otherwise the pilot must instruct the passengers to shut windows and doors themselves.

(2) Several emergency exits of ample size must be provided in the roof of the cabin. These must be so placed in relation to chairs, etc., that passengers can get out without difficulty.

(3) Lifebelts must be provided for every passenger and every member of the crew. Having regard to space available, etc., the pneumatic type of lifebelt is usually preferred; if this type is used the lifebelts must be tested at regular intervals and two or three spare belts should be carried. Lifebelts must be placed in obvious and accessible positions. The carrying of a collapsible lifeboat cannot be considered necessary in organized air transport.

(4) Full and clear instructions as to the procedure and use of lifebelts should be issued to passengers in the form of notices or otherwise.

In reviewing this aspect of safety in passenger air transport it has been necessary to deal at some length with the various forms of accident which may occur from time to time. A few years ago it might have been considered inexpedient to refer publicly even to the possibility of such accidents, but the time has now come when the subject can be freely discussed without any fear of scaring the prospective air traveller. The record of safety which has already been achieved in organized passenger air transport is such that free discussion of possible risks and safety precautions is likely to increase rather than decrease confidence. The passenger on a modern ocean liner is not scared when he sees the array of boats on the boat-deck or the lifebelt in his cabin, and in the same way the modern air passenger will be reassured rather than scared by the observance of safety precautions in air transport.

CHAIRMAN LAND: I think the paper speaks for itself. We are indebted to Major Mayo, and we are indebted to Mr. Loening for the able manner in which he presented it to us.

The paper is open for discussion.

F. C. PERRY (Indemnity Insurance Company of North America, Trenton, N. J.): I don't believe that Major Mayo touched on the subject of air sickness. Was this included?

CHAIRMAN LAND: Well, it is part of the show all right. But I don't know whether it is a question of safety. That is possibly the reason why he didn't mention it in this paper.

MR. PERRY: How about this proposition then: If you took a canvass of every person here physically, do you suppose a group of doctors would pass every one as to strength of heart and for altitude flying of anywhere from 500 to 5,000 feet? Supposing each one were to take an airplane ride. There might be some casualties, maybe two per cent.

CHAIRMAN LAND: I shall ask Mr. Loening to make general reply to the discussion at the end.

MR. LOENING: As far as I can get Major Mayo's general scheme, I don't think the study of that would come in except that he would want the seats separated from the pilot, so the disturbed person can't start doing something funny that would disturb the other passengers. The pilot should be entirely separate from the passengers.

MR. PERRY: My point is, supposing you made a survey of the United States to find out the available number of people who would avail themselves of air transportation. It is not everyone who would want to go up that should go up, because their physical constitution doesn't warrant taking that risk.

MR. LOENING: When we get to that stage, I guess doctors will be available at every air station.

I think Major Mayo brings up one point about which we might differ. He says, "Bad landings due to error of judgment on the part of the pilot are comparatively rare and they seldom cause risk to passengers."

If he limited that to landing in the home aerodrome, that might be true. But we have lots of examples. Only recently an army plane had to make a landing in Newport, in which the pilot used bad judgment. He didn't know the field and made a bad landing, as bad as he ever made in his career. I certainly would want to enter my objections to that statement.

I think that is where Colonel Lindbergh's training comes in for the safety of the pilots.

LT. ALDRIN (26 Broadway, New York City): Mayor Mayo's paper was cer-

tainly very illuminating. There is one point I would like to emphasize, and that is, in regard to parachutes for passengers.

Major Mayo spoke in connection with organized passenger air transport. Sometimes it is necessary to carry passengers in other directions, not on organized routes. That is to say, you want to carry passengers on intermittent flights over very bad territory, probably. Take for example in the Rocky Mountain district, where there is no possibility of landing. Sometimes it might be a question of having your passengers carry parachutes as well as the pilot.

The other question is in regard to fire extinguishers. There was recently a very serious accident down near Cincinnati, in the case of a cabin machine taking fire. They had a pyrene fire extinguisher. Somebody tried to use it around a cabin and asphyxiated them all, including the pilot. Of course, landing was a pretty serious affair.

In regard to communication between the pilot and passengers, I think that is a very important point. I recently made a trip to the Coast in a cabin machine, in which there was full communication. The danger there is where the passengers might get hysterical and might interfere with the full use by the pilot of these facilities and their control.

On the other hand, in separating them, there is a certain lack of moral support; you might say, in the pilot being away from the passengers. There is a happy medium, I think. You may have windows or something of a similar nature separating them. There is a big value right there. I think both sides must be considered very seriously.

MR. LOENING: I think Major Mayo answers some of the points that have just been brought up.

He specifically states, about the fire extinguishers, that they should be of a type that would not cause asphyxiation, and he covers the other points in a way.

The big distinction is the question of parachutes. I think his attitude might be explainable from the standpoint of lack of knowledge of what parachutes do in Europe, compared to the many experiences we have had in this country, and their wide use.

It is only a year or so, I believe, since the British and French air services started to use parachutes at all. I believe Major Mayo feels an encumbrance like that would not be a proper thing to use in air transport. And if flight were made over rocky regions it isn't a fit place for air transport.

DR. FREDERICK HOFFMAN (Newark, N. J.): I feel strongly that it would be ill-advised to use parachutes in passenger service. In an open plane you can jump, but in the passenger plane jumping with the parachute is very difficult, and it is a needless expense for the company and an unnecessary load.

In regard to the contact with the pilot, at times when there seems to be an impending accident, it adds to the courage of the passengers to see the pilot undisturbed by impending risk.

I had an accident one time and there was a forced landing. I heard a ripping noise, the plane caught fire. I looked at the pilot, and he was undisturbed, as much as to say, "I should worry," and I gained moral courage from him.

I think it is a great thing to see a pilot in operation, and it is certainly an inspiring thing. It gives you courage in your lonely cabin. But if you can't see out, if you know there is something wrong, you become easily frightened.

LT. BROWN (Navy Department, Washington, D. C.): It has been my particular job to study accidents for a little over a year, and I certainly want to add my commendation to the way in which the Major has treated this subject.

I am inclined to agree with him on the subject of parachutes in cabin planes. You should make them safe enough so the parachute is not necessary except in the most extreme emergency, and therefore, they should not be carried.

There is something about a parachute that to the uninitiated is very terrifying.

both when it is put on and when they are instructed. I have seen people turn around and back away from a plane after being given a parachute, told to count six and then pull the string after having jumped.

Another thing is, in time of emergency, those people aren't going to jump. We have had enough cases of experienced men who have refused to jump, have become panicky and just frozen in their seats and will not jump.

In regard to bad landings, I disagree with the Major, having gone over the statistics in respect to this, and although we have no fatalities from land planes, we have had eight fatalities in a period of seven years from bad sea-plane landings. The sea-plane is apt to have a tendency to dig in if it is landed improperly, falling over on its back.

So I don't think that can be altogether disregarded, particularly in sea-plane construction.

CHAIRMAN LAND: We don't want to get too far ahead of our program here, as so much of this discussion is running on parachutes. I think unless there is someone else who wishes to discuss this paper, we will go to the next paper, which is on the subject of parachutes.

Our next speaker is again, like Major Mayo, a man who "knows his stuff." There is nobody in the United States, to the best of my knowledge,—I don't think there is anybody in the world, as well qualified to talk on parachutes, who has done as much human service for parachutes, who knows about their use, and who is as vitally interested, as is the next speaker on our program. I take pleasure in presenting to you, Major Hoffman of the Army Air Corps.

The Parachute in Passenger Flying

By E. L. HOFFMAN

Major, A. C., U. S. Army Corps, Wright Field, Dayton, Ohio

By far the greatest adverse factor with which we have to contend in the development of passenger transportation by airplane, is the risk involved. The layman often feels that aviation is not safe enough and the lure of speed and time saved are not sufficient to induce him to use air transportation. The further development and application of the parachute will go far towards meeting the public's requirements regarding safety.

The public will travel by air just as soon as it has definite assurance that air travel is not unduly dangerous.

When the individual parachute was put on the market great difficulty was experienced in getting the pilots to use them. Today there are several thousand in use and records show that over 100 lives have been saved by the parachute. In the development of a parachute suitable for use with passenger craft, support will probably be difficult to obtain and to convince commercial operators of its utility will be another serious problem. It is human nature to absorb new ideas slowly and almost unwillingly.

Surely there is no one who will say that the individual parachute, as we know it, isn't worth while. Its uses are limited, however, and in its present form it is certainly NOT suited for commercial passengers. There are some applications of the "Parachute Principle" which are suitable for this purpose. Part of the problem is to determine which application is most suitable and the other part is to apply it successfully.

Any heavier-than-air craft may fall. Gravity is working all the time and if not opposed will cause falling bodies to acquire high velocities. Man is so constituted that he can with-stand only relatively low accelerations so that if he is suddenly stopped while traveling at a high velocity, the result is fatal. Almost any person

can withstand a free jump from a height of four feet above the ground and many can withstand a jump of ten feet. The problem of relatively safe aviation thus resolves itself into providing equipment which will give assurance that, under all circumstances, man will never strike the ground with a force greater than that caused by a jump from a pedestal four to ten feet high.

There is only one means by which this can be accomplished feasibly with heavier-than-air craft, and that is by use of the parachute mechanism.

Now let us see what form such parachute mechanism should take:

In general, it can either be an individual or collective parachute. In the first arrangement, one individual is launched with one parachute, and in the other arrangement, more than one person is launched with one parachute. The parachute in use by the military forces of all the world is an individual parachute. It is not suitable for commercial use. This parachute generally requires that the release trigger be pulled after the person has left the plane.

It could be arranged so that this releasing was done automatically after leaving the plane. Elderly persons, children, and others will not jump out, no matter what the consequences of their not doing so will be.

So for commercial planes, it is easily seen that the release of the passengers must be in the hands of one person, the pilot. It must be arranged so that no passenger, either carelessly or deliberately, can fail to go with the parachute mechanism when the pilot so wills. Still keeping within these restrictions, the mechanism could be arranged in the following ways:

- a. Individual parachutes concealed in the seats or elsewhere, automatically releaseable when the pilot opens the floor.
- b. Detaching the cabin and carrying it down by parachute or parachutes, either with or without other parts of the plane.
- c. Bringing entire airplane down by one or more parachutes. (The engines and/or gasoline could be detached if necessary.)

The objections to (a) above are these:

- (1) All passengers must be in their seats and securely strapped in, at the moment of opening the floor.
- (2) The airplane might be on its back, so they couldn't fall out.
- (3) It doesn't seem feasible when passengers are in their berths.
- (4) The floor might drop prematurely.

The objections to (b) above are these:

- (1) Structurally, it is an extremely difficult problem, and the additional weight required will be GREATER than that required to bring down the entire airplane. Visualize the additional weight caused by putting a bomb bay in a bomber, and you can begin to see why this weight goes up.
- (2) At moment of launching, the plane could be in a position where all passengers might be thrown on their heads and on top of one another.
- (3) Six years ago an experiment was conducted in which the fuselage was pulled in twain in the air and the after portion with seats descended by parachute. The experiment was successful, but it was thought that any such releasing mechanism would be dangerous and unreliable.

The solution is to bring down THE ENTIRE PLANE by parachute or parachutes.

Hereafter, a parachute mechanism which lowers the entire airplane will be called a "Planechute."

Up to the present time two different airplanes have been landed by the use of a giant parachute. Both tests were held in California and both were very successful, especially in view of the newness of the art.

The following points are to be considered:

- a. Where will the parachute be stowed?
- b. How will the plane be suspended when descending by parachute?
- c. How rapidly can the plane be allowed to fall?
- d. What will be the weight of the entire mechanism? What will be the bulk?
- e. How will the parachute be launched?
- f. Will the parachute be rendered inoperative by breakages, fire, or collision?
- g. How will the added weight affect the balance of the airplane?
- h. Will a device be necessary to release the parachute from the airplane after landing? Or in the air?
- i. How many operating controls will be required for launching, where will they be placed, and of what will they consist?
- j. If releasing devices are necessary, where will they be located, etc?
- k. Will auto rotation occur when plane is suspended. If so, what remedies will be the best?
- l. What effect will rain, snow, mud, heat, etc., have on any part of the parachute mechanism?
- m. Will it be certain to operate, without ever failing, in any position the airplane can ever get itself into?
- n. Can it be positively prevented from premature release?
- o. What is the minimum altitude at which it can be expected to operate?
- p. Is there any limit to the size and weight that can be successfully descended by parachute?
- q. Provide for ease of packing or stowing and inspection.
- r. Will the addition of the planechute cause any resistance while in flight?

Discussions of the Above

a. *Where will the parachute be stowed?*

Consider the conventional airplane; for example, the Bellanca monoplane, Columbia, or the Spirit of St. Louis. These are selected because most passenger airplanes will be of this general type; i. e., top wing monoplane with enclosed cabin.

Assume that it will weigh, fully loaded, carrying six persons, 3,000 pounds. A parachute mechanism to handle this plane can be built to weigh 150 to 200 pounds. These ships carried a ton more weight than this across the Atlantic, so they could surely carry this load without inconvenience. If the added 150 to 200 pounds of parachute is considered bothersome, then just leave out one passenger. In other words, consider the plane as a five-passenger ship with parachute, rather than a six-passenger ship without parachute.

Now 150 pounds of concentrated weight can be carried on an airplane in only certain locations. It can't be carried aft near the tail, nor can it be carried out near the wing tips. It should be carried as close to the center of gravity of the airplane as practicable. This leaves the center section of the wing and the central portion of the fuselage from which to choose. Further discussion will enlarge on this point.

b. *How will the plane be suspended when descending by parachute?*

The plane should be made to meet the earth in the manner in which it can absorb the most shock. Obviously, this is the normal position of landing; i. e., with wheels and tail skid both touching the ground at once. In this position the fuselage makes an angle of about 15 degrees with the horizontal, with the nose uppermost. The parachute attachment must be so arranged that it will cause the plane to ride in this position when descending. A single-line attachment will not answer here, nor will a double one. A three-point suspension is the least number of lines that will do and it may be desirable to have four such lines. The point of lift of the parachute will have to be slightly ahead of the center of gravity of the plane, in order

to keep the nose elevated as much as desired. Since these bridle cables or rods need be quite strong, they will consequently be heavy, and, it is therefore desirable to keep them as short as practicable.

c. How rapidly can the plane be allowed to fall when descending, by parachute?

In considering this point, we will use the same reasoning that was used in designing the military SERVICE parachute. In the military service men are taught to jump with a large chute which will let them down gently, but for emergency jumps a smaller chute is used. This is done because one would be unnecessarily hampered in carrying the large chute all the time, for he might never use it. The small SERVICE chute is made just large enough to let one down without serious injury, although it may under some conditions cause slight injury.

When we design to bring the entire plane down in an emergency, we are justified in bringing it down at such a rate that no one will be seriously injured, although they may be shaken up somewhat. The faster we can let it come down, the smaller and lighter will be our parachute mechanism.

A person sitting in a plane can hit the ground much harder, without injury, than can a person descending in an individual parachute, for the reason that there is more shock absorbing material intervening. In the first case, part of the shock is taken up by the tires; part by the regular shock absorbers; part by the seat cushions; and part by the collapse of the landing gear, if the shock is great enough to cause such collapse.

Experience shows that it is likely that a plane can be allowed to descend as rapidly as 25 feet per second.

In calculating the minimum size of planechute required to bring down the present Army training plane, i. e., the P. T., without regard to the speed of fall, but only insuring that the nose be held up in landing position, it is surprising to find that a chute of about 36 feet diameter will do. The falling speed, however, would be of the order of 30 M.P.H. It's not likely that this speed would kill the occupants. Now, the other odd part of this is that that parachute area is only slightly greater than the area of the two service chutes always carried by the two occupants. Someone suggested that the plane would be ruined if it struck at this speed, but it wouldn't be any worse off than it is now when the two occupants leave it high in the air.

This is the minimum of planechute which could be used. The maximum is only limited by the weight the plane can carry. Just what shall be settled on as the right size for emergency use will have to be determined. An exhibition or demonstrator planechute should be larger than one purely for emergency, for the same reasons that the Army training chute is larger than the service chute.

d. What will be the weight of the entire parachute mechanism?

Without going into details, the statement may be made that the weight of this mechanism for any plane will be of the order of 5 to 7 per cent of the loaded plane.

With regard to bulk, one cubic foot of planechute mechanism for every 700 pounds of gross airplane weight should provide a safe rate of descent.

e. How will the parachute be launched?

First, remember that any relatively light thing such as a parachute, when released from an airplane, does not rise or go up or soar, as has been popularly believed. Rather it goes straight to the rear, parallel to the line of flight at the moment of release. Of course it does not go back, it is the plane that goes forward. What we are visualizing is, the relative motion between the parachute and the plane.

With this in mind, then, it will follow that from the point of release, there must be nothing directly to the rear on which the parachute can catch or foul.

In (a) above we limited the storage location of the main parachute to two places, i. e., the center section of the wing, or the mid portion of the fuselage. To the rear of these positions are the following obstructions to be considered in connec-

tion with fouling: the horizontal stabilizer with elevators; the vertical fin; the rudder; the balance on the rudder; the tail skid; the braces, wires, or struts in the empennage.

In stowing we must consider not only the main chute, but the suspension lines, which may be from 50 to 75 feet long, and may number 50 or more, as well as the suspension bridle mentioned in (b) above. None of these may be allowed to foul anything.

In (b) above we have definitely located our points of attachment for the suspension bridle. They must be on top of the airplane and within a few feet of the center of gravity. This is the region of the center section of the wing.

Now if we should decide to stow the parachute in the fuselage, it will be found that it can not be launched from the bottom or either side without danger of fouling in either a right or left-hand spin. That is, the attaching means will foul or wrap around the fuselage. It does seem feasible to launch it from the top of the fuselage or the center section or perhaps both.

If it is possible to stow in the center section, then the parachute, suspension lines, and attachment bridle are as short as possible; the whole thing is concentrated and can be neatly concealed.

f. Will the parachute be rendered inoperative by breakages, fire, or collision?

The only breakages likely to occur in the air are wing and aileron failures. Since the chute is stowed in the center section, such breakages would not interfere, as any of these breakages would be considerably outboard from this location.

Airplane fires are of two general classes, i. e., fire in the air and fires after crash; or simply air fires and crash fires.

With reference to air fires, when fire does break out, it does so in the engine section. It starts small and gradually grows to greater proportions, fanned by the blast of the propeller. This blows it directly aft, endangering the occupants of the cabin.

With the planechute, the moment fire breaks out, the pilot releases the chute and shuts off the engine. The wind blast on the fire is then upward, removing the flames from the vicinity of the cabin. The blast is also much less than that from the propeller. The pilot then has a chance to fight the fire on the way down with extinguishers. Modern planes will be constructed so that all portions which can become exposed to fire will be of metal.

In the Columbia, and in most conventional planes of this type, the pilot is seated right next to the engine, so that he will discover a fire as soon as it breaks out.

It is proposed to make the suspension lines of the parachute or a part of them of cable, which will not be immediately affected by fire. The suspension lines and attachment bridle being some 75 feet in length, the parachute will be clearly out of the way of the flames.

In considering fires in the air, thoughts sometimes turn to "Flaming coffins." These huge fires were the result of the gas tank being ruptured and ignited by incendiary ammunition. The chances for fires of such huge proportions in commercial aircraft are very remote. Fires from ruptured feed lines only will be the rule. With proper cowling above the motor, metal cabins, wings, etc., such fires can do little if any damage to the inflated parachute. The gas will be shut off immediately.

When collisions occur, the planes usually bump on their extremities, i. e., wing tips or tail; therefore it is advantageous to locate the parachute near the center of the airplane.

g. How will the added weight affect the balance of the airplane?

Not at all, since the principal weight is carried near the center of gravity.

h. Will a device be necessary to release the parachute from the airplane after landing?

The reason for fitting release devices to individual parachutes, when it has been done, was for the purpose of preventing the person from being dragged by the wind after landing. The dragging force of a giant chute is unbelievably great, and a release will be necessary for service use. For testing and demonstrating, such a device should be incorporated, for should anything go wrong when launching high in the air, the pilot might cut away the entire chute and bring down the plane as is usual.

i. How many operating controls will be required for launching; where will they be placed; and of what will they consist?

In general, there will be one control and it must be within easy reach of the pilot. It most likely will take the form of a wire cable, with handle and locking pins. With two distinct motions this should release and launch the entire parachute mechanism.

j. If releasing devices are necessary, where will they be located, etc?

A releasing device will be necessary. This should consist of a handle, placed within easy reach of the pilot and a small cable, perhaps ten feet in length, running to the concentrating point of the supporting bridle.

k. Will auto rotation occur when plane is suspended? If so, what remedies will be best?

One of the marked disadvantages noted in the most recent drop with a parachute at Tracey, California, seemed to be that the plane continued to rotate, tending to wind up the suspension lines. Most planes, if unrestrained, want to take a spinning attitude. This point will have to be studied. It would seem that several remedies are feasible, however.

l. What effect will rain, snow, mud, heat, etc., have on any part of the parachute mechanism?

The parachute must be protected against all these when stowed. After release, they will have no effect on the efficiency of the parachute.

m. Will the parachute be certain to operate, without ever failing, in any position into which the airplane can get itself?

A parachute in use is a very peculiar thing. We are generally satisfied with a thing if it works successfully 99 per cent of the time. Not so with a parachute. It must never fail because human life depends upon it. Most things can be classed generally as good, fair, and poor. A parachute must be good; it can not even be fair. Passenger carrying airplanes are not going to be stunted deliberately but nevertheless, studies have been made of the possibilities of failure to function in the following positions and maneuvers of the airplane: 1. Level flight, 2. Nose Dive, 3. Steep climb, 4. Stall, 5. Side slip, 6. Loop, 7. Tailspin, etc. In analyzing these maneuvers, no condition is found in which a parachute, installed as described above, would fail to function.

n. Can it be positively prevented from premature release?

It can be and must be. In designing the release, at least two distinct movements, easy to make, should be required of the pilot. Both the release handle and all parts of the release mechanism should be designed to prevent accidental release.

Stowage compartments for parachutes in the slipstream must be so constructed that they will resist any tendency of the slipstream to open them.

o. What is the minimum altitude at which the parachute can be expected to operate?

When using the individual parachute, the person usually drops over the side and pulls the release. The parachute thus is not opened until the person is 100 feet or more below the level of the plane. This is termed the dropping method. Another method which is used in practice jumps particularly, consists of crawling out on the wing and pulling the release while still hanging on to the ship. Here the parachute inflates and pulls the person away from the plane. This is termed the lift-off method. With this last method about the only valuable altitude that is lost, is equal to the length of the suspension lines. In other words, with the military para-

chute, whose suspension lines measure 20 feet, an aviator could lift off safely as low as 50 feet above the ground.

The planechute utilizes this lift-off method and so the Columbia could be saved by the parachute when as low as 100 feet above the ground, and a fall from a lower height wouldn't be apt to kill anyone. This considers only the position of level flight. In a dive more altitude would be necessary.

p. Is there any limit to the size and weight that can be successfully descended by parachute?

There seems to be no limit to either. The greater the weight to be supported, the greater must be the strength of the suspension lines. It would seem that the strain on the supporting fabric can be kept constant by increasing the area, until the unit strain is the same. In other words it would seem that if 300 lbs. require 300 square feet in descent, then 3,000 lbs. will require 3,000 square feet. In either case each square foot of cloth is only subjected to a strain of one pound.

This is not strictly true, for the strength of the fabric is governed by the tensile strength of each individual thread and this gives results considerably at variance with the above; but with proper reinforcing, fabrics can be made to withstand a great deal.

q. Ease of stowing, inspection and maintenance.

With the locations as proposed; i. e., the main chute and all lines stowed in the center section or fuselage, it is relatively easy to get at either for the purposes enumerated above.

r. Initial cost, length of life, and repair parts.

For a plane the size of the Columbia (5 passengers), the initial cost may be from \$1,000.00 to \$1,500.00. The military parachutes have given a life well above five years and these should last longer.

No matter what improvements are made in heavier-than-air craft in the way of lighter engines, greater speed range, lower landing speed, stability, better climb, more reliable motive power, or what not, the fact that the machine is still heavier than air makes it imperative that it be parachute equipped, for when it is several hundred feet in the air, something can and may happen to it which only the parachute can remedy.

A parachute which oscillates will never do well for a planechute. There are now non-oscillating parachutes.

It is true that the planechute may land in trees, on the edges of buildings or cliffs, or elsewhere. The present individual chute is apt to also. It can't be helped at present. With the motor running, the planechute will be more steerable.

For the benefit of those who do not know, let me say that parachutes are more readily affected by air currents than planes and that up and down trends always will be troublesome and do the unexpected. Figures for rates of descent only hold in still air and this is seldom experienced. While theoretically the up and down trends usually cancel each other, actually you can always expect a down trend, especially when the wind is high.

With the planechute, wind draft must be considered. There is a parachute now extant which tends to land with a certain side down wind. This will be of value here.

It seems that with the planechute, it will always be best to arrange to land down wind, just the opposite of conventional practice. An arrangement has also been proposed, which consists of a light drag line attached near the tail which will come into play as the plane nears the ground, and by the force exerted will tend to swing the tail into the wind.

No doubt the use of the planechute will call for stronger landing gears and oleos capable of absorbing more shock than are usually fitted now, and it will be necessary to provide anchorages and follow through sufficiently strong to withstand

the shock occurring when the parachute opens. After the parachute is opened and the plane is descending, the strain on these parts will be greatly reduced.

Whether or not the dissipation of the kinetic energy of the plane at high speeds will be a serious problem, will have to be determined. The shock load on an 80-foot diameter parachute, carrying a load of 1600 pounds, traveling 100 MPH. is of the order of 5600 pounds. The particular parachute used in the test by which these figures were obtained took care of this load readily.

If it is found necessary, a Shock Chute or decelerator chute may be used. Such a chute will be so made that it can withstand high shock loads, and will come into play to slow up the plane by pulling up its nose before the other chutes are brought into play.

It is easy, indeed, to visualize the use of a planechute on the smaller planes. It is more difficult to imagine their use on very large planes. The larger the plane, the longer the planechute's suspension and, therefore, the plane has to be higher for it to operate successfully. Perhaps the planechute will have an influence on limiting the size of the planes for passengers.

If it is asking too much to imagine all planes equipped with planechutes, surely it is easy to imagine such planes as small commercial passenger planes, civilian and military training planes, ambulance planes, military transport planes, etc., so equipped.

Designers and operators speak of "Pay loads." They say the planechute will reduce their pay loads. It will from their present figures, but they have no business figuring their pay loads as they do today. The Leviathan could carry many more passengers if all the life boats and life saving apparatus were taken off. I am afraid the present pay load is bound to shrink considerably when safety appliances are demanded.

The Effect on Flying of the Entire Airplane Parachute

When we first started to develop the military parachute, much indifference and opposition was encountered in our service. A few of the war pilots wanted them, particularly those who had seen some Germans use them successfully, but the average peace pilot looked upon them as just one more thing to bother him—and felt sure that nothing was going to happen to HIM, anyway.

After a while some pilots were saved from certain death by the use of this parachute, and one would have thought that certainly, then all fliers would demand them. There still remained some, who in their peculiar way, reasoned that THEY would never need one. Later their use was made compulsory in the Army. At the present, this parachute has saved upward of 100 persons' lives. Colonel Lindbergh is high gun with four jumps to his credit.

The layman, however, does not consider a safety device in this way. When told that it is possible to have a parachute which will take care of him and the plane without any knowledge or precaution on his part, he is at once interested in flying. Such an attitude has been displayed by hundreds of persons who have said that they would not consider going up without such an apparatus.

Flying today, aside from the military, is done without any parachute device—just a blind trust in Providence.

For several years it was difficult to get anyone sufficiently interested to go into the business of manufacturing parachutes. The market for them was obscure. Even those in closest touch with conditions couldn't foresee that soon all civilized countries would be bound to supply parachutes for their military and test pilots. Two manufacturers started in finally to build them. The Army bought all it then needed and there was a lull. One company went out of business, certain in the belief that the saturation point had been reached. The other company stuck and is now sup-

plying these parachutes to our Army, Navy, Post Office Department, Great Britain, Spain, Canada, Australia, Brazil, Japan, Poland, Sweden, and other lands.

Looking backward, it is simple to see that any prime life-saving device is bound to succeed, almost in spite of anything. People think a lot of their lives and are willing and anxious to buy anything that will insure that they continue to live.

This parachute will materially reduce accidents caused by the following:

- a. Fire in the air.
- b. Fire after crash.
- c. Collision.
- d. Motor failures.
- e. Fog or clouds.
- f. Night flying.
- g. Sleet on wings.
- h. Stalls.

When these sorts of accidents are greatly reduced, there are not many causes remaining.

We will now discuss the sub-heads listed just above:

a. Fire in the air.

This has been previously discussed.

b. Fire after crash.

If we have fewer crashes, we will have fewer crash fires.

c. Collisions.

This has previously been discussed. It must be remembered that in any collision there must be more than one plane involved, and even if one plane should fall and yet the others were saved, we have still accomplished something worth while. There may be collisions in which nothing can be of any help.

d. Motor failures.

In many cases, a forced landing in difficult terrain may be fatal. It requires considerable skill and luck to land safely with a dead stick under the best of conditions. Often military pilots have jumped rather than attempt a landing, because they knew that in either case the airplane would be a total loss and if they stayed in the plane, they might get pinned in the wreckage and burned to death.

There are any number of little things that can go wrong with an aviation engine which may require an emergency landing. Often it is something that can be easily fixed, but you have to come down to do it.

e. Fog or clouds.

Fog has baffled man since the beginning of time. It hampers the mariner greatly. When he encounters it, the laws require that speed be reduced and whistles blown at intervals. The aviator has to keep his speed up to be able to stay aloft. He wouldn't dare navigate in areas where other aircraft might be flying. Collision in the air is much more serious than collision at sea. But what worries him most is what to do in case his motor stops—from lack of fuel or any other cause. With the parachute this worry is eliminated.

Pilots hesitate to go through or above clouds with their present flying equipment, especially on cross-country trips. The height of the clouds above the ground is variable and the pilot has no means of telling, except by meteorological reports, whether or not he has a space below the clouds of good enough visibility to permit a safe landing. This condition is the greatest cause of irregularity in flying schedules.

With this parachute device the cloud menace is not nearly as serious. If the motor fails or a landing is required for any other reason, the parachute may be released, allowing the airplane to float down in comparative safety.

f. Night flying.

It is always dangerous to make a forced landing anywhere at night. With this parachute it would be very simple. It is an unusual person who can sleep in an

airplane, but perhaps the use of this device will allay their fears so that sleep will be possible.

g. Sleet on wings.

Under certain atmospheric conditions, sleet forms on the wings, changing their shape and destroying their lift. An airplane in this condition must be landed with more than usual speed. This increases the danger. The remedy is the parachute.

h. Stalls.

This is the condition in which the plane loses flying speed and falls. The plane will usually correct itself after falling a slight distance, say three or four hundred feet. Hence, the stall results in an accident when occurring near the ground. It is usually brought on when taking off, by motor failure combined with turning in an endeavor to get back into the same field.

Since this parachute device will operate at about 200 feet altitude in level flight the pilot may be trained to take off with one hand on the parachute release lever, so that he can immediately release the chute at the first sputter of the motor. This chute will catch him every time when above 100 feet and when at lesser altitudes it will tend to hold up the nose, even if not fully inflated, and in this attitude, no fatalities should occur.

This device has one highly important and very unusual potentiality. Many times when making a forced landing, the pilot still has the use of his motor. With the parachute inflated and the motor usable, the device becomes a SEMI-DIRIGIBLE; and as a result, with a little practice, the pilot should be able to land in an *extremely small space*.

Without doubt, with the constant use of this device many advantages, not now apparent, will come forth, just as was the case with the military parachutes.

As soon as the public is satisfied that it can travel in the air with reasonable safety—and this device is just the one and only thing which will bring this about—the entire aviation industry will spring to life with a rush, the proportions of which are difficult to forecast.

This parachute device should be "The Renaissance of Aviation." It will bring aviation out of the dark, because it will do away with the fears of the public, and make possible normal progress.

CHAIRMAN LAND: Major Hoffman has given us a lot of food for thought. His paper is constructive. It is evolutionary; to some of us it may be revolutionary. Nevertheless the keynote in the paper is in the last paragraph. If you can assure our public that aviation is safe, you have the keystone laid.

The paper is now open for discussion. I want to thank Major Hoffman for the excellent paper.

H. J. STACK (In Charge of Parachute Experiments During the World War in France): I want to say that Major Hoffman's remarkable paper is to me one of the finest things of the whole convention. We have something in his plain truth that if perfected is going to be the finest thing in aviation.

Traditional pilots have always disliked parachutes. For years and years the British, French and American pilots have disliked parachutes. We had parachutes available for them during the last years of the war, but most of them, the British particularly, preferred to take a sporting chance rather than use the Guardian Angel, and our own American pilots didn't want to bother with the things.

I believe, during this period of ten years, in the development of these remarkable parachutes that Major Hoffman has been bringing about in his work, that it is one outstanding thing. It certainly has paralleled the growth of aircraft, and I believe every assistance should be given to these people who are directing the work of the development of the parachute. It certainly sounds like a mighty fine thing.

R. W. GRISWOLD (Formerly with Fairchild Aviation Corporation): After what you said in regard to the advisability of bringing down the whole plane instead of

just the cabin, you gave the reason of impracticability; if you make it a detachable cabin it will run into excess weight.

I have put some thought on this thing. I have been very much interested in your experiments, and it seemed to me that it was too bad to bring down the dead weight of the airplane and motor, gas and oil, when all you want to save is the passengers. I believe it is possible to use a type of construction where the cabin will not contribute anything to the structural strength of the machine. In that case, it would be very simple to build a detachable cabin.

I would like to have you express some thoughts on that, as to whether your parachute can be righted to just bring down the cabin itself. Of course, it may be the wings of the machine may contribute to the lift of the parachute in coming down.

I would like to have your thoughts on that.

MAJOR HOFFMAN: I may not be entirely correct in the analysis of that cabin problem. I have worked on it and decided to abandon it because it appeared as though it were going to add too much weight.

I was thinking of inserting a false cabin within the fuselage. That, of course, does build up the weight. If you know of some way you can hang it onto the structure as false work, you may get away with less weight.

It is a matter of launching, too, that has to be considered; it is a fact that you do get considerable lift from your wings if they are on, and from your fuselage surfaces. So the detachable cabin arrangement may have some uses. For strictly passenger work, I think I prefer the entire airplane.

DR. GEO. F. MYERS (President, Plane Parachute Corporation, Jackson Heights, N. Y.): I think this matter of taking up just the fuselage or the cabin is wrong, because there is a heavy plane dropping down to the earth, and probably killing somebody; if it should drop on a church or schoolhouse, probably eight or ten people would be killed or maimed and the building set on fire. Therefore, I believe the only thing to do would be to take the whole plane.

It is not going to be such a heavy affair or such an expensive one. When you figure it out the way Major Hoffman has, it is going to be a moderately cheap affair, when you come to think of the lives it may save. Even if it would only save one life a week or a month or a year, it would be worth while putting parachutes on all planes.

MR. EMERSON (Chicago): It has been a great privilege and satisfaction to listen today to the authority from the Western Hemisphere and the development of the parachute during the decade since the war. It is also satisfying to note the disagreement with Major Mayo of the British Service, as to the utility of parachutes for passenger service, and also his disagreement with Lt. Brown, who expressed similar doubts.

It was my good fortune to receive my first parachute instruction from Major Hoffman's predecessor, the most practical parachute expert the world has ever known. This was the late Captain Tom Baldwin.

Shortly after my designation as a test pilot in the Navy, eleven years ago, they wished on me the problem of seeing what could be done in providing parachutes for Naval Aircraft. I went to my old friend, Captain Tom, who gave me the lowdown on the whole proposition; and having such a good start, I did what I could in those days on the development of this safety device for our Naval Aircraft.

It is a remarkable thing about that parachute, that it vies with the boy's kite as being the most antique or most anciently known form of aircraft. And up to the present time it, like the kite, has been so little developed. The potentialities of parachutes for various purposes are greater than the layman has any conception of.

The development that the major is now encouraging, in bringing down whole planes, indicates one of those very great potentialities. It is extraordinary that in

the last dozen years there have been, so far as I am aware, only five distinct mechanical advances in parachute types.

They being so few, I will detain you long enough to enumerate them, because they contribute to this discussion of aeronautical safety. I will take them up in chronological order.

The first was the Guardian Angel in its several types. I believe I was the first to try that type on this side of the water, and I will say this for it: It is the only parachute I ever tried that I hadn't seen packed myself.

A second development was carried on simultaneously in France and by the United States Navy. It was analogous to Major Hoffman's problem of bringing down the whole aircraft. The people in the latter part of 1917, who were using parachutes on the Allied side, were not plane pilots. They were the balloon observers who, when their balloon was set on fire by the incendiary bullets of a diving attack plane, were notified up at the telephone cable by the men on the ground that the balloon was on fire and they must jump immediately. They had a leeway of three seconds in which to jump, because if they delayed longer, the burning balloon came down just as fast as the parachute and set it on fire. Their decisions to jump must be of the immediate, military character.

The problem was to save not only the observer but to save the valuable maps which he had made in his artillery spotting. Therefore, the problem was to bring down the whole basket. In the later part of the war, two observers were usually carried up.

It is a curious coincidence that the first of those basket parachutes was tested out by the United States Navy on the same date that Captain Wolf of the French Service tested out the first one for the French Army.

A third development was the automatic or self-opening type of parachute, developed by Coughlin, one of our very old parachute experts, who is the civilian parachute expert for the Navy. It is little known outside of naval circles.

The fourth development was the Irving parachute, which is the parachute you are now familiar with, in which the person jumps free, and after counting three or four or five or six, pulls a release cord and opens the parachute.

The last development is what Mr. Hoffman has stressed.

Those are the only important developments that have taken place in parachutes for a dozen years.

I will mention, not as a development but as a small contribution which I tried to make to the art, a number of years ago, something that may be of use to this overseas flying, particularly for commercial purposes.

I conceived the idea of using one of these pneumatic, rubber, inflated boats to jump into the sea. Being a naval aviator, naturally that problem concerned me, and I believe I was the first to make use of that particular method.

In this instance, I jumped from an airship, not from an airplane, with a fully inflated rubber boat. The parachute was an ordinary man-carrying parachute, and functioned normally. After being dragged under water and half drowned, I managed to scramble aboard the boat, where I had oars that I could connect up, and I would have been able to paddle ashore, but a destroyer picked me up.

I contribute that thought because of its applicability on a larger scale to over-water aircraft, either heavier or lighter than air. There are quite large pneumatic boats, inflated or uninflated which may be carried with little addition to the weight, and the passengers upon their landing in the ocean will be as safe as they are in the modern life boat.

The individual parachute is like the life preserver on a ship. The larger type of parachute may be likened to the life boat.

I may mention that in railroad transportation we have nothing corresponding to either type of salvage. Therefore, we increase the weight of the structure and its

strength to such a point as to reasonably protect the passengers against severe shock.

STARR TRUSCOTT (National Advisory Commission for Aeronautics, Washington, D. C.): I would like to appear in a dual capacity. First I would like to read a short note which has been received from Lt. Harper of the Bureau of Aeronautics, Navy Department, who unfortunately has been prevented from appearing here, but has read Major Hoffman's paper.

When Major Hoffman says, "With the planechute, the moment fire breaks out, the pilot releases the chute and shuts off the engine. The wind blast on the fire is then upward, removing the flames from the vicinity of the cabin." Lt. Harper takes issue with that statement and believes that is questionable. He believes that there is a possibility or probability that the fire will continue going backward and not all up, because the plane will still have some forward motion while the parachute is opening, and during that time the parachute may take fire.

With reference to the point where the major answers the question, as to whether the parachute will be certain to operate without ever failing in any position into which the airplane may get itself, Lt. Harper wishes to call attention to the fact that he has omitted the question of what happens if the airplane is descending on its back. Airplanes have been known to descend in this position, and that would appear to be a question to be seriously considered.

He also believes that the assumption that the planechute, using the liftoff method, would save the airplane from an altitude as low as 100 feet from the ground is somewhat too optimistic, and that the distance will be considerably greater than this.

There is also a question as to the life of the parachute particularly for use in tropical areas. We, apparently, are pretty sure that a parachute used in the tropics will have a considerable reduced life as compared to the life of the same parachute in the temperate zone.

There is also the question of the possibility of using the combined airplane and open parachute in the landing of the airplane. Major Hoffman states that with the parachute inflated and the motor usable the device becomes a semi-dirigible. With this statement, Col. Harper is inclined to differ and believes that the pilot would have very little control if he tried to use the airplane as a semi-dirigible, and that that lack of control would come at the time when he needed the control the most.

Lt. Harper also notes some further points which might be added to the discussion. One of those I believe I am competent to deal with myself, and will pass on to the final point, which is that the Handley-Page Slot properly installed in use will function to a certain extent as a planechute. Of course, the plane with the slot will still have forward velocity, but so will the plane chute in the wind.

With the slot the airplane is still under control and has a speed of vertical descent which is comparable with that of a plane chute.

If you will now visualize me as passing from the mouthpiece of Lt. Harper to my own person, I want to express, as have others, the very great pleasure in hearing from Major Hoffman. For some years I was associated with the Bureau of Construction and Repair and the Bureau of Aeronautics in the Navy Department, and in the office of the chief of those bureaus it was my duty or part of my job to follow the development of parachutes and further it as far as it was possible.

During that period, Major Hoffman was active and the work was done as far as it was possible to do it.

In the Navy Department there were developed certain sources of supply and certain methods of construction, which have in some part been taken over by the Army, and others still remain. In others the Army has remained satisfied with its own practice and quite justifiably so.

But it was a great disappointment, when some years ago Major Hoffman

apparently had to give up activity in parachutes, and this is the first opportunity I have had to see and listen to him since he has returned to that activity. I feel very, very glad to learn of the progress which he has been making in solving this very difficult problem which he has tackled.

May I add a few words which may give you something of a background? This business of fitting parachutes to airplanes began in the minds of inventors many years before the airplane was a practical device. It has been my misfortune in the last few years to have to deal with many new aeronautical inventions.

The number of people who have attempted to combine the airplane and the parachute and the number of different ways that have been attempted is positively astounding, and of course, in discussing these applications with the various inventors, I found that it was very advantageous to be able to refer to the past practices or past attempts to reduce the idea of the practice. But so far no one except Major Hoffman has made a really successful job of the combination.

CHAIRMAN LAND: I will now ask Major Hoffman to reply.

MAJOR HOFFMAN: I want to thank Mr. Truscott for all the nice things he said about me, which were undeserved.

I didn't find anything in Mr. Emerson's discussion with which I didn't agree. To take up Lt. Harper's comments, which are very well taken indeed, the first one is about fire, setting the parachute on fire during the course of launching, as I understand it.

There is a possibility that this will happen with a very great, large fire. But I don't believe it will with the so-called small fires that we can expect. That matter will just have to be proven. That is the only way to find out about that. We will assume when we get our mechanism finished we will actually set a plane on fire and see what happens. I am very confident we can do it and get away with it.

About the plane being on its back sometimes, that is a very good point. I didn't think it was likely that a commercial plane could get around on its back, but it might in some cases. So we will look into it.

He says that my estimate of saving the plane at 100 feet is rather optimistic. I had to make it that way to satisfy everybody. I don't infer that you will save the plane, but I say that no one will be killed at 100 feet. The plane may be smashed considerably. The nose is supposed to be held up, and when the nose is held up you aren't going to get killed.

About the semi-dirigible features—I know why he takes issue with that; but I may say I am confident on that score, because we have already done enough with our model planes and have been dropping them in our wind tunnel work to know that the semi-dirigible idea is all right.

About the Handley-Page Slots—They are of course very valuable as an addition to safety in aviation. But I can't see that they are going to take care of many of these things that we have enumerated here, some of which I can easily recall. In a jam of the controls, your slots wouldn't be much good. If a wing breaks off they wouldn't do you any good. For fire in the air they wouldn't help a great deal. In a collision they certainly would not. Sleet on the wings certainly wouldn't be helped by slots.

CHAIRMAN LAND: I wish to thank Major Hoffman again for his able paper and his discussion. He has aroused some very interesting discussion. I wish we had more time to elaborate on it.

The last paper we have today was to be presented—again going to the superlatives—by the best informed man on all phases of aeronautics in this country or abroad, Dr. Ames of Johns Hopkins University. He has many duties and one of them is Chairman of the National Advisory Committee for Aeronautics.

Those of you who have topside jobs realize the work is delegated down the line, and the preparation of the report which the National Advisory Committee for Aeronautics has permitted to be released today on the subject of "Accident

Analysis," has not only a national but an international importance. Passing down the line, from Dr. Ames to the sub-committees who do the initial work, they naturally associated themselves with the representatives of the services, representatives of civil life taken into their Advisory Councils, aviation attaches in Washington, and so on. The man who has been designated to deliver this paper, as intimated, has done a lot of work. This is Lt. C. R. Brown, Bureau of Aeronautics, Navy Department, Washington, D. C., in charge of the Statistical Section.

He has done a tremendously loyal, faithful amount of work, in an effort to reduce crashes not only in the Navy but also in cooperation with his army brothers and in cooperation with civilians.

I take pleasure in introducing, Lieutenant Brown.

Accident Analysis

By LIEUT. C. R. BROWN

Bureau of Aeronautics, Navy Department, Washington, D. C.

We are here today for the single purpose of reducing accidents and promoting the safety of aviation. The conference I find, from the papers which have been read, has left no stone unturned. The problem has been attacked from every conceivable angle, from the actual mechanism of the machine itself to the supervision of its operation through more efficient weather service and more intelligent ground administration.

The committee whose report I present was organized by the National Advisory Committee for Aeronautics in response to a request from the air coordination committee consisting of the Assistant Secretaries for Aeronautics in the Departments of War, Navy, and Commerce. The work was undertaken in recognition of the difficulty of comparing and drawing correct conclusions from reports of aircraft accidents prepared by different organizations using different classifications and definitions. The air coordination committee's request was made "in order that practices used may henceforth conform to a standard and be universally comparable." The purpose of the special committee therefore was to prepare a basis for the classification and comparison of aircraft accidents, both civil and military.

Prior to the preparation of this analysis form, the different departments of the government and certain industrial concerns had been analyzing accidents using widely varied methods. Further complication arose from similar practices abroad. No two methods were identical. The results though illuminating and in some degree helpful, were difficult if not impossible to compare. If compared they were confusing and in some ways apparently contradictory. To correct this condition was the task of this committee.

The various members brought to the meetings widely divergent opinions, but the report in its final form does not represent a combination of compromises. As our studies progressed, and they were extended over a period of four months, we found that our differences of opinions arose from the fact that none of us had had a complete grasp of the subject and the factors involved. Our apparently divergent views were harmonized by combination, not by compromises. The report as it now stands was unanimously approved.

The report therefore affords a method of correlating these various factors which have here before this conference been given so much painstaking study and of balancing them one against the other in order that we may learn their relative importance. Obviously we must know our weaknesses before we institute corrective measures. Like the doctor, we must diagnose our ills before we may cure them, and we must be certain that our diagnosis is correct, that we know

the true underlying causes. Like our medical friend, we must treat the disease, not the symptoms.

Also, in any science so closely governed by the law of compromise as aeronautics is, it is essential that the relative importance of these various factors be known. We cannot build a landing gear strong enough to withstand any impact. Such a landing gear would be too heavy. We can only give it sufficient strength to withstand what we consider are its normal landing loads with a reasonable margin of safety. Then if our statistical report shows that landing gear failures are prevalent in a particular type of aircraft, or should they show they are prevalent in all types, the gear must be strengthened. Likewise, if no stalls ever occurred, it would be foolish for a designer to fit an anti-stall device which decreased the aerodynamic efficiency of an aircraft.

In short, correct statistical service is vital if we are to devise corrections for the ills we encounter. By checking and rechecking constantly, it keeps the designer and those responsible for the safe operation of aircraft correctly informed. If efficient, nothing can escape. It exposes defects and subjects corrective measures to a critical and dispassionate examination.

The essence of the whole report may be found in the accident analysis form (reproduced as a part of Dr. Ames' paper, which is a part of this record.) The rest of the report is an explanation of that form, with exact and comprehensive definitions of the various sub-divisions represented in the form.

In the upper left-hand corner are the words "Classification of Accident." This provides first for the classification of an accident according to its nature, such as "Tail Spins," "Collisions," "Forced Landings," "Take-off Accidents," etc.

Below the classification, according to nature or type of accident, is the caption "Result." An occurrence, of course, must have certain results before it can be termed an accident and the committee recognized this fact by defining an accident as "an occurrence which takes place while an aircraft is being operated as such and as a result of which a person or persons are injured or killed, or the aircraft receives appreciable or marked damage through the forces of external contact or through fire." But we are also interested in the *degree* of injury received by personnel and the *degree* of damage done to material. Consequently the caption "Results" is introduced and these results are further subdivided under headings of "Personnel" and "Material." Personnel injuries are divided into fatal, serious and minor injuries; material damage into complete washouts, damages requiring a major overhaul of the aircraft, etc.

From this much of the form alone, a clue may be obtained to its possible uses. For example, we may find the percentage of fatal accidents due to tail spins, and, if results warrant, show how necessary the elimination of this type of accident has become. Let us suppose that our diagnosis shows that thirty per cent of all fatal accidents result from tail spins and that experience tells us that these spins can be completely eliminated by the use of a slotted wing. The installation of this gear on all aircraft not required to possess high maneuverability would in all probability become obligatory. If, on the other hand, collisions in the air were found to be the greatest single taker of human lives, it would be just as essential to provide better visibility or in some way correct this condition. The degree of damage resulting from the various types of accidents would also be of great interest to the commercial operator and, for that matter, to all who are responsible for the maintenance of aircraft. This information would be as readily available.

But, as can be seen, the form carries the analytical study much farther than this. Regardless of whether the accidents are classed according to nature, results or as a whole it allows for their analysis according to *causes*. They may be analyzed according to the immediate causes and the underlying causes at the same time and these two methods are dovetailed together by the form.

The committee realized that one accident may be traceable to a number of

causes and allowed for this by considering each accident on a percentage basis. For example, a pilot who finds his engine has failed him may still be in a position to safely land his aircraft. If he fails to do this through some error on his part, a certain percentage of this accident would be charged to "Power Plant Failure" and the remaining percentage to "Errors of Pilots." This "Error of Pilot" may have involved both faulty technique and an error in judgment on the part of the pilot. In such a case, the percentage charged to "Error of Pilot" would be again divided and part of it charged to each one of these sub-heads, the amount under each depending upon the relative importance they bore in the subject case. Thus factors in each crash can be traced down to the last subdivision under any heading and weighed in accordance with their importance.

It may be held that the degree of responsibility and the weight given the various factors is subject to a great deal of difference in opinion. It is a remarkable fact that two commercial aviation accidents, two Army aviation accidents and two Navy aviation accidents, six in all and all of them typical of the operations carried out by these different activities, were analyzed separately by each member of the committee and that the findings were so nearly uniform as to be almost identical.

It may be thought that the information regarding the average accident is too fragmentary to permit analysis by so elaborate a method. On the contrary, it was found that the data available on the vast majority of accidents was entirely sufficient.

Near the end of the Committee's report, as presented by Dr. Ames in this record will be found the "description and typical analysis of an accident." This description illustrates the methods used in analyzing the average accident.

In conclusion the Committee feels that the form already referred to enables the presentation of a composite and comprehensive picture of all accidents which can be easily and readily broken down into their component parts. Power plant failures, for example, can be given a separate study without juggling figures and the various factors entering into them can be easily determined. In fact, regardless of the angle from which it is desired to attack the problem, the form lends itself readily to such use. We recognize that it cannot be considered complete; additions and revisions will inevitably be made, but the construction is flexible and admits of such changes when the occasion does arise.

CHAIRMAN LAND: I take this occasion to congratulate Lt. Brown on the work he has been doing for the last two years and the able manner in which he has presented this subject for our education and consideration.

We are probably not truly appreciative of this work and won't be for several years, but if this accident analysis can be standardized in this country and adopted abroad, we are taking one of the major steps to reduce accidents, and thereby promoting safety, again the keystone of the arch of success of commercial aviation.

We are grateful to the National Advisory Committee for Aeronautics for permission to use this paper and for holding it up so as to be released at this time.

There is one gentleman here who is in a position to tell the aviation public at least, and possibly the general public how much value there is in this paper, not only from a national point of view, but also from an international point of view.

I should be glad to have the paper discussed or to hear any comments on it.

R. B. ANDREWS (Crayman Company): In the analysis of this accident, of course, you have a very obvious initial point: that is the breaking down of the ignition system, and from the fact the pilot was seriously injured and not killed we got some other information.

How are you going to analyze the accident where you say there is only a pilot, no observer, no passenger, no observable or apparent engine trouble. How are you going to analyze that? How are you going to get your causes? In other

words, how are you going to get the averages when you are going to wash out a lot of things you don't know anything about?

LT. BROWN: That point is very well taken. Of course, in any statistical study the unknown is of no use. We feel anyway that if we have got enough of the known that the unknown is going to follow the same law, the same thing by the law of averages.

In this classification you will find, under the immediate causes, "undetermined." That is for an accident of which nothing is known. You may have information which is fragmentary. You may find it is a material failure, that it was a power plant failure. But you may not be able to determine what failed about the power plant. You only know the power plant failed. So under "power plant" you will find "undetermined."

In that way we have followed right through under structural failures and have inserted those for the purpose of record. But when the final analysis comes, of course, the undetermined will have to be struck out and you will have to take the average of those you know for the results obtained.

Does that answer your question?

MR. ANDREWS: In a large part.

Special Investigation of Each Accident

LT. BROWN: The Department of Commerce now has an inspector who goes around to every accident and he reconstructs that accident, whether it was fatal or not, as well as he can, from the information at hand. The Navy Department has what is known as a "Trouble Board," which is separate from our Boards of Investigation and all that. That is made of three members, and they visit the crash. They take the testimony, not under oath of course, and thresh the thing out and submit a report of each accident that way.

I might take occasion to refer to last year's crash analysis that the Bureau of Aeronautics put out to see the percentage of unknown causes. The unknown was 3.6 per cent of the other causes. That is, we divided pilot and material. Other causes, which is material, and everything amounted to 52 per cent. The pilot was responsible for 48 per cent.

So roughly that is 1½ per cent of unknown crashes we had in the Navy. Of course, civilians will be under greater handicap. They haven't quite the imperialistic control we have. But I am happy to say we have reduced to less than two per cent, the unknown accidents.

EARL D. OSBORN (Aviation Publishing Corp., New York): I was wondering whether you are going to be able to tie this in on the mileage basis or classify the types. Is that contemplated at all? This, as I understand it is just based on the number of accidents.

LT. BROWN: The Navy is studying on hours flown, which is a poor basis, because one aircraft may go up and carry eight passengers and another may carry no passengers at all. So it has been worked out on a passenger basis.

But you can do that if you have your number of fatal accidents, serious accidents and minor accidents, up in the left hand corner of this form, on page 9. You also have your reports from all sources of the amount of flying done.

We unfortunately haven't got the reports on the passenger hours flown. I don't believe civil aviation carries that far. We have complete reports for each month.

The main idea here was to get the causes of accidents, not the relative safety. The relative safety is an excellent thing from the point of view of deciding whether the company is efficient or not, and from the point of view of the layman who wants to take a flight in a plane. But from the point of view of the man who is analyzing these accidents and trying to reduce them, he is more interested in what is causing the most accidents to passengers and of passenger legislation according to that.

Aircraft Accidents—Method of Analysis**By DR. J. S. AMES****Chairman, National Advisory Committee for Aeronautics,
Washington, D. C.****A Report Prepared by
Special Committee on the Nomenclature,
Subdivision, and Classification of Aircraft Accidents**

This report on a method of analysis of aircraft accidents has been prepared by a special committee on the nomenclature, subdivision, and classification of aircraft accidents organized by the National Advisory Committee for Aeronautics in response to a request dated February 18, 1928, from the air coordination committee consisting of the Assistant Secretaries for Aeronautics in the Departments of War, Navy, and Commerce. The work was undertaken in recognition of the difficulty of drawing correct conclusions from efforts to analyze and compare reports of aircraft accidents prepared by different organizations using different classifications and definitions. The air coordination committee's request was made "in order that practices used may henceforth conform to a standard and be universally comparable." The purpose of the special committee therefore was to prepare a basis for the classification and comparison of aircraft accidents, both civil and military.

The special committee was organized in pursuance of resolution adopted by the executive committee of the National Advisory Committee for Aeronautics on March 1, 1928, and held its initial meeting on March 19, 1928. Sixteen meetings were held, the last being on July 17, 1928.

Following is the organization of the committee:

Representatives of the National Advisory Committee for Aeronautics:

Dr. George K. Burgess, chairman.

Mr. George W. Lewis.

Representatives of the Army Air Corps:

Lieut. D. B. Phillips, United States Army.

Lieut. J. D. Barker, United States Army.

Representatives of the Bureau of Aeronautics of the Navy:

Lieut. Commander L. C. Stevens, Construction Corps, United States Navy.

Lieut. Charles R. Brown, United States Navy.

Representatives of the Aeronautics Branch of the Department of Commerce:

Mr. Daniel deR. Scarritt (succeeded by Mr. Edward P. Howard).

Mr. Lester T. Bradbury.

Mr. Scarritt, having resigned from the Government service, was succeeded by Mr. Howard as a representative of the Department of Commerce at the ninth meeting of the committee. Most of the meetings were attended also by Mr. E. M. Kintz, of the Department of Commerce, and Mr. Starr Truscott, of the National Advisory Committee for Aeronautics, and they assisted the committee in the preparation of this report. In connection with the preparation of the definitions and explanations involving the physiological aspects of aviation Dr. L. H. Bauer, of the Department of Commerce, and Lieut. Commander John R. Poppen, Medical Corps, United States Navy, were also of assistance.

Foreign Cooperation

The meeting of May 22, 1928, was attended by the following representatives of foreign governments:

Wing Commander T. G. Hetherington, air attaché, British Embassy.

Lieut. Yoshitake Miwa, Imperial Japanese Navy, assistant naval attaché, Japanese Embassy.

Commander Silvio Scaroni, air attaché, Italian Embassy.

Maj. Georges Thenault, assistant military attaché for aeronautics, French Embassy.

At that meeting the proposed method of analyzing aircraft accidents was explained and the value of a uniform system for reporting accidents was discussed. It was suggested that the representatives of the foreign governments consult with the personnel in their governments who were responsible for analyzing and reporting aircraft accidents, regarding the possibility of adopting the proposed method and form.

Great interest was expressed, and it was the opinion of those present that the adoption of a uniform system would be advantageous. The representatives of the foreign governments were invited to submit comments and suggestions regarding changes, but none had been received up to the date of the last meeting of the committee. This was probably due to the necessarily lengthy period of time required for translation, consideration, and approval.

An aircraft accident is an occurrence which takes place while an aircraft is being operated as such and as a result of which a person or persons are injured or killed, or the aircraft receives appreciable or marked damage through the forces of external contact or through fire. A collision of two or more aircraft should be analyzed and reported statistically as one accident.

Immediate Causes of Aircraft Accidents

In the course of its meetings the committee considered various methods of analyzing aircraft accidents. These included studies and classification by (a) the immediate causes, (b) the underlying causes, (c) the nature, and (d) the results of the accidents. Each of these methods was considered in detail, and it was finally found possible to reduce their analysis to the methods described in this report and combine the results in the form of a single chart.

A plan devised by Lieutenant Philips, of the Army, and Lieutenant Brown, of the Navy, for the division of the immediate causes of aircraft accidents into four major classes, and providing for the further subdivision of these major classes as seemed desirable, together with proposed definitions of these classes and subdivisions, was submitted to the committee for consideration.

The outline and definitions of the classification of accidents as presented to the committee were carefully considered by the members of meetings, and modifications were made in the plan as originally drafted so as to provide for every type of aircraft accident in the light of the experience of the members in classifying and analyzing accidents in the Government services.

In working out this outline the committee attempted to provide a plan which would permit of the careful analysis of aircraft accidents by the different organizations from the point of view of both personnel and matériel problems. The plan also permits of the analysis of a given accident into two or more distinct causes and makes possible, by the use of percentages, the indication of the relative weight of each cause in any particular accident.

Cross Analysis

The plan provides for the analysis of crashes according to the nature of the accident (take-off accidents, tail spins following engine failure, etc.), the degree of seriousness of personnel injuries, and the amount of damage occurring to matériel.

Furthermore, the system, through the use of a cross-analysis method, allows for analyzing pilot errors and matériel failures according to the underlying causes of these errors or failures.

The plan also provides for the analysis of aircraft accidents of different organizations on the same basis, so that the records will be comparable and the preparation of a composite report of all aircraft accidents will be possible. It is the belief of the committee that if all aircraft accidents occurring in all agencies are classified in the manner recommended a composite of all the accidents will offer a basis upon which a study may be made and correct conclusions drawn.

Aircraft Analysis Form

In drawing up the aircraft accident analysis form and the accompanying definitions the committee had in mind the frequency rate of accidents from the various causes, the logical lines along which studies should be conducted, and the ease with which these studies can be made from this chart. It is recognized that to make a detailed study of accidents due to any one cause a further subdivision may be necessary. However, if all accidents are classified according to this chart the major causes can be easily determined and further investigation can be readily carried out for the purpose of eliminating these causes.

It was also recognized, in working out this chart, that the division of immediate causes between personnel and matériel as set forth in the chart and definitions was more or less arbitrary, since all defects of aircraft can in the last analysis be attributed to errors of personnel, whether in operation, inspection, maintenance, manufacture, or design. Since the purposes of the accident study seemed to be best served by drawing attention to defects of matériel, even though traceable ultimately to personnel errors, the line between personnel and matériel in the immediate causes was drawn at the operating personnel of the aircraft. In other words, under the main heading "Personnel" there are included only those accidents for which personnel engaged in operating the aircraft are responsible. Accidents due to matériel failure are classified under "Matériel" even though personnel charged with design, construction, or operation may be held responsible for the failure. Errors due to personnel other than those immediately accessory to the operation of the aircraft are shown in the "Underlying causes" or "Cross analysis," as set forth hereinafter, rather than in the main headings of immediate causes.

The plan as drawn up by the committee is not in any sense final or complete, but is presented to provide a working basis for the study of aircraft accidents from all sources.

Weighing of Accidents

Where two or more factors cause an accident, part will be charged to each; for example, in the case of an avoidable accident following an engine failure the responsibility for the accident might be considered to be equally divided between the pilot and the power plant, in which case 50 per cent would be charged to "Personnel" and 50 per cent to "Matériel." If the responsibility for the accident rested largely upon the pilot, "Personnel" would be charged with 60, 70, or 80 per cent of the accident, or even more, depending upon the degree of responsibility decided upon. Conversely in the above cases "Matériel" and "Miscellaneous" would be charged with a total of 40, 30, or 20 per cent of the accident. This same division of responsibility might be carried out under "Personnel" or other subheads. However, in the particular case cited "Errors of pilot" would be the only division of "Personnel" which could be charged with this accident. If 80 per cent of the accident were charged to "Personnel" in the above instance, then 80 per cent of the accident would be charged to "Errors of pilot." Then, assuming that the responsibility for such piloting error rested jointly upon error of judgment and poor technique, a still further subdivision would be made and 40 per cent of an accident would be charged to "Error of judgment" and 40 per cent to "Poor technique." Thus the factors of each crash could be traced down to the last subdivision under any heading and weighted in accordance with their importance.

Classification of Accidents

For the purpose of comparative study aircraft accidents may be divided into groups of accidents of the same general characteristics. Accident prevention must be regarded as the primary purpose of aircraft study. Studies of accident causes point out needed remedies more clearly when they are supplemented by certain studies based upon the nature and results of the accident.

For example, in both bad landings and tail spins the principal cause is usually errors of the pilot. Statistics based upon the study of causes merely show that pilot's errors are responsible for more than half of all accidents, and the formulation of remedies for the situation appears difficult. If, however, the same accidents are classified according to their nature and results, it is found that the tail spin is the kind of accident that is by far the most prevalent among those which produce fatal consequences. It is apparent that new designs which decrease the tendency of airplanes to spin, or new training methods which increase the ability of pilots to avoid falling into spins and to recover from them quickly, will have a marked influence toward the prevention of fatal accidents.

Likewise, the study based upon nature and results indicates, in the case of collisions, that this kind of accident is third in importance among those which produce fatal results, and that these accidents are much more prevalent during winter months than in summer; and while remedies are not so obvious as in the case of tail spins some lines of attack immediately suggest themselves.

The following classifications for study of accidents according to their nature are recommended:

I. Nature of the Accident

This consists of dividing accidents into separate classes according to the type of accident which occurs.

1. *Class A—Collisions in full flight with other aircraft.*—This includes all collisions with airplanes, balloons, or other aircraft while the colliding aircraft is at flying speed or at an altitude which permits free maneuvering. It excludes collisions (1) on the ground while taxiing, taking off, or landing, and (2) in the air immediately before landing or after taking off and while the airplane is at or near its minimum flying speed.
2. *Class B—Collisions in full flight with objects other than aircraft.*—This includes collisions while at flying speed and with power plant functioning normally with trees, poles, houses, mountain sides, or other obstacles. It includes collisions with the earth or water by diving. It excludes collisions (1) on the ground while taxiing, taking off, or landing, and (2) in the air immediately before landing or after taking off and while the airplane is at or near its minimum flying speed.
3. *Class C—Tail spins following engine failure.*—This includes spins, stalls, and all collisions with the earth while the airplane is out of control due to loss of flying speed following engine failure.
4. *Class D—Tail spins without engine failure.*—This includes spins, stalls, and all collisions with the earth while the airplane is out of control following loss of flying speed, with the engine functioning normally. It includes spins due to structural failure or defective handling qualities of the airplane.
5. *Class E—Forced landings.*—This covers accidents while making landings necessitated by conditions which could not be overcome while in flight. Such conditions include engine trouble and other defects of the aircraft, loss of knowledge of the direction to the destination or the location on the map of the aircraft's position, bad weather, darkness, and exhaustion of fuel.
6. *Class F—Landing accidents.*—This includes accidents while the pilot is in the act of executing a voluntary landing. It does not include forced landings

or accidents while examining a field from the air or approaching it for a landing.

7. *Class G—Take-off accidents.*—This includes accidents occurring between the time of starting a take-off to the time when full flying speed is gained, except those covered under other classifications, as, for instance, tail spins or forced landings.
8. *Class H—Taxying accidents.*—This includes all accidents which occur while the aircraft is maneuvering under its own power on land or water. It excludes accidents while the aircraft is still rolling after a landing or while it is getting up speed for a take-off.
9. *Class I—Fires in the air.*—This includes all accidents in which fire breaks out, either as a cause or result of the occurrence, while the aircraft is in flight.
10. *Class J—Carrier, platform, and arresting-gear accidents.*—This includes accidents occurring while the aircraft is landing upon or taking off from (1) the deck of a floating aircraft carrier, or (2) an elevated platform intended for the landing and taking off of aircraft, but excludes launching-gear accidents.
11. *Class K—Launching gear accidents.*—This includes accidents during take-off in which the aircraft is assisted in gaining flying speed by the application of an external force.
12. *Class L—Miscellaneous.*—This includes accidents the nature of which is known but which do not fall into one of the above classifications.
13. *Class M—Indeterminate and doubtful.*—This includes all accidents concerning the nature of which so little is known that any classification can not be intelligently accomplished.

II. Injury to Personnel

This consists of dividing accidents into separate classes according to the injury suffered by personnel in such aircraft.

1. *Class A.*—A "Class A" injury is one resulting in the death of the individual within a period of 90 days.
2. *Class B.*—A "Class B" injury is one resulting in serious injury to the individual. Because of the difficulties of classification, the opinion of a physician should be obtained whenever possible as to whether an injury is severe or minor. When a physician is not available, the following general rules should be followed: Any injury that results in unconsciousness; any fracture of any bone except simple fractures of the fingers and toes; lacerations that involve muscles or cause severe hemorrhage; any injury to any internal organ; or any other injury that it seems probable will incapacitate the individual for more than five days should be classed as a severe injury. All other injuries should be classed as minor.
3. *Class C.*—A "Class C" injury is one resulting in only minor injury to the individual.
4. *Class D.*—Any personnel who experience an aviation accident with no personal injury shall be classified as "Class D."

NOTE.—The classification of an accident according to injury to personnel shall contain a letter for each individual in the aircraft at the time of the accident, the first of these letters representing the pilot of the aircraft. For example, in an accident where the pilot is killed, one passenger seriously injured, and the remaining passenger escapes with only minor injury the accident would be classified as a Class ABC accident. Had the pilot escaped with minor injury and both passengers been killed, it would have been a Class CAA accident.

III. Damage to Matériel

This consists of dividing accidents into separate classes according to the amount of damage which occurs to matériel.

1. *Class A.*—This includes all accidents as a result of which the aircraft is of no further value except for salvage or usable parts.
2. *Class B.*—This includes all accidents as a result of which it is necessary to completely overhaul the aircraft before it would be again airworthy.
3. *Class C.*—This includes all accidents as a result of which it is necessary to replace some major assembly of the aircraft before it would be again airworthy, such as a wing, fuselage, undercarriage, tail, or engine. Accidents in which the damage to the engine or other major assembly was a *cause* and not a *result* are excluded from this category unless the remaining damage warrants such.
4. *Class D.*—This includes all incidents which because of other factors come within the category of an aircraft accident and as a result of which there is only minor and easily repairable damage to the aircraft, such as a broken tail skag, wheel, bent propeller tip, etc.
5. *Class E.*—This includes all incidents similar to Class D accidents above in which there is no damage to matériel.
6. *Class F.*—"Class F" is included in this analysis only because of the interest it may have for the different organizations which may use this method of analyzing. It consists of matériel failures which did not result in an accident, and, strictly speaking, does not actually fit into an accident analysis. However, the methods here used for analyzing matériel failures which did result in accidents can as easily be applied to those which did not, and thus afford a method of studying the potential accidents, which because of other reasons did not occur, such as a successful landing after engine failure, etc.

The following classifications for study of aircraft accidents according to their causes are recommended:

A. Immediate Causes of Aircraft Accidents

The following is a proposed list of immediate standard causes of aircraft accidents, with definitions where considered necessary for clarity.

- I. *Personnel.*—This includes all accidents which can be traced to persons accessory to the operation of the aircraft, either on the ground or in the air. This does not include accidents due to errors or omissions of personnel charged with the design, manufacture, maintenance, or inspection of aircraft.
 1. *ERRORS OF PILOT.*—This includes all accidents the responsibility for which rests upon the pilot. The pilot is the actual manipulator of the controls or the individual responsible for their correct manipulation.
 - (a) *ERROR OF JUDGMENT.*—This includes all accidents resulting from a decision made by the pilot which was not the best possible under existing circumstances.
 - (b) *POOR TECHNIQUE.*—This includes all accidents resulting from lack of skill, dexterity, or coordination of the senses in handling aircraft controls, whether traceable to inherent inability to attain such or to infrequent flying, lack of experience in flying, lack of experience in flying under particular conditions, or in the particular type of aircraft.
 - (c) *DISOBEDIENCE OF ORDERS.*—This includes all accidents resulting from the violation of disobedience of local or general orders or regulations or provisions of law governing the operation

of aircraft, such as low acrobatics, acrobatics in aircraft not to be used for such purposes, or any other type or manner of operation specifically forbidden by orders or regulations issued by competent authorities.

(d) CARELESSNESS OR NEGLIGENCE.—This includes all accidents resulting from the absence of care on the part of the pilot according to circumstances or the failure to use that degree of care which the circumstances justly demand, either on the ground or in the air, such as careless manipulation of the controls of an aircraft, failure to ascertain the amount of gasoline on board before taking off, failure to ascertain the conditions of the instruments, etc.

(e) MISCELLANEOUS.—This includes all accidents resulting from errors of the pilot not accounted for above.

2. ERRORS OF SUPERVISORY PERSONNEL.—This includes all accidents the responsibility for which rests upon individuals other than the pilot who exercise control over the operation of the aircraft, such as navigators, formation section leaders, ground-operations officers, etc.

3. ERRORS OF OTHER PERSONNEL.—This includes all accidents the responsibility for which rests upon other personnel directly concerned with the operation of the aircraft, such as members of the flight and ground crews of the aircraft, aerographers, etc.

II. *Matériel*.—This includes all accidents resulting from failures of the airplane, power plant, accessories, and launching and arresting devices, whether traceable to materials, faulty design, maintenance, or inspection.

1. POWER-PLANT FAILURE.—This includes all accidents resulting from failure or malfunctioning of the propelling system and all auxiliaries essential to its proper functioning, exclusive of instruments.

(a) FUEL SYSTEM.

(b) COOLING SYSTEM.

(c) IGNITION SYSTEM.

(d) LUBRICATION SYSTEM.

(e) ENGINE STRUCTURE.

(f) PROPELLER AND PROPELLER ACCESSORIES.

(g) ENGINE CONTROL SYSTEM (THROTTLE ROD, ETC.).

(h) MISCELLANEOUS.

(i) UNDETERMINED.

2. STRUCTURAL FAILURE.—This includes all accidents resulting from failures of the airplane exclusive of the propelling system and instruments.

(a) FLIGHT CONTROL SYSTEM.

(b) MOVABLE SURFACES.

(c) STABILIZING SURFACES.

(d) WINGS, STRUTS, AND BRACING.

(e) LANDING GEAR.—This includes all accidents resulting from failure of the landing-gear struts and shock-absorbing gear, but does not include accidents resulting from failure of the wheels or floats attached thereto.

(f) WHEELS, TIRES, AND BRAKES.

(g) SEAPLANE FLOAT OR BOAT.

(h) FUSELAGE, ENGINE MOUNT, AND FITTINGS.

(i) TAIL SKID OR WHEEL ASSEMBLY.

(j) ARRESTING APPLIANCES ON AIRCRAFT.

(k) MISCELLANEOUS.

(l) UNDETERMINED.

3. **HANDLING QUALITIES.**—This includes all accidents resulting from those peculiar characteristics of certain types of aircraft affecting their controllability while on the ground or in the air, such as marked tendency to ground loop, inability to recover from a spin, etc.
4. **INSTRUMENTS.**—This includes all accidents resulting from failures of instruments which were essential to operation under the conditions of the flight.
5. **LAUNCHING DEVICES.**—This includes all accidents resulting from failure or malfunctioning of catapults.
6. **ARRESTING DEVICES.**—This includes all accidents resulting from failure or malfunctioning of arresting gear not a part of the aircraft.
- III. **Miscellaneous.**—This includes all accidents not accounted for above.
 1. **WEATHER.**—This includes all accidents resulting from conditions of the weather which could not reasonably have been foreseen and avoided. (Mention may be made on the chart of contributing weather causes, as fog, gale, ice, hail, snow, rain, lightning, etc.).
 2. **DARKNESS.**—This includes all accidents resulting from conditions due to nightfall which could not reasonably have been foreseen and avoided.
 3. **AIRPORT OR TERRAIN.**—This includes all accidents resulting from airports or landing conditions of places which could not reasonably have been detected or avoided. (Forced landings should be charged to power plant, etc., unless report shows that safe landing could have been made, in which case the crash would probably be attributed to error of judgment or poor technique.)
 4. **OTHER.**—This includes all accidents resulting from causes not otherwise accounted for above.

IV. *Undetermined and doubtful.*

B. Underlying Causes of Aircraft Accidents

The following is a list of standard underlying causes of aircraft accidents, with definitions where considered necessary for clarity.

- I. **Errors of pilot.**—Returning to "Errors of pilot," paragraph I, subparagraph 1, above, the subdivisions of this paragraph were made according to the immediate causes of the errors attributed to the pilot, such as an "Error of judgment," "Poor technique," etc. The underlying causes of such errors may frequently be of more interest than the actual causes themselves. These causes may be defined as those elements which contributed to the pilot's mental and physical equipment at the time of the accident or to the deficiencies which existed in such equipment.
 1. **LACK OF EXPERIENCE.**—This includes all accidents resulting from insufficient personal acquaintance with the actual conditions which had to be met under the circumstances.
 - (a) **LACK OF GENERAL EXPERIENCE.**—This includes all accidents resulting from a lack of experience in the general problems of aviation, such as landing, taking off, air work, etc.
 - (1) **LACK OF TOTAL GENERAL EXPERIENCE.**—This includes all accidents resulting from a lack of general experience due to the fact that the individual concerned has never engaged in such work for a sufficient period of time to acquire the necessary experience to have avoided such accidents.
 - (2) **LACK OF RECENT GENERAL EXPERIENCE.**—This includes all accidents resulting from a lack of general ability due to the fact that the individual concerned has

too infrequently engaged in general flying activities prior to the accident, and consequently lost the ability he had originally acquired.

(b) **LACK OF SPECIAL EXPERIENCE.**—This includes all accidents resulting from a lack of experience in special problems of aviation, such as certain features of cross-country flying (which might, for example, require an intimate knowledge of the terrain of a certain section), carrier operations, night flying, blind flying, etc.

(1) **LACK OF TOTAL SPECIAL EXPERIENCE.**—This includes all accidents resulting from a lack of special experience due to the fact that the individual had never engaged in such special problems for a sufficient period of time to acquire the necessary experience to have avoided such accidents.

1. **LACK OF EXPERIENCE.**—Continued.

(b) **LACK OF SPECIAL EXPERIENCE.**—Continued.

(2) **LACK OF RECENT SPECIAL EXPERIENCE.**—This includes all accidents resulting from a lack of ability in the special problems due to the fact that the individual concerned has too infrequently engaged in special flying activities prior to the accident, and consequently lost the ability he had originally acquired.

2. **PHYSICAL AND PSYCHOLOGICAL CAUSES.**—This includes all accidents resulting from a demonstrable disease or defect or poor reaction.

(a) **DISEASE OR DEFECT.**—This includes all accidents resulting from a disease or defect, demonstrable by physical (including nervous system) examination.

(1) **INHERENT DISEASE OR DEFECT.**—This includes all accidents resulting from a disease or defect which is not susceptible to remedy within a reasonable period of time, such as overshooting a field, faulty landings or collision because of defective vision or judgment of distance; unconsciousness; hysterical or epileptic tendency; chronic air sickness; inability to withstand altitude, etc. The history of an individual may often be necessary to determine if a disease or defect is inherent.

(2) **TEMPORARY DISEASE OR DEFECT.**—This includes all accidents resulting from a disease or defect which is remediable and one which may not be expected to repeat itself with undue frequency in the individual concerned, such as fatigue, either mental or muscular, staleness, temporary illness, incomplete convalescence, etc.

(b) **POOR REACTION.**—This includes all accidents which result from no demonstrable disease or defect but from psychological causes, making the individual react either erroneously or slowly to a situation, such as selecting what is manifestly the poorer of two fields for an emergency landing, persisting on a course when better judgment would indicate that he should land or turn back, indulging in acrobatics over prohibited areas or at too low altitude, etc.

- (1) **POOR REACTION, INHERENT.**—This includes all accidents resulting from psychological causes which apparently are not susceptible to correction within a reasonable period of time. The history of the individual would be a very important adjunct in determining if such poor reaction were inherent and its repetition to be frequently expected.
- (2) **POOR REACTION, TEMPORARY.**—This includes all accidents resulting from psychological causes which apparently are subject to correction, disciplinary or otherwise, within a reasonable period of time.

II. Matériel failures.—The underlying causes of "matériel failures" should also prove of considerable interest in analyzing accidents.

1. FAULTY INSTRUCTIONS.—This includes all accidents resulting from matériel failures which were traceable to errors or omissions in the standard instructions covering the use of such matériel.

(a) **FAULTY OPERATING INSTRUCTIONS.**—This includes all accidents resulting from matériel failures which were traceable to the operation of such matériel in accordance with standard instructions which prove to be incorrect or incomplete, such as instructions governing the use of the mixture control which when carried out are found to damage the engine, instructions governing the proper engine operating temperature which when carried out are found to damage the engine, etc.

(b) **FAULTY MAINTENANCE INSTRUCTIONS.**—This includes all accidents resulting from matériel failures which were traceable to the maintenance of such matériel in accordance with standard instructions which prove to be incorrect or incomplete, such as instructions governing the type of protective coating to cover duralumin parts when operating as a sea-plane, etc.

2. FAULTY INSPECTION.—This includes all accidents resulting from matériel failures which were traceable to errors or omissions in the inspection of such matériel.

(a) **FAULTY MANUFACTURING INSPECTION.**—This includes all accidents traceable to faulty inspection of matériel where such errors or omissions occurred prior to the receipt of this matériel by the consumer.

(b) **FAULTY OVERHAUL INSPECTION.**—This includes all accidents traceable to faulty inspection of matériel where such errors or omissions occurred during overhaul or storage of the matériel.

(c) **FAULTY MAINTENANCE INSPECTION.**—This includes all accidents traceable to faulty inspection of matériel where such errors or omissions in inspection occurred after the final delivery of this matériel to the operating unit.

(d) **FAULTY INSPECTION, INDETERMINATE.**—This includes all accidents traceable to faulty inspection of matériel where actual responsibility for the errors or omissions in inspection can not be definitely placed.

3. FAULTY MATERIALS.—This includes all accidents resulting from matériel failures which were traceable to defective materials when such defects in materials could not reasonably have been detected and eliminated by a proper system of inspection.

- (a) **ORIGINALLY DEFECTIVE MATERIALS.**—This includes all accidents traceable to faulty materials where the materials contained such defects when originally delivered.
- (b) **DETERIORATED MATERIALS.**—This includes all accidents traceable to faulty materials where the defects of such materials occurred through deterioration after delivery.
- (c) **FAULTY MATERIALS, INDETERMINATE.**—This includes all accidents traceable to faulty materials where it is not possible to determine the actual time or place when such defects first appeared.
- 4. **FAULTY DESIGN.**—This includes all accidents resulting from matériel failures which were traceable to errors or omissions in the original design of such matériel.
 - (a) **FAULTY DESIGN, ORIGINAL.**—This includes all accidents traceable to faulty design where such errors or omissions in design occurred in the original design of such matériel, or in the course of changes initiated or directed by persons having recognized authority regarding design or construction.
 - (1) **FAULTY ORIGINAL DESIGN, STRUCTURAL STRENGTH.**
 - (2) **FAULTY ORIGINAL DESIGN, ARRANGEMENT.**
 - (3) **FAULTY ORIGINAL DESIGN, AERODYNAMIC.**
 - (4) **FAULTY ORIGINAL DESIGN, INDETERMINATE.**
 - (b) **FAULTY DESIGN, MODIFICATION.**—This includes all accidents traceable to faulty design where such errors or omissions in design occurred in modifications to the original design of such matériel initiated or directed by persons not having recognized authority regarding design or construction (such as jury rigs, emergency repairs, etc.).
- 5. **INDETERMINATE MATÉRIEL FAILURE.**—This includes all accidents from matériel failures the exact source of which can not be determined.

Description and Typical Analysis of an Accident

Pilot John Doe was flying in a seaplane at 200 feet altitude over a point of land between a bay and the open sea when the engine stopped. Pilot Doe had an opportunity to land either directly into the wind in the open sea or cross wind in the bay. He started to land in the ocean, but at 100 feet altitude he changed his mind and attempted to turn so as to land in the bay. In turning, Doe held the nose of the seaplane up, stalled it, and spun into the land. The airplane was demolished, the pilot was seriously injured, and the passenger was killed.

Doe, according to his record, was an experienced aviator with 30 hours' flying during the preceding month and with recent experience in stunting airplanes.

Examination of the engine showed that one of the teeth in the magneto timing gear had stripped, the broken tooth having been drawn into the other teeth, causing the eventual stripping of all teeth. The original break was determined to be a visible hardening crack.

The NATURE of this accident is Class C—Tail spin following engine failure. The classification according to RESULTS is Personnel, Class BA; Matériel, Class A.

In analyzing this accident the IMMEDIATE CAUSE is charged, as indicated on the analysis chart, as 75 per cent "Personnel" and 25 per cent "Matériel," for the reason that the account of the accident shows that the pilot had two chances to make a safe landing and took advantage of neither of them. Considering the 75 per cent which is charged to "Personnel," it is obvious that this is chargeable neither to "Errors of supervisory personnel" nor to "Errors of other personnel,"

N.A.C.A. AIRCRAFT ACCIDENT ANALYSIS FORM															
CLASSIFICATION OF ACCIDENT NATURE:			UNDERLYING CAUSES OF ACCIDENT:												
			ERRORS OF PILOT						MATERIEL FAILURES						
			LACK OF EXPERIENCE	GENERAL	SPECIAL	DISEASE OR DEFECT	PHYSICAL AND PSYCHOLOGICAL	POOR REACTION	FAULTY INSTRUCTIONS	INSPECTION	MATERIALS	DESIGN	INDETERMINATE		
RESULTS: PERSONNEL: CLASS															
MATERIEL: CLASS															
IMMEDIATE CAUSES OF ACCIDENT															
%	%	%													
PERSONNEL	ERRORS OF PILOT	ERROR OF JUDGMENT													
		POOR TECHNIQUE													
		DISOBEDIENCE OF ORDERS													
		CARELESSNESS OR NEGLIGENCE													
		MISCELLANEOUS													
	ERRORS OF SUPERVISORY PERSONNEL														
		ERRORS OF OTHER PERSONNEL													
	MATERIEL	POWER PLANT FAILURE	FUEL SYSTEM												
			COOLING SYSTEM												
			IGNITION SYSTEM												
LUBRICATION SYSTEM															
ENGINE STRUCTURE															
PROPELLER AND PROPELLER ACCESSORIES															
ENGINE CONTROL SYSTEM															
MISCELLANEOUS															
UNDETERMINED															
STRUCTURAL FAILURE			FLIGHT CONTROL SYSTEM												
		MOVABLE SURFACES													
		STABILIZING SURFACES													
		WINGS, STRUTS, AND BRACINGS													
		LANDING GEAR													
		WHEELS, TIRES AND BRAKES													
		SEAPLANE FLOAT OR BOAT													
		FUSELAGE, ENGINE MOUNT AND FITTINGS													
		TAIL SKID OR WHEEL ASSEMBLY													
		ARRESTING APPLIANCES ON AIRCRAFT													
HANDLING QUALITIES															
		INSTRUMENTS													
		CAUTIONING DEVICES													
		ARRESTING DEVICES													
		WEATHER													
MISCELLANEOUS		DARKNESS													
	AIRPORT OR TERRAIN														
	OTHER														
UNDETERMINED AND DOUBTFUL															

PREPARED AND RECOMMENDED BY
SPECIAL COMMITTEE ON THE NOMENCLATURE, SUBDIVISION
AND CLASSIFICATION OF AIRCRAFT ACCIDENTS
NATIONAL ADVISORY COMMITTEE
FOR AERONAUTICS
JULY 17, 1928

so that the whole weight, 75 per cent, must be placed under "Errors of pilot." It appears further that the errors of the pilot involved errors of judgment in that he lost altitude while wavering indecisively between landing in the ocean and attempting to land in the bay. It appears that poor technique was the most important single factor in that he continued to pull the nose up, still further stalling the seaplane, when he should have sensed the approaching stall. It is considered that

a charge of 35 per cent to "Error of judgment" and 40 per cent to "Poor technique" represents as near an approximation as can be arrived at in this case.

On analysis of UNDERLYING CAUSES it would appear that the "Error of judgment" and "Poor technique" were both due to a "Temporary poor reaction" with a strong possibility of such "Poor reaction" being "Inherent" rather than "Temporary." However, in the absence of a history of the individual this would have to be classified as "Temporary."

Considering the 25 per cent charged to "II. Matériel," the entire 25 per cent obviously should be assigned to "1. Power plant failure," in the second order of subdivision, and again in the third order of subdivision the entire 25 per cent should be charged to "(c) Ignition system."

The underlying cause of this matériel failure is unquestionably faulty manufacturing and accordingly on the cross analysis it would be placed under the head of "Manufacturing inspection."

Conclusion and Recommendations

The special committee on the nomenclature, subdivision, and classification of aircraft accidents, having studied in considerable detail the problem of classifying and analyzing the causes of aircraft accidents, at its final meeting held on July 17, 1928, unanimously adopted a resolution approving this report and recommending that it be published by the National Advisory Committee for Aeronautics and that copies be transmitted to the War, Navy, and Commerce Departments with a recommendation that the proposed method of analysis of aircraft accidents outlined in the report be adopted for use in their respective services. The special committee recommends further that copies of the report be transmitted also to the appropriate representatives of the various interested foreign governments with a request that they cooperate by contributing information from time to time in relation to aircraft accidents.

With the submission of this report the work of the special committee is concluded and it should be discharged. It is probable, however, that the introduction of the proposed chart for the analysis of accidents will result in questions as to interpretation and suggestions for changes, many of which, it is believed, have been considered during the meetings of the committee. It is also probable that study of the information obtained from the application of the method of analysis will indicate that certain features in aircraft construction or operation should be given more detailed study or consideration. The committee therefore at its final meeting adopted a resolution recommending that its present personnel be reorganized into a standing committee on aircraft accidents of the National Advisory Committee for Aeronautics for the purpose of considering from time to time such new matter regarding aircraft accidents as may appear desirable or as may be brought before it.

Respectfully submitted.

SPECIAL COMMITTEE ON THE NOMENCLATURE, SUBDIVISION,
AND CLASSIFICATION OF AIRCRAFT ACCIDENTS.

GEORGE K. BURGESS, *Chairman*.

WASHINGTON, D. C., August 15, 1928.

ADJOURNMENT

**SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL**



Legislation

First National Aeronautical Safety Conference

Under Joint Auspices of

The Daniel Guggenheim Fund for the Promotion of Aeronautics and the National Safety Council

October 4 and 5, 1928

HON. F. TRUBEE DAVISON, Chairman

Assistant Secretary of War, War Department, Washington, D. C.

The session on Legislation of the Aviation Division at the Seventeenth Annual Safety Congress was called to order at two forty-five o'clock by the chairman, Hon. F. Trubee Davison, Assistant Secretary of War, War Department, Washington, D. C.

CHAIRMAN DAVISON: Gentlemen, as you know, the subject is "Legislation" and the first paper will be read by Mr. MacCracken, the Assistant Secretary of Commerce in charge of Aeronautics. Of course, Mr. MacCracken knows more about this legislative question than anybody else; he has been operating under the Air Commerce Act that was passed in 1926; and as a result of that experience and the experience he has had in several of the states as well as in local legislation, he is particularly well qualified to present a paper on this topic.

HON. WILLIAM P. MACCRACKEN, JR.: Mr. Chairman and Members of the Congress: Before undertaking to read the paper itself, I want to express my personal appreciation of the work of the National Safety Council in getting up this aeronautics program. I think that they have been most generous and most successful in what they have undertaken.

Federal Legislation Relative to Safety

By HON. WILLIAM P. MACCRACKEN, JR.

**Assistant Secretary of Commerce for Aeronautics, Department of Commerce,
Washington, D. C.**

Federal policies pertaining to the subject of the safe operation of civilian aircraft are defined by the Air Commerce Act of 1926. The purpose of this Act was declared to be "the encouragement and regulation of the use of aircraft in commerce." Its administration is vested in the Secretary of Commerce, who, by its terms, is clothed with broad powers to promulgate regulations; impose, mitigate and remit penalties, and to issue and revoke licenses for aircraft and airmen.

There are four essentials in the Federal Government's policy relating to the safety of civilian aircraft: (1) Airworthiness of the craft; (2) Competent personnel; (3) Uniform Air Traffic Rules; (4) Adequately equipped airways.

In determining what regulations should govern the first three of these factors essential to safe operation, the Department of Commerce endeavored to secure the advice of all those in any manner engaged in, or connected with, the manufacture or operation of aircraft and engines. Whatever merit there may be in the present Air Commerce Regulations is, in a large measure, due to the response of the industry to the Department's expressed desire for cooperation, coupled with the fact that the administration of the regulations has been almost wholly in the hands of experienced flying personnel.

Under the terms of the Air Commerce Act the owners of aircraft engaged in interstate or foreign commerce by air are required to secure a federal license for such aircraft. The first prerequisite is that the owner shall be an American citizen. Such owners, though their craft do not engage in interstate or foreign commerce by air, may secure a federal license if they so desire.

At the time of the passage of the Act very few of the states had any laws relating to the licensing of aircraft. During the past two years several such laws have been enacted. These have not been uniform, but there has been a marked tendency towards requiring a federal license for all aircraft operating within the state.

In some instances the state legislation has in effect made the federal license a prerequisite for the issuance of a local license, with the result that at the present time of the 8,177 civilian-owned planes appearing upon the records of the Department of Commerce 4,488 are operating as licensed aircraft, or upon letters of authority pending action upon their applications for license.

When the Air Commerce Act was pending before Congress there was considerable sentiment in favor of requiring all aircraft to conform to the federal licensing provisions. Those who advocated such action did so upon the theory that in order to adequately protect interstate and foreign commerce by air, it was necessary that only airworthy craft in the hands of competent pilots should be permitted to use the air space of the United States and its territorial waters.

Those opposed to this view argued that such a requirement would constitute an infringement upon the rights or the responsibilities of the several states. The latter view prevailed insofar as the licensing provisions of the Act are concerned.

It is unfortunate that some state authorities in administering their licensing laws have shown a tendency to establish standards at variance with those of the Federal Government. This is bound to cause confusion, as well as to increase the burdens of aircraft operators and the possibilities of accident. If this practice continues the Federal Government will ultimately be forced to assume a broader jurisdiction. The states, through legislation and their administrative officers, can cooperate in such manner as to avoid the necessity of extending the licensing jurisdiction of the Air Commerce Act. What the processes will be I cannot forecast, but there can be no doubt that in the best interests of aircraft development and safety there should be but a single standard for licensing equipment and personnel.

In determining the question of airworthiness the Department has fixed certain minimum safety factors, and has also provided the industry with a handbook of approved practices. It is not the intention of the Department to in the least stifle the originality or the initiative of the aeronautical engineer. To do so would not only retard economic progress, but also militate against advance in the safety of the air.

When an airplane is designed, the stress analysis is submitted to the Engineering Section of the Air Regulations Division. When this is approved by that Section the application for an Approved Type Certificate is then referred to the field service. An inspector examines the shop facilities and practices of the manufac-

Civil Aviation
Period January 1st to July 1st, 1938.

FATAL STATISTICS		NUMBER OF ACCIDENTS	
TYPE OF FLYING	Schedule Flying	34	390 Total Number of Accidents Reported
	Student Instruction	69	
	Experimental	17	
	Miscellaneous	270	
	Licensed	196	
	Unlicensed	124	
	Letter of Authority	71	
	Average Age of Pilots	28.6 years	
	With Medical Waiver	16	
	Without Medical Waiver	264	
PILOT	Fatal Injury Class "A"	68	Passengers
	Severe Injury Class "A"	63	
	Minor Injury Class "C"	69	
	Uninjured Class "D"	192	
	Fatal Injury Class "A"	88	
	Severe Injury Class "B"	70	
	Finger Injury Class "C"	74	
	Uninjured Class "D"	208	
	Licensed	165	
	Temporary Number	190	
PASSENGER	Not Licensed	65	Pilot
	Completely Embalmed "A"	12	
	Complete Overhaul "B"	25	
	Major Assembly repairs "C"	69	
	Minor Repairs "D"	42	
	Not Damaged "E"	2	
	Class "A" Collision	2	
	Class "B" Collision	25	
	Class "C" Engine Failure	17	
	Class "D" Without Engine Failure	90	
AIRCRAFT	Class "E" Forced Landing	86	Passenger
	Class "F" Bad Landing	56	
	Class "G" Take Off Accidents	44	
	Class "H" Tearing	10	
	Class "I" Fires in the Air	4	
	Miscellaneous Class "J"	61	
	Unknown and Doubtful "K"	11	
	Licensed	1	
	Unlicensed	1	
	Letter of Authority	1	

	Pilotage		Passengers	
Parachute Flying (Alarms)	6.72	4	2	16
Student Instruction	37.49	27	11	119
Experimental	4.84	4	7	6
Dissemination Flying	69.22	60	51	124
Total	118.27	105	75	260

turer, and the plane is given a thorough flight test. If the reports are all favorable the Approved Type Certificate is issued, and the manufacturer can produce duplicate plans according to this design, with the assurance that they will be licensed by the Federal Government. From time to time inspectors visit the factories where planes are being manufactured under Approved Type Certificates, to check up on the workmanship, and materials, as well as to ascertain that the manufacturer is not deviating from the approved design.

Due to the unusually heavy demands for this type of service, some delays and difficulties have been experienced. On the whole, it has demonstrated that, for the present at least, this method will probably prove satisfactory from the point of view of the manufacturer and the operator, as well as the Federal Government.

Once the aircraft is licensed, it is then subject to the regulations of the Department relative to maintenance and inspection. The responsibility for this rests almost entirely upon licensed mechanics employed by the operators, subject to periodic checks by the Department's inspector. Daily and other periodic inspections are prescribed by Regulation to be carried out by those licensed to make them.

In the licensing of personnel the pilot presents a much more difficult problem than the mechanic. At the present time the Regulations require that all pilots take an annual physical examination, and that pilots carrying passengers for hire or reward shall also take a semi-annual check-up.

In addition to the physical examination, the applicants are required to pass theoretical written examinations, and a practical flying examination. Renewals of licenses are issued upon the passing of the physical examination, accompanied by an affidavit that the pilot has had the minimum amount of flying time required during the preceding period.

In order to secure a mechanic's license, it is only necessary to pass the written examination, and to submit evidence of prior experience in airplane rigging or internal combustion engines, according to the type of license desired.

The Air Commerce Act requires that all planes, civilian, and military, commercial and non-commercial, shall conform to the Air Traffic Rules promulgated by the Department of Commerce. In this respect, Congress recognized the need for uniformity in order to adequately protect interstate and foreign commerce by air.

The fact that the Federal Government has undertaken to prescribe Air Traffic Rules applicable to all aircraft obviates the necessity for any state or local legislation on this subject, and in all probability the courts will hold that any such legislation is unconstitutional. However, the successful enforcement of these regulations will, to a great degree, depend upon the measure of cooperation that exists between state and local authorities on the one hand, and the Federal authorities on the other. Thus far there has not been any evidence of a lack of cooperation on the part of either group in this regard, although there is evidence that the law and regulations have not been brought to the attention of a great many of the local and state authorities.

For violations of the Air Traffic Rules, as well as for other regulatory provisions of the Air Commerce Act, civil penalties are prescribed. These are assessed by the Secretary of Commerce upon complaint. The party penalized may submit evidence to controvert the charge or in mitigation of the penalty. The matter is then investigated by the Air Regulations Division, and a recommendation is sent to the Secretary, who either remits the penalty or mitigates it to such sum as he deems reasonable. To date this method has proven very satisfactory. It has avoided increasing the burdens of our Federal Courts, and has assured the aircraft operators that their transgressions would be dealt with by those having a real knowledge of aeronautics.

The Air Commerce Act places upon the Department of Commerce the responsibility for investigating and determining the causes of all accidents involving civil aircraft. This has already reached considerable proportions, and has necessitated

the creation of an Accident Board. At the present time this Board consists of two pilots, the medical director, a statistician and a lawyer.

In analyzing the report of each accident the following factors are taken into consideration:

Many accidents involve several factors, and it is the function of the Board not only to determine what factors are involved, but also to assign a relative weight which should be given to each factor. This is done in terms of percentages, and reports are to be issued quarterly showing the results of the findings of this Board in a consolidated form.

It is the hope of the Department that this report will not only prove of benefit by pointing out the weaknesses to the Department and to the industry, in order that they may be corrected, but will also be of assistance to the insurance companies who are covering the risks, as well as the means of stimulating confidence in the minds of the public.

So far this paper has dealt entirely with the regulation of aeronautics by the Federal Government as a means of increased safety in operation. By far the greater part of the expenditure of Federal appropriations made to carry out the purposes of the Air Commerce Act has been spent in providing and maintaining airway aids. The subject of lighting, directional radio, communications, airway selection and marking, and weather service are subjects of other papers which have been presented to the conference. It is not my purpose to even attempt a summary of these papers, but merely to point out that while the public in general is inclined to lay emphasis upon the Department's regulations and their enforcement in promoting safety in aeronautics, by far the greater part of the funds expended are used in providing safer airways for the pilots.

During the current fiscal year the Department will spend approximately twenty dollars for air navigation facilities to promote safety in aeronautics for every dollar it spends toward accomplishing the same result through regulation. The total appropriation for carrying out the provisions of the Air Commerce Act is in excess of five millions of dollars. While this sum is not large as Federal appropriations are judged, it must be borne in mind that the original appropriation for the fiscal year nineteen twenty-seven was but five hundred thousand dollars.

While there is much room for improvement, it is gratifying to note that this program of the Federal Government which, as a whole, has been in effect for less than two years, has done much to increase public confidence, as well as to reduce the dangers in air operation. Perfection is impossible of attainment, but sufficient experience has been gained to indicate that air transportation will not only be relatively as safe as any other means of transportation, but eventually will probably be the safest means of transportation.

In order to bring this about, however, it requires the continued cooperation of all Governmental authorities, Federal, state and local, not only among themselves but with the manufacturers and users of aircraft.

There is still need of further legislation, particularly on the part of the states, and there will always be an ever increasing need for substantial Federal appropriations. The advantages to be gained, however, by safe and sound aeronautical developments are worth many times the effort and money necessary to be expended to bring about this result.

CHAIRMAN DAVISON: The subject is now open for discussion.

J. F. VICTORY: I am in hearty sympathy with practically everything that Secretary MacCracken has said. I think that congratulations are in order to the Department of Commerce and his administration for the great advancement made in aeronautics under that Act.

I think it would be in order to refer, just for a moment, to one remark of his, to the effect that the jurisdiction of the Federal Government is limited to the

regulation of aircraft engaged in Interstate Commerce, primarily in recognition of the Doctrine of States Rights. In the interest of historical accuracy, that statement does not tell the whole story. The jurisdiction of the Federal Government is limited largely in recognition of this point of view as well as in recognition of the Doctrine of States Rights.

We have before us the example of strict regulation in England. We have seen how England was quick to establish the equivalent of Federal jurisdiction over all aviation, and we saw in a few years the harmful results of premature regulation and over-regulation as it existed in England, with the result that the vast majority (I understand over ninety per cent of the aircraft that were privately owned and operated at the time the British air regulation went into effect) had been driven out of the air because of the unreasonable regulation.

It was because we did not want to drive out of the air in this country aircraft that might perhaps not be able to stand the strict regulations as to airways, that the Doctrine of States Rights was put forward as one that should be observed in enacting Federal legislation. It was felt also that while uniformity of regulation is desirable, it could be better accomplished by the appeal of a sane, sensible, Federal interpretation of a sound Federal law, rather than by the assertion on the part of the Federal Government of exclusive Federal jurisdiction.

MORRIS FITLER (Mutual Life Insurance Company, New York City): I noted a reference in the Secretary's paper to some accident statistics for the first six months of the current year. I should like to ask Mr. MacCracken if the Bureau of Commerce has recently gotten out a report on the basis of mileage flown and casualties similar to the one issued about a year ago for the year 1926 and the first six months of 1927?

MR. MACCRACKEN: This report which I have here doesn't cover that; a subsequent report was gotten out on a mileage basis. This simply covers all operations. The only thing to do would be to get the airway operation and the experimental operation. The report is in scheduled flying. It is easy enough to get the figures and transpose them. Student instruction: We don't have any information coming into the Department giving the total number of hours flown in student instruction. If we could get those figures we could give this information on that basis. The same is true with experimental and miscellaneous flying. That report gotten out on a mileage basis is available, I am quite sure.

MR. FITLER: Is that up to 1928?

MR. MACCRACKEN: Up to July 1st. The third quarter is of October 1st, and that hasn't been completed yet. The Accident Board has considered all the cases they had up to the first of October.

SENATOR BINGHAM: The question which has just been asked with regard to mileage brings up the subject which I have had in mind for a long time, and noting that it was asked by an insurance man, I want to make one or two observations.

The question obviously is, How many miles you can fly safely, or how many miles do you fly, before you receive an accident? Of course, every actuary wants to know that fact. On it he is going to base his charges for insurance.

I don't want to be severe, and I shall try to be temperate in my language, but I really feel that that is a wholly wrong way to look at this subject. May I illustrate it in this way? Suppose you were asked to insure the life and property of a person going from New York to Boston by water. You wouldn't find out how many miles it was from Boston to New York, or New York to Boston, would you? That wouldn't interest you at all. You wouldn't want to know how many passengers had gone between Boston and New York and multiply it by passenger miles and see how many had been lost, would you? You would remember that on the Coast of Cape Cod, within historic times, 2,000 ships have been wrecked and thousands of lives have been lost. You would want to know

the type of conveyance that the man was going to use in going from New York to Boston. If it was a canoe, you wouldn't insure him, unless the premium was approximately one hundred per cent. If it was in the *Aquitania*, you could give him a very low rate for himself and his goods.

If you were asked to insure a ship sailing from San Francisco to Yokohama and to insure the same ship going from San Francisco to Nukualofa you wouldn't ask what the distance was from San Francisco to Nukualofa because you wouldn't care. As a matter of fact, the mileage is roughly the same between those two points. To be accurate, it is farther from San Francisco to Yokohama than it is from San Francisco to Nukualofa.

The same ship and the same captain going on those two voyages would receive an entirely different insurance rating. In fact, the rate from San Francisco to Yokohama would be fairly low. Why? Because you have got known routes, good charts, aids to navigation at both ends, and you know what the dangers are because they are all charted. The route from San Francisco to Nukualofa is not charted; Nukualofa is surrounded by shoals; there are no aids to navigation; the currents are uncertain; there are no lighthouses to speak of, and the rate is almost prohibitive. The mileage has nothing to do with it.

Now, Mr. Chairman, I feel that with safety in air navigation and with the insurance rates, that the insurance people ought to look at air navigation just as they look at ocean navigation, and every single trip ought to be a separate problem by itself. You ought to know, in the first place, whether it is a canoe or an ocean liner you are dealing with, whether it is a schooner without power or a good ocean-going power boat you are dealing with, or if there is no question about the captain and the ship, what the conditions are over which you are going to sail and what you are going to find at the other end.

Those are the things that, it seems to me, are the measures which insurance should consider. They shouldn't consider at all the mileage. To my way of thinking, the American people would be getting air-minded much more quickly if we were not quite so far away from the clipper ship. It is over one hundred years since clipper ships were successful in ocean transport and were desirable. In those days, we thought in terms of a movable means of transportation, water, air and weather; and we were not thinking in terms of a fixed means of transportation, rails and ballast and mileage.

I grant you that your insurance rates from Boston to San Francisco and your insurance rates from Boston to Pittsburgh vary according to the mileage, but your risks are according to mileage, and safety varies according to mileage.

But in the air, safety varies as to whether you are near a lee shore or a safe harbor. Anybody who is accustomed to sailing knows that if you are sailing along a lee shore and the wind is blowing on the land strongly (a good gale say) and your power fails, you are going to be up against it. If you have a sail boat, you have got a great struggle to get away from the lee shore. In the air, you can't get more than two or three miles away from a lee shore, you can only go up two or three miles, and you have always got the lee shore and you have the wind blowing, because gravity never fails to work, and if your power fails, you have got to come down.

Since you can't get as far from the lee shore as you would like to at sea, you want to be as near as you can to a safe harbor to put into, which leads me to my next point, that flying along an airway such as the Department of Commerce is laying out—and I want to pay the very highest compliments I can to the way in which the Air Commerce Act has been administered by Secretary MacCracken; they have laid out these airways in such a way that when the power plant fails, although the lee shore is there, there is a safe harbor. If you are flying a good ship with a good pilot along an airway with a safe harbor between, your risk is practically nil. But if you take the same ship and fly across moun-

tains and forests with no emergency landing fields and no lights and no charts, your risk is very great.

I want to protest against the question of how many miles you can fly safely. My recollection is that during the administration of the air mail by the Post Office Department, we finally got up to some stupendous figure. I think the loss in life was only one life for more than one million five hundred thousand miles. Is that correct?

MR. MACCRACKEN: Yes.

SENATOR BINGHAM: Only one life lost for one million five hundred thousand miles flown! That is nearly sixty times around the world. And surely if you can take a ship that can go around the world sixty times you haven't a great lack of safety. At the same time the air mail was flying at night one million five hundred thousand miles, you know what was happening to the so-called casual or miscellaneous flying done by ambitious young pilots that want to earn a little money by taking up people for \$1.50 or \$2.50, a joy ride, when that isn't enough to maintain the overhead cost and depreciation on their ship.

I think the work the Department of Commerce has been doing in connection with Federal legislation is magnificent. I think the next step that has got to be taken is to get the States to put into effect laws similar to those which New York State put into effect under the able leadership and suggestion of the chairman of this meeting.

I want to add one thing to what Mr. Victory said about why, when we passed this Act, we made it apply to Interstate Commerce. People like Orville Wright and others felt that the progress of aviation would go ahead if we let each State regulate its own commerce. I wish very much, and I yield the rest of my time to the chairman for that purpose, that the chairman would tell us just what New York has done during the past few months in this regard, because it seems to me that New York has shown the way to other States. I won't mention Connecticut, because Connecticut got aboard the regulatory ship before New York ever heard of it. I wish the chairman would tell us what New York has done, because I think everyone ought to know, and every State that hasn't got a good law at present ought to follow, what New York has done.

Out in California not long ago, one of the pilots told me about a fellow who learned to fly and had been turned loose at the end of four hours flying. He bought an old ship and hung out a sign to the effect that he was an aviation teacher. In order to pay for his ship, he started out teaching other people how to fly. Of course, he and his first pupil were both killed. There was no law in California.

Won't the Chairman tell us what New York has done?

CHAIRMAN DAVISON: Senator, the policy that has been adopted by New York State at the last session of the Legislature is perfectly simple, and without attempting to use the proper phraseology, roughly it is this: The State of New York adopted by law the regulations of the Federal Government in so far as they applied to planes, the licensing of planes and the licensing of pilots, and required that no one could fly a plane and no plane could be flown within the borders of New York State without a Federal license. A violation of those requirements of the law was punishable as a misdemeanor. As a result, every law enforcement officer of the State has the authority to enforce the particular provision of the law that has been violated.

I don't know whether or not it is proper for the chairman to express opinions in these matters, but as I am the chairman and nobody can call me down, I am going to do it anyway. Personally I am a firm believer in this question of uniform regulation. Here is a flight that we all of us take many, many times a year, the trip between New York and Washington. It is only a two hour flight, and yet in those two hours we pass six separate jurisdictions. That is just an every-

day commonplace illustration of the problem that the airplane is up against, and undoubtedly other airways that are flown over very frequently would serve as even a better example than that. It seems to me, therefore, that the Constitution of the United States, being what it is, and the leadership having been taken by the Federal Government in the Department of Commerce, as it has been taken, that the obvious and the logical way for all the States is to follow the procedure that has been adopted in New York. In that way, the standards will be kept uniform, and judging by the experience that the Federal Government has had so far, those standards will be very high.

It seems to me that the danger of giving direct authority to State officials, even though small authority, at the start is this: That they will inevitably from time to time have some disagreement with the Federal Government, perhaps only as to minor details. They think they can do a better job than the Federal Government can do in that particular regard. They will always be branching out and ambitious for more power and more authority, until finally you will find a great conflict between the regulations of the individual States and that of the Federal Government.

New York State eliminated that by giving no authority to any State official other than the authority to enforce the laws which had already been adopted. The Legislature here also took one further step and that was to appoint a joint committee of the Legislature to study the whole problem. They were not given authority at all except to gather information and enforce the regulations. The policy that this committee has been following during the past few months since its existence is to examine the operation of the laws that have been passed, not so much in regard to regulations, although they follow that too in so far as the enforcement is concerned, but in addition to that, the laws in regard to the establishment of airports and managing of airways and that sort of thing; the result being that there is a body, with no authority, following this whole question, responsible to the Legislature, composed of members of the Legislature and therefore having great weight in the legislative body whenever it meets.

I hope that the legislation that was enacted here as it might be adopted to the needs of the various States, may become better known so that the other States can see what New York has done and if they think well of it, as I think they ought to, take advantage of that experience.

SENATOR BINGHAM: Wasn't there another law also authorizing the municipalities?

CHAIRMAN DAVISON: I referred in a general way to that; a law giving to municipalities definitely the power to acquire landing fields and to bond themselves for the equipment of it and out of current revenues only of course, to maintain airports and landing fields.

There was one interesting provision in so far as condemnation of property is concerned which so far as I know is unique in legislative history, and that is, the city governments were given authority to condemn lands for airport purposes outside of the city limits so long as it was within a ten mile radius. The reason for that is perfectly obvious. Very often it is necessary to go outside of the city limits in order to find land suitable for flying purposes. If they didn't have the power of condemnation it would enable the owner of the property to hold up the city government. There was one additional provision put in as a safeguard in recognition of the sound doctrine of home rule, and that is, that the city government cannot condemn property outside of the city limits without the consent of the local authorities outside.

SENATOR BINGHAM: I would just like to make one other suggestion, and this in more of a broad nature to the members of the National Safety Council. Until such time as we can get the Legislatures to adopt uniform legislation (and I suppose those of us who have studied State legislation know that not until the millennium arrives will all the forty-eight States adopt the same law in regard to

anything) until such time as we can get the States, at least, to go so far as to require a Federal license to fly, I believe few things would go farther toward procuring safety and doing away with accidents in the air than if the National Safety Council would urge the people of the United States to do this: When you fly, make sure that your pilot has a Federal license and the ship you are going to fly in has been passed by the Department of Commerce. If the passengers who pay the money will look after their own interest to that extent, then the slowness of State Legislatures need not endanger the progress of aviation as much as they are doing at present.

MORRIS PITLER (Mutual Life Insurance Company, New York City): I should like to make it clear that the question of mileage is not as important to life insurance companies as my question to Mr. MacCracken seemed to make it. If Senator Bingham or anybody else should come to the company I represent for insurance and should state in his application that he has during the past year taken a dozen flights in airplanes, and would probably in answer to some of our questions state that he intends to continue flying for certain reasons, he will undoubtedly not be asked the mileage he has flown or that he might fly, or whither those trips took him. The question of mileage has been forced upon us by the fact that the statistics we can obtain on casualties are based entirely on mileage flown. We are not interested in mileage. We are interested in individuals. We are interested in knowing among how many pilots—full time pilots—did these casualties take place. Those figures are not given to us. The figures state that there were so many casualties in so many miles flown. We get the mileage and try to translate it into the number of full time individuals. We take what we can get and try to translate it into our own terms. That is why we are interested in securing the mileage for the most recent period for which experience is available. We want to translate that also into the number of full time pilots, in so far as we can, so that we can base our rates, not on miles but on full time pilots.

These other considerations, of course, are considerations to us, whether the pilot is licensed by the Federal Government, whether he is flying in a licensed plane, whether he is flying on regular routes, and any other safety consideration that we can think of. The question of mileage has practically nothing to do with it, except in so far as it allow us to deduce other facts in which we are most interested.

CHAIRMAN DAVISON: I feel sure that the Federal Government as a whole—I know it is true in the War Department because I can speak for the War Department—would be very glad to hear from the insurance companies if we can help you by keeping our Federal statistics in any different way than we are doing. If you people can get together and tell us what information you want, I can promise you we will go the limit in endeavoring to adjust our records so that you can have that information. At the present time, there is an interdepartmental board studying that very question, and it seems to me that the suggestions of the insurance companies might be important and helpful in that regard.

MR. PITLER: I promise you will hear from us within the next few months.

MR. BOND (Department of Commerce, Washington, D. C.): It has been my privilege to be employed for the past three years as airway superintendent. During that time I have traveled quite a bit and have laid out quite a few airways. It has been very pleasing, I have found, to everyone connected with aeronautics to see the progress that aviation has made during the two and one-half years the airways division has been in existence.

It is my thought to suggest to you some changes that might be made in the Air Commerce Act. We sometimes are asked to lay out an airway between two cities, and in between those two cities there are numerous towns. The first thing that comes up that the airway superintendent wants to know is, where are you going to fly, from which airport to which airport. He goes to the transportation

company and he likely finds that they have been using a field for carrying passengers and the like but that it is inadequate as an airport for the city. The reason that it is inadequate is because it is on a highway where numerous people travel, and it was convenient for that purpose. They had no thought in mind when they chose the field for an airway. In some cases, they have reestablished their airports with the thought in mind of an airway; in other cases, they have not. In some cases, the local politicians have gotten busy, dug up some old piece of land which no one had use for, bought it at a low price and magnanimously sold it to the city at a large profit. Little thought was used as to whether that field was suitable to the airway, whether it lay to the north, east, south or west of the city, whether a lake intervened between it and the airway, whether the pilots must fly straight to it or have to go around the city. My thought is, that while the Federal Government has no control over municipal matters, some better means of cooperation should be devised. My own thought is that the Department of Commerce at the present time is rating airports, giving them A, B, C or D ratings, and I think they should go further and say that if an airport is unsuitable to an airway, no airway would be provided for that city.

The second thought is that in the Air Commerce Act provision was made that the government would not provide any money for lighting airports. The wisdom of that is apparent. However, there is something else needed. The Federal Government has a chief engineer of lighting, who is in constant contact with the lighting companies, who are continually developing equipment, and he is in very close contact with the new development made in lighting. The cities are in a different position; they have had no experience in lighting airports; they do not know what is required; they do not know what is the best equipment. Sometimes they ask the Federal Government to suggest to them what the best equipment is. My belief is that in the future we are going to have thousands of airports with thousands of different system of lighting, among which, within a few years, some will have fallen into obsolescence, while others will keep up with the progress being made by the lighting industry, and there would be no uniformity so far as regards lighting of airports.

The next point I have in mind is this: Airports generally lie any place from one hundred to three hundred miles apart. In between those airports, there are numerous towns generally, with a population of anywhere from 5,000 to 50,000, where no airport can be established because of its geographical location. However, we generally do place a landing field near such a town with the thought that perhaps in the future a local service might be established. The airways superintendent goes to the Chamber of Commerce, the Town Council or the Mayor and asks them whether they will cooperate with the government in establishing a landing field. In practically every case, they are very glad to cooperate with the government.

Then, the first question they ask is, "What do we get out of this?" We hem and haw and then say, "There is much publicity for your town; and you become established on the national air map and perhaps some day in the future airplanes will land here."

The second question is, "Will the landing field be established here, whether we contribute to it financially or not?" The answer to that is generally, "Yes." Sometimes there is a choice between two towns.

The next question is, "If we establish a landing field what rights do we have upon it?" We answer, "If you establish an airport with all the contributory lights and the beacon, you will be permitted to use the field to its fullest extent." Generally, the cost of that is too high and they can't do it. Many towns have been contributing to the rental of the field and in return the government can't permit them to use that any more than the town that doesn't bring in a single dollar. It is my belief that the government should permit such small towns complete use of the

field, because it will aid the government in getting more landing fields, more dollars per year, and it will encourage local flying and will help to keep the public air-minded.

SENATOR BINGHAM: I would like to ask Secretary MacCracken what changes in the Air Commerce Act will be needed to meet the first two suggestions that his man has made?

MR. MACCRACKEN: I think, Senator, it would require an amendment which would authorize the Federal Government to establish cooperative intermediate landing fields.

SENATOR BINGHAM: I mean the first two suggestions he made.

MR. MACCRACKEN: Perhaps I didn't get them quite as clearly in mind as the Senator has them.

MR. BOND: The first suggestion was that the government have jurisdiction over the choice of an airport; and the second was that the government should cooperate in the lighting of them.

Problems in Government Cooperation

MR. MACCRACKEN: The only way that can be done is, I think, by a single amendment which would provide for the cooperative airport; in other words, if there are cooperative intermediate fields. Of course, it might be that the establishment of aids to navigation between the airports would be regarded as a contribution. In fact, it is at the present time. There wouldn't need to be any amendment to the law in that respect. We could do it by administrative action.

The Act prohibits the Secretary from expending any Federal appropriations toward the maintenance of an airport. If it is an airport in the daytime you can't say it is an airport at night and we are just maintaining a night airport. The law does not state between those.

The same thing is true when it is a cooperative proposition between the small town and the government. There have undoubtedly been some misunderstandings and some hardships growing out of that situation. We have had instances where the people in Town A (we will say) have bought the field and leased it to the government, rented it at \$10 or \$15 an acre and released it to the government at \$1 an acre, because they were public spirited and thought eventually there would be enough aerial activity to take it over and make it an airport of the national airways. The government goes in and pays the rental for the land, \$10 or \$15 an acre, in Town B. The people of Town A want to establish a school or something else, a little flying activity, or maybe one of the prominent citizens has bought a ship and wants to operate from that field. They come to us and say, "Can't we do this?" We say, "We are very sorry, but that is an intermediate landing field. If you want to make it an airport, then you will have to take over the maintenance of it." They don't want to do that. That is a very heavy burden. They are in exactly the same position as the other community. It is pretty hard to explain to these people why in one case we are paying only \$1 an acre and they are standing the real cost while in another case we are paying the full cost.

CHAIRMAN DAVISON: The second paper that was to be read at this conference was by the Honorable T. L. Raymond, Mayor of Newark. As we all know, Newark has taken a front place among the larger cities in the development of airport facilities, and the Mayor has been the leader and extremely active in heading that movement. Unfortunately the Mayor is ill and cannot be here. He has, however, sent as his representative, Mr. Charles S. Dion. I take great pleasure in introducing Mr. Dion who represents Mayor Raymond.

Municipal Legislation Relative to Safety

By HON. THOMAS L. RAYMOND

Mayor of Newark, N. J.

The history of aviation as a new factor in the commerce of the world, its development and its potentialities, has given rise to a problem, the nature and the importance of which demand serious consideration from every American city of consequence. This problem is a dual one, and one to which the continued prosperity of a large commonwealth is, and henceforth must always be, inseparably bound.

Basically the question is this: What can aviation do for my city? And: What can my city do for aviation?

The first part of the question has been, and continues to be, successfully answered. It is with the second aspect which we are to deal—that portion which has for one of its subheads the consideration of municipal legislation relative to safety in aviation.

First—and it may be said without contradiction—intelligent local regulation of a municipal airport is an absolute necessity, and should be placed in the hands of the most competent man available. In conjunction with this, and as a definite aid thereto, there should be close cooperation with State and Federal authorities.

The American Bar Association, at its annual meeting in Seattle, Washington, received a report from its standing committee on Air Law. This committee presented, among others, a recommendation that a uniform State Air Licensing Act be adopted by the various states.

This law provides that the Commissioner of Motor Vehicles enforce his authority by promulgation of regulations which shall follow the regulations of the Federal Government under the Air Commerce Act of 1926 and amendments thereto. It is further provided that aircraft and airmen must be licensed either by the Federal Government or by the State. In a given case where Federal licenses have been obtained, no further action is necessary; but where this is not the case, the state officials under the law are empowered to insist upon the obtaining of a state license. In this manner a great majority of aircraft and airmen would operate under Federal licenses. Actions by the states would then, by wording of the proposed act, follow closely, if not identically, the law and regulations of the Federal Government.

Carrying this idea forward, there should be a provision that in the promulgation of State regulations—which must follow the Federal act and regulations thereunder—there should be specifically included provision for air traffic rules and local regulation.

There is every indication of a nation-wide interest and activity in the question of airports. In many localities these have been put into operation, while in many others plans and possibilities are actively under discussion. In many instances these airports adjoin large cities or towns. And public safety requires that every aid to safety be offered by the municipal authorities.

This can be accomplished by the promulgation of local regulations applying to civil aircraft. These statutes, however, specifically would not apply to public aircraft, meaning those owned by the Federal Government or by State Governments.

What local regulation should be can best be illustrated, perhaps, by citing a few of the general rules which we are promulgating at the Newark Metropolitan Airport. These read, in effect:

1. All airmen and aircraft operating on or from this airport shall be subject to and bound by the rules and regulations authorized by the Air Commerce Act of 1926, and laid down in the Air Traffic Rules, effective March 22, 1927, as estab-

lished by the United States Department of Commerce, and any amendments made thereafter to said air traffic rules will be specifically adopted and be made a part thereof as fully as though the same were completely set forth herein.

2. All persons using in any manner the airport area shall exercise due care to guard against fire and injury to persons or property. No rubbish shall be scattered about the airport area, and the crews of all visiting aircraft shall be required to keep clean the space allotted to them.

3. No intoxicating drinks shall in any way be brought on the field. No passengers or pilots shall be permitted to use or to ride in planes if under the influence of liquor.

4. No person except a pilot or mechanic attached to the personnel of the municipal airport or employed by the owner of a plane at said airport, or an owner of such a plane, or other person duly authorized by the municipal airport shall cross the deadline or enter upon the flying field unless he is to participate in a flight. If such person is to participate in a flight, he shall not cross the deadline until the plane in which he is to fly has come to a full stop and the pilot thereof has signalled that he is ready. Such person shall upon alighting from a plane leave the field by the shortest possible route.

5. No acrobatic flying shall be allowed anywhere within one mile of the field.

6. Motors shall not be run in hangars or within the space between the deadline and the hangars.

7. No airplane engine shall be started without chocks under the wheels. No engine shall be run at any time without a pilot or mechanic in the cockpit.

8. No smoking shall be allowed in any hangar within twenty-five feet of any aircraft or gasoline container.

9. In taxiing to and from the deadline, each pilot shall keep his plane swinging slightly from side to side in order to keep a sharp lookout for other craft on the ground or about to land.

10. All taxiing shall be done at a slow speed. No pilot shall taxi closer to another plane than 100 feet unless the mechanic shall have hold of one wing. No pilot shall approach the deadline closer than 50 feet until a mechanic or mechanics shall have hold of the wings to guide the plane into place on such line.

11. No pilot shall take-off without first looking to the rear.

12. Upon exit from the field, all taxiing shall stop at the deadline.

13. All planes arriving must circle the field at least once before landing.

14. Under normal conditions take-off and landing shall follow a right-hand or clockwise circuit of the field. Ships approaching the field from across country shall make at least one circuit of the field with traffic before landing.

15. United States mail planes shall have the right of way over *all other air traffic*.

16. Aircraft approaching each other head-on shall pass to the right.

17. Aircraft overtaking other aircraft shall pass to the left.

18. Each single motor ship, carrying passengers, must have at least one attendant beside the pilot.

19. Under normal conditions a pilot shall have the right of way over any aircraft which appears on his left side or above him and give way to any aircraft which appears on his right or below him.

20. An airplane which is not functioning properly for any reason or which is landing with a dead stick shall have the right of way over all other aircraft.

21. No flying shall be done directly over the field at an altitude of less than 1,500 feet. No stunting shall be done.

22. Lighter-than-air aircraft shall have the right of way over heavier-than-air aircraft.

In order to carry out the provisions of the above rules the airport officials should provide a trained personnel, including mechanics, uniformed regular and/or special

Legislation

policemen, and firemen. Adequate firefighting facilities should be placed at or in the immediate vicinity of the airport.

The administration building should be so placed, and the airport manager's office so located therein, that the entire landing field shall be visible from this office.

Adequate facilities for determining the direction and velocity of the wind should be installed.

Runways and boundaries of the airport should be specifically marked and all obstructions which are visible in clear weather should be indicated by red lights or flood lights in foggy weather and at night.

Hangar roofs should be painted some distinguishing color. For the purpose of identification the name of the airport should be painted in large black letters on the roof of one of the large hangars. For fields in use by air mail planes, a Meteorological Bureau, operated by the U. S. Weather Bureau, is absolutely essential. This facility is not absolutely necessary for civilian aircraft but it is highly desirable, however, at airports in use by transport companies.

Adequate lighting facilities should be provided so that the landing at night will be comparatively safe for all types of planes. These facilities are absolutely essential on fields in use by air mail planes.

A minimum of safety is provided when the field is made a four-way field, consisting of two runways at least 2,000 feet long in line with, or approximately in line with, the prevailing winds, summer and winter. A paved take-off strip is desirable but not essential.

The greatest factor of safety is provided when the entire landing field is so constructed and the surface of the field is in such condition that landings and take-off may be made in any direction and at any time of day or night.

Briefly, then, we find that local regulation of a municipal airport is not only desirable, but patently necessary; and that such regulation, when adopted and enforced in cooperation with state and Federal provision, is conducive of the best results. This would show that in all cities and large towns where airports are in operation or under way, the prescription of a set of regulations in conformity with others in force over the country at large will tend to bring about a systematized understanding and appreciation of the value of safety in aviation.

In this way a great new airport and its parent commonwealth may, and can, prove of distinct service to the science of aeronautics and its many manifestations; not by being unique in its operation, but by becoming subservient to the general good, and therefore attaining to its rightful place as a servant of flying.

CHAIRMAN DAVISON: Is there further discussion on either Federal or municipal legislation?

MR. MACCRACKEN: May I just offer one comment on what Mr. Victory said about the desire to avoid the experience of England in this matter of regulation? I recall that was one of the matters brought up, and it so happens that one of the strongest advocates of that point of view is a resident of a State which is now figuring on enacting a law which would step up the regulations all along the line for flying within the State. They are even talking about five hundred hours for solo flying for a license to carry any passenger at all, as against two hundred hours for the air transport. So, it presents a very difficult problem.

The minute that you get the individual States prescribing the requirements either for the personnel or the craft engaged in aviation, you won't get uniformity, you are going to get petty jealousies; there are going to be troubles in the legislation and the administration of the legislation. The case that I refer to is one which I hope will never arise, but I understand there is a strong possibility of this act, which is regarded as most drastic, being passed by the Legislature when they convene at the beginning of next year. It has already been approved by some of the people in the State.

In other States, at the outset they have said they wanted to conform to Federal regulation, but the jurisdiction is given to the local authority to make some slight deviation. I know of one State in particular (I don't care to mention the name because it only makes it more difficult to iron out these differences) that when they started out wanted to make the licenses look like the Department of Commerce licenses. They adopted as a policy that they would only issue a license to a Department of Commerce licensee. There was no objection to that as long as they adhered to it. But it only had been in for a few weeks, when one of our inspectors turned down one of the men that someone in the State thought should be licensed. Right away, they did away with all of this requirement for a Federal license as a pre-requisite to issuing their license and issued their own. It takes a careful inspection of the license to know whether it is a Federal license or a State license. That is going to result in endless confusion and added risk. The government might be able to compel them (as we do in private enterprise, at least) to change their license so that it would be more easily distinguishable. I don't know that that right rests in the government.

I can see where there is going to be a lot of difficulty if that goes very far. I appreciate what Secretary Davison has done in getting the great State of New York on the right track. There are a number of other States that will follow suit. I hope that they all will.

CHAIRMAN DAVISON: On that point of similarity, I don't know whether there are any other factors that enter or not, but any State, for instance, which attempts to clothe its police with a uniform that might be mistaken for an Army uniform, can be made to change. Whether there is some specific legislation on the point you raise, I don't know.

MR. MACCRACKEN: It may be that we have something of that kind that we can protect ourselves with.

MR. PERRY: Can you tell me if the government through the Department of Commerce can regulate the Interstate Commerce—that is, all the traffic inside of a State, providing it does not go over another boundary?

MR. MACCRACKEN: The government is doing that in so far as the air traffic rules are concerned, upon the theory that in order to adequately protect Interstate and Foreign Commerce you must have uniform air traffic rules. It was the contention of those of us who argued for a similar jurisdiction with respect to licenses that it was just as necessary to have only air-worthy craft and competent personnel in the air to protect Interstate and Foreign Commerce. Perhaps that is stating it a little strongly. I think the necessity is greater for the uniformity in air traffic rules than it is for the uniformity in licensing requirements. I do believe that the uniformity in licensing requirements is great enough to warrant the government, under the Interstate Commerce clause, to take that jurisdiction. Senator Bingham and I differ on that point. He stated this afternoon that he didn't believe that that was a proper exercise of jurisdiction. There are many lawyers who take the same point of view. He is not alone by any means in that regard; nor do I stand alone on the question, fortunately. The answer is that Congress did not assume that jurisdiction. I am confident that either by Federal legislation or possibly even by Constitutional Amendment, if it should turn out that the Senator and those who take the same view are right in the eyes of the Supreme Court, this matter can be cleared up.

There is another way that it can be taken care of and that is under the treaty making power. That was the case in the Migratory Bird Law Act. As you remember, Congress passed a Migratory Bird Bill which was held unconstitutional on the grounds that shooting birds, even though they flew across State lines, was not the province of Interstate Commerce, even though the game birds might be the subject of commerce between the States. After that law was held unconstitutional, a treaty was negotiated between Canada and the United States to protect

migratory birds in flight in the two countries, with the result that Congress repassed the Migratory Bird Bill and it was held constitutional by the Supreme Court.

MR. PERRY: Mr. Davison, as Chairman, can you tell me about the law in regard to navigable rivers. As I understand it, all navigable waters in, around, and adjacent to the United States are under the control of the government and those waters which are not navigable are State controlled. Is that right?

CHAIRMAN DAVISON: Well, I am far from an expert on that subject; in fact, I know very little about it. Generally speaking, your statement is correct, although there is conflict about a lot of local police regulation. If there is any question as to interference, that is a matter for the government, and under the government that goes to the War Department.

MR. PERRY: All air over the United States should, in my opinion, be federally controlled and not State controlled, because it is dependent upon the whole people for its use.

CHAIRMAN DAVISON: Is there any further discussion on this subject?

J. P. PRICE (National Exchange Club, New York City): I was in at the discussion where Colonel Lindbergh spoke and the question of pilots' licenses was raised. Someone from the floor raised the question of Federal control of pilots' licenses. Senator Bingham in here told us, I think, that one way in which the passenger could bring about very much better conditions was to insist that any pilot who piloted him should be equipped with a Federal license and that the equipment in which he flew should be Department of Commerce inspected equipment. It is obvious when the man over on the other side raised the question of legislation—that is Federal control of licenses—Colonel Lindbergh told him that the Federal government could only regulate licenses where the contemplated flights were to be across State lines—interstate. It is obvious from that discussion and this one that the Federal control would be a fine objective, a very fine thing both from the licensing of pilots and from the licensing of a control airway. I don't know whether that is correct or not.

The same thing occurs to me in regard to marine navigation, where lighthouses in navigable waters are under the control of the government. Am I correct?

CHAIRMAN DAVISON: I can't answer that question?

MR. MACCRACKEN: There are some of the States which have a certain amount of jurisdiction over steamboats in inland waters which are not navigable waters of the United States. Take, for example, the great Salt Lake, which is in Utah, wholly within the State and does not connect with any body of water that is used for Interstate Commerce. There the government does not assume any jurisdiction at all. The common notion is that the jurisdiction of the government over maritime matters is based on what is known as the Admiralty Clause of the Constitution. As a matter of fact, the decisions of the Supreme Court on that subject all show that it isn't based on what is known as the Admiralty Clause of the Constitution. The basis for Federal jurisdiction is the Interstate Commerce Clause, and not the so-called Admiralty Clause. It is simply an application of that same doctrine to aviation that may become necessary if we get into too much difficulty. It is the application of that doctrine that will support the constitutionality of our air traffic rules if that is ever attacked. Of course, if the constitutionality of those rules is not sustained, then we are in a bad fix.

MR. PRICE: Is there anything that Congress can do, that the government can do to enlarge the powers of the government to assume supervision over airways or air navigation or pilot licenses or anything of that sort that a national organization could add its weight of influence to in order to bring about, that you know of?

MR. MACCRACKEN: Well, I am one of those fellows that, if I am beaten on a point and the other fellow succeeds, then I am going to give it a fair trial. I argued very strongly before this Bill was passed for the broader Federal jurisdiction. I lost out on it. I am perfectly willing to give this thing a fair trial and see

if all the States will fall in line as New York and others have done. If they do that, the system is going to work.

There is more than one way of skinning the cat, and we can get this uniformity if the States will adopt the Federal regulations without the government saying, "You have to." Instead of really stirring the matter up in an aggressive campaign to get the Federal jurisdiction extended, I would rather see organizations such as the one you represent and the National Safety Council and all the other national organizations that are interested in this subject concentrate their efforts on the State Legislatures to get them to follow the example of the State of New York and other States. If that is done, there is no need of testing the question of the Federal power on this particular point. But, as I pointed out in my paper, and I think it is well to keep in mind, that if this present system falls down badly as a result of the States, each one of the forty-eight States going their own several ways getting into conflicts and difficulties, why in order to unsnarl the tangle, we will have to go to the government. I am not prepared to say that it has reached that stage at the present time.

CHAIRMAN DAVISON: Any further discussion?

I have here a letter from the two Presidents, the incoming and the outgoing of the National Safety Council to the first National Aeronautical Safety Conference.

The Council Extends Appreciation

To The First National Aeronautical
Safety Conference:

The National Safety Council extends to you its sincere appreciation of the splendid contribution you have made to the Cause of UNIVERSAL SAFETY in the execution of the comprehensive program developed for this First National Aeronautical Safety Conference under the able direction of Mr. Harry F. Guggenheim, President of the Daniel Guggenheim Fund for the Promotion of Aeronautics, Incorporated.

The Council is deeply interested in all phases of National Safety and since its inception has earnestly endeavored to extend its life conservation activities on a strictly cooperative basis.

Fully appreciating the truth of Mr. Guggenheim's statement as expressed in his paper presented at the Sixteenth Annual Safety Congress in Chicago, last year—that Safety is the First Essential for Progress in Air Transport—we deem ourselves most fortunate in obtaining your interest and cooperation in the promotion of this initial Aeronautical Safety Conference.

In order that the good work you have here initiated may be carried on, it is the belief of the National Safety Council that future conferences of this nature should be insured through the appointment of a committee composed of outstanding authorities in the field of aeronautics, and we respectfully urge that you give consideration to our suggestion. In connection with this suggestion we hereby confirm our pledge of cooperation as expressed in the resolution adopted by the members of the National Safety Council at its Annual Meeting in Chicago on September 26, 1927.

NATIONAL SAFETY COUNCIL
HOMER E. NIESZ

President, 1927-1928

HENRY A. RENINGER

President, 1928-1929

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Cement Section

New Section Officers

- General Chairman*—F. E. TOWN, Manitowoc Portland Cement Company, Manitowoc, Wis.
Vice-Chairman—EDWARD H. PARRY, Glens Falls Portland Cement Company, Glens Falls, N. Y.
Secretary—A. J. R. CURTIS, Portland Cement Association, Chicago.
Poster Committee Chairman—R. B. FORTUIN, Pennsylvania-Dixie Cement Corporation, Nazareth, Pa.
Membership Committee Chairman—HENRY A. RENINGER, Lehigh Portland Cement Company, Allentown, Pa.
Program Committee Chairman—FRANK SASS, Universal Portland Cement Company, Buffington, Ind.
Engineering Committee Chairman—S. H. HARRISON, Vulcanite Portland Cement Company, Phillipsburg, N. J.

Retiring Officers

Chairman, F. E. TOWN, Manitowoc Portland Cement Company, Manitowoc, Wis.; *Secretary*, A. J. R. CURTIS, Portland Cement Association, Chicago, Ill.; *Poster Committee Chairman*, R. B. FORTUIN, Pennsylvania-Dixie Cement Corporation, Nazareth, Pa.; *Membership Committee Chairman*, HENRY A. RENINGER, Lehigh Portland Cement Company, Allentown, Pa.; *Program Committee Chairman*, R. FRAME, Alpha Portland Cement Company, Easton, Pa.

October 2, 1928

F. E. TOWN, Chairman

Superintendent, Manitowoc Portland Cement Co., Manitowoc, Wis.

The first session of the Cement Section at the Seventeenth Annual Safety Congress, was called to order at ten o'clock by the chairman, F. E. Town, Superintendent, Manitowoc Portland Cement Co., Manitowoc, Wis.

CHAIRMAN TOWN: You notice one of the first orders of business on the program is an address by your chairman. I do not wish to disappoint anybody, but it may not be so much of a disappointment after all, if your chairman has no formal address. I do not think time should be taken by me from more important matters. I would simply like to touch briefly on some of our safety work during the last few years without going through a great number of statistics.

In the first place, it was only seven or eight years ago that the Cement Section was organized as one of the distinct sections to operate by itself. This, of course, was a natural subdivision of the Council because the cement industry had already started its activities along safety lines. By that I mean, having its Bureau of Accident Prevention and Insurance well organized as a part of the Portland Cement Association with a secretary to conduct the work of accident prevention as we know it today, in so far as its direct relation to the Association is concerned. Three years ago the Cement Section of the National Safety Council decided to organize in a somewhat more permanent form.

The first two or three years Major Reninger, who had been one of the strong workers of the Council as a vice-president, had been acting as chairman of this Section, and we all know how well he had been conducting the activities of this group of men.

About three years ago it was decided the interest had grown so great in these annual meetings and the numbers large enough that it warranted perfecting the permanent organization with a staff of elected officers. At that time Major Reninger was elected officially as first chairman of the Section. The next year it was decided to increase the activities of the Section along similar lines carried along by other sections of the Safety Council, and accordingly several committees were elected. Undoubtedly, from year to year as the needs manifest themselves, it will be necessary to increase the activities by increasing the number of committees to carry on the larger work.

Need of an Engineering Committee

At the present time we have the Poster Committee, the Membership Committee and the Program Committee, and we are about to consider a little later the advisability of an Engineering Committee. In this connection I might say that one of the broadest fields, perhaps, for activities in the Cement Section for increasing the knowledge of the members in a very practical way, may be developed by furnishing a definite line of information pertaining to the cement industry in its accident prevention work; and in order to approach this in the best possible way, it will be advisable to decide on an Engineering Committee whose duties it will be to check over all papers that have been written up to the present time, and which are on file with the Council, as to certain types of hazards existing in plants. They may include valuable information of hazards in the plants in general, as well as in the individual departments.

Statistics have shown the departments that offer the greatest hazards, such as coal plants, quarries, packing departments, etc. This information may be made available under one heading and constitute a small textbook of hazardous conditions in and around cement plants, and their treatments.

It will be well for you to be thinking of the advisability of increasing our committees by adding that Committee of Engineering, as some action will probably be taken at this meeting.

Undoubtedly you have all seen the data as given out from the Association offices from time to time. I hope you read each bit of literature you receive because it is enlightening and shows progress made in all parts of the work and those parts of the cement plants that constitute the greatest possible hazards. I would like to call your attention to an article entitled: "August Goes Over the Top." This shows the cement industry starting along in 1925 and continuing up and through August of 1928. Each one of those months has broken the record, you might say, or has shown considerable improvement over the corresponding month of any previous year. The comparative record of accidents for August, 1928, as compared with July, 1928, and also as compared with August, 1927, lines up somewhat as follows:

Comparative Record of Accidents—August, 1928

August, 1928, lost time 71, fatal 2
July, 1928, lost time 67, fatal 1
August, 1927, lost time 122, fatal 2
Eight months of 1928, lost time 691, fatal 18
Eight months of 1927, lost time 911, fatal 20
Plants with clear record, eight months of 1928—34
Plants with clear record, eight months of 1927—21

August was another excellent month so far as low accident frequency was concerned. In comparing the months of 1928 with the corresponding months of 1927, we find reductions in every case, but the biggest improvement of all between August, 1928, and August, 1927. This is true as to both percentage and actual number of accidents reduced. The August, 1928, accident record demonstrates the prolonged effect of the June no-accident campaign this year and exhibits an almost entire absence of "rebound" or higher accident rate which was previously a noticeable feature during the months following the June campaign.

In view of the greater hazards often supposed to exist during the fall months, a warning to beware might not be inappropriate at this time. However, the many evidences of improvement in the mill organizations, greater interest in safety work and enthusiasm to step out and demonstrate what a "hazardous" industry can do during a "hazardous" season, makes any special word of warning appear unnecessary.

We are learning that a cement mill may be operated about as nearly accident-free as the operating force wants it. We can write our own ticket. October, with cool, comfortable weather, should complete our magnificent six-months record with a new low point!

Fatal accidents are not showing much reduction from last year's experience. A study of several recent fatalities indicates that they are often needless. During August a kiln back-fire caused the death of one man and serious injury to three others. The several grave accidents of this kind during the past two years convince us that the burning and coal grinding departments do not generally realize the very dangerous nature of powdered coal and the necessity for extreme care, good house keeping and wide-awake management at all times.

Whereas a few years ago the thought of an entire year without an accident in any one plant was almost a monstrosity—it seemed to be almost impossible,—we now know what has been happening in the last two or three years with the ever increasing number of members of the "Trophy Club." The last word I had, which I believe was up to about September 1st, there had been thirty-four plants that were still members of the Trophy Club, which means they had not had any lost-time accidents so far this year.

I feel that before I stop I should mention some of the very distinct advantages of our affiliations with the National Safety Council. I just wonder how many of us there are who have visited the National Safety Council headquarters in Chicago or who know the marvelous resources at our command. I had the privilege last fall of calling at the offices and was certainly surprised to see the extent to which the work was carried on; to see the great number of trained specialists, men who are experts in their line, to see the great amount of individual work that is being done in each branch and to see a library, estimated by the Council to be worth a million dollars. In there, they have records and clippings from every line of industry that we may happen to think of. For its operation they employ five trained, graduate librarians. In addition, they have an art gallery containing the original paintings from which splendid lithographs are made. Some paintings are valued as high as one thousand dollars each, and I would certainly recommend to each and every one of you that you make it a point to call at headquarters and

be shown the wonderful work done by the Council. They will be only too pleased to take you through and show in detail what they are doing.

Now, one of the first addresses we have this morning is by Mr. Posselt, vice-president of the International Cement Corporation of this city. It gives me great pleasure to introduce Mr. Posselt.

What Organized Safety Work Has Done for the Cement Industry

By E. POSSELT

Vice-President, International Cement Corporation, New York City

The development of the cement industry in all of its branches during the past 25 years has indeed been marvelous, and among the very satisfactory advancements made, safety and accident prevention rank high.

It is entirely proper and very useful from time to time to review and discuss our performance, and it is a great pleasure to me to have the honor to present to you on this auspicious occasion, the Seventeenth Annual Safety Congress, a brief paper on "What Organized Safety Work has done for the Cement Industry."

Accident Prevention in the cement industry was started deliberately, not accidentally, and today it has grown until it is no incidental part of our activities.

Successful safety work requires the interest and attention of everyone in the organization from the highest official down, and the progress achieved in recent years is certainly powerful evidence of general interest.

Cement company executives who are the guardians of plants and properties, have a very definite obligation to conserve and develop human equipment, which after all is the great motivating force. But, this is not only a moral obligation; it is good business—it gives big returns. A good plant, from a purely mechanical point of view, can be built in a comparatively short time. An efficient operating organization, however, requires much longer time to build up, and the most exacting efforts on the part of the executives in training the men. A broken bolt can be replaced without a great deal of difficulties; a broken arm cannot be restored to normal function except by the natural process of healing which takes a long time. It is true that if a man is injured, he may be replaced, but the training required to make a substitute proficient is usually no small item, and the change involves loss of time, hard work, and risk; with the result that the substitute, with all of our investment in him, may be no better than the man we had originally.

Accidents Affect Morale of Plant

In many other ways as well, accidents destroy the effectiveness and morale of organizations. If one man is injured, the entire force may fear or take a dislike to certain equipment, or may even lose faith in the organization for which they are working. Frequent accidents often drive men to other work, and not infrequently very good men are lost in this way. Consequently, it is not unusual to find high accident rate coupled with a large turn-over, and in such cases it is difficult to decide whether the large turnover is due to the many accidents or the many accidents to the large turnover. Nevertheless, these two undesirable factors are closely linked together. In our own industry we notice that last year 347 out of 1143 accidents were to men employed less than six months, and 486 out of 1143 accidents occurred to men who had been employed less than one year.

Accidents are a drain on industry and a burden on society. While it is, there-

fore, to everyone's interest to reduce them, I hope we can succeed in convincing every individual workman that after all the great incalculable cost falls upon the injured and those who are near to and dependent upon him.

To obtain the proper results in accident prevention, organized efforts are necessary, in fact essential. I would like to emphasize this statement by pointing out my own experience and observations in the plants of the International Cement Corporation. No efforts or expenses are spared to build our plants in the most substantial manner, arrange and install the equipment with every thought of safety, and provide all possible means of accident prevention. We still have a long way to go before we consider that every plant is mechanically perfect as far as safety is concerned, but I have no hesitancy in saying that at least several of our plants are as well protected as modern engineering can provide; and yet we have accidents—in fact we have suffered some very severe accidents in our most up-to-date plants. This, gentlemen, would emphasize that the personal equation cannot be controlled by machinery, and without the interest and complete cooperation of every man in the organization accidents cannot be avoided.

A Big Reduction in Accidents

Now, let us see what the industry has accomplished during the last few years.

In January, 1925, lost time accidents were being suffered at the rate of 28 per one million barrels of cement produced. In July, 1928, this rate had dropped to less than 4 accidents per million barrels.

During 1925 lost time accidents averaged 212 per month. By 1927 this rate had dropped to 114 per month. For the first eight months of 1928, they have averaged 88 per month.

The accident total for the last three months has only been equal to the total for one average month two years ago. The quarter ending on June 30, which is the last one for which figures are available, shows 10 per cent fewer accidents than any previous quarter and the half year ending on the same date shows 15 per cent reduction over any previous similar annual period. Most assuredly these results are worth while, and we can see that we are getting somewhere.

The improvements in the plants and equipment has no doubt been a factor in this performance, but as I pointed out before, without the organized effort of our entire industry through the Portland Cement Association Accident Prevention Bureau, and the individual efforts in every plant, I am sure we would have had another picture to present.

Under the direction of our Committee on Accident Prevention, the Association has furnished us with statistics and information of all kinds pertaining to accidents and their prevention, and has suggested various and sundry methods for the most effective efforts towards accident prevention.

All of this can only be the means towards an end, and each plant organization must after all work out its own salvation, so to speak.

Most of us are inclined to judge the performance on the total and average figures, and without a very careful analysis of all the data pertaining to a problem we may overlook some of the very important facts. This applies to the statistics which we gather on accidents, and if one is content to compare his own performance with the averages and totals of all the other plants, then he may not get as good results as is possible under his particular conditions.

As an example of what individual efforts can produce, I have prepared a table attached giving the accidents and days lost per 100,000 man hours, as tabulated by the Portland Cement Association for 1925, 1926, and 1927, and have shown the corresponding figures for the plants of the International Corporation for this same period.

For our own plants, records are kept along the same lines as those of the Association. We are very strict in the classification of accidents, and under our system and policies there is but little possibility that a lost time accident is not properly recorded.

In 1925, none of our plants were in the first group, and our performance was not as good as the average of all of the 120 plants included in the Association reports. In 1926, we had one plant in the first group, four plants in the second, two plants in the third, and only our foreign plants remained in the fourth group. It is evident that the foreign plants had a good many more accidents than domestic plants, and for this reason we urged the Association not to include the figures of the foreign plants in the statistics, and for 1927 these have been left out.

In 1927, we had three plants in the first group, two in the second, and two domestic plants in the third group, and the average of the accidents in all of our plants was considerably below the average of 134 plants reporting to the Association.

A complete study of the conditions in our own plants, and organized efforts, intelligently guided and systematically enforced, is the only way in which the proper results can be obtained, and I believe the figures presented speak for themselves as evidence of the effect of organized efforts.

While I do not wish to impose on you with too many statements of our own performance, I feel that after all actual experience and observation is the best guidance for further efforts. I, therefore, feel justified in calling attention to just one thing in connection with our experience outside of the United States. Here at home we have all seen accident prevention grow from a rather insignificant activity some 15 or 20 years ago, until its present day enormous importance, and to some people it may be like watching a growing child, it is difficult to realize and to appreciate the changes and the developments that take place.

American Methods in Foreign Plants

Four or five years ago, we began to implant the American methods of Safety Prevention in our foreign plants. Many of us operators who are familiar with conditions were skeptical as to results, and very discouraged during the first few years. We were operating in countries where industry was but little developed, and the great mass of labor instead of being interested in preventing accidents were rather inclined to use any little injury as a pretext for laying off. Real efforts date back only to 1925, and it is simply astonishing to note the interest that the men themselves are taking in this work today, and the figures which are given on the table show a very marked improvement, and I can further state that still better results have been had during 1928. Without organized safety work this improvement would not have been possible.

It is not for me to comment on the methods and details of our safety work. This is referred to on many occasions and is constantly being studied and considered by our committee, and its able chairman. A question that many of us no doubt feel inclined to ask is "Does this work pay dividends?" Does anything which reduces the interruptions in our operations, which cuts down the clerical work, which minimizes labor turnover, which saves medical expenses, and which builds up the morale of an entire organization have any cash value? The answer to these questions is, of course, that it does. We, in the cement industry, are convinced that it does from the results in our own plants. However, this answer was further confirmed in an investigation on Accidents and Production, by the American Engineering Council, and a report on such an investigation was presented before the meeting of the American Society of Mechanical Engineers at the Spring meeting at White Sulphur Springs in May, 1927. The findings of this investigation was based on information from about 14,000 companies and show conclusively a distinct relation between accidents and production.

For the purpose of classifying the performance, it has been customary for the last several years to divide the plants into four groups. The first quarter of the plants reporting and having the lowest accidents come in the first group, the next quarter are placed in the second group, and so on.

This classification shows in every year a very large difference between the first group and the fourth group. The accompanying table shows very forcefully the improvement during these last three years.

I am impressed with the interest the executives are taking. It reflects their belief that accident prevention is worth while, and their desire to be helpful to the men. Without the encouragement of the executives, accident prevention activities have a hard time of it in any mill. I have also been impressed with the awakening that has come to our superintendents and foremen, and it is a splendid sign to see the foremen voluntarily accepting more responsibility of this kind.

Our work has an additional value, incidental perhaps but nevertheless important. It is earning for us the respect and confidence of the public. Industrial publications regard reports of our accident prevention progress as important and give this news the prominence which it deserves. Even the daily newspapers publish current reports of our safety work, because they realize that the progress we are making is of public interest. Comments are not limited to the papers of the small cities and towns where the plants are located, but the leading papers of the country are giving splendid publicity to our work.

Popular interest in our accident prevention work is building popular respect for us among the public at large. The public is beginning to realize that the cement industry is taking active steps towards reducing accidents in mills and that it is working in the interest of its employees. It is beginning to realize that our mills are safe places in which to work—probably much safer than our streets and highways.

But let us not become self-satisfied with results. We still have accidents that must be avoided.

Accident prevention was first taken up as an important Association function in 1913. Our efforts are being better organized from year to year. More and more interest is being taken by the member companies, and the interest of the employee has been aroused to a point where I confidently predict great improvements for the future. There are today in this country a total of 157 plants manufacturing portland cement—137 of these plants cooperate actively through the association in accident prevention work. These 157 plants are owned by 95 companies. Of these companies 80 belong to the association and, therefore, contribute not only by their interest in the work, but by financial support as well. There can be little doubt that the cement industry has developed to its present state of importance largely through cooperation expressed most forcibly by means of the Association. The policy of the open door which has always prevailed with practically all the member companies has been a powerful factor in the tremendous growth and splendid advancement of the industry.

This same open door policy is to the advantage of members and non-members alike, and our organized efforts towards accident prevention reflects itself to the benefit also of the men who work for the companies that enjoy the fruits of the Association's efforts without being members and taking part direct in its work.

While we have made an excellent record in the past, we are looking hopefully to the future. We have proved to ourselves that accidents can be reduced, and during the coming years, we must show the industrial world that cement which is one of the greatest human benefactors, making possible, as it does, safe roads and safe structures of many kinds, can be manufactured without accidents to those who labor to make it.

Location of International Plants in Association Groups

	No. of No. of Associa- Acci- Days tion No. dents Lost	No. of No. of Associa- Acci- Days tion No. dents Lost	No. of No. of Associa- Acci- Days tion No. dents Lost
1st Group	No Plant in this Group	Houston 14	Kansas 3 Houston 21 Dallas 23
2nd Group	Kansas 38 Indiana 45	Kansas 39 Alabama 42 Virginia 58½ Indiana 62	Virginia 37 Knickerbocker 55
3rd Group	Cuba 63 Dallas 77	Dallas 83 Knickerbocker 86	Alabama 78 Indiana 89 Cuba 79½
4th Group	Alabama 91 Houston 105 Argentina 110 Knickerbocker 116 Uruguay 119	Cuba 104 Argentina 115 Uruguay 123	*Louisiana 100½ Argentina 110½ Uruguay 132½
General Average of International Plants	5.61	3.8	2.8

*Louisiana operated last half of 1927.

1927 — Cuba, Louisiana, Argentine and Uruguay not being listed in the Association report, are given numbers intermediate to regular numbers and properly classified from data supplied the New York Office.

Association Grouping of Plants According to Accidents and Days Lost Per

100,000 Man Hours with the Location of Plants of the International Cement Corporation

	1925	1926	1927
120 Plants Reporting	124 Plants Reporting	134 Plants Reporting	
Per 100,000 Man Hours	Per 100,000 Man Hours	Per 100,000 Man Hours	
Aver- age No. Acci- dents	Aver- age No. Acci- dents	Aver- age No. Acci- dents	Aver- age No. Acci- dents
No. 1-30	No. 1-31	No. 1-34	No. 1-34
1st Group. Best 30 Plants	Best 31 Plants	Best 34 Plants	
No. 1-30	No. 1-31	No. 1-34	No. 1-34
9	121	10.2	2
			Ten of these plants were awarded the Association trophy of which the Kansas Portland Cement Company was one.
2nd Group Plants No. 31-60	Plants No. 32-62	Plants No. 35-68	5
1.5	30.0	25.3	11.2
3rd Group Plants No. 61-90	Plants No. 63-93	Plants No. 69-102	1.1
2.9	51.8	49.9	36.2
4th Group Plants No. 91-120	Plants No. 94-124	Plants No. 103-134	3.4
5.5	110.9	113.0	104.8
General Average all Association Plants	2.6	2.2	1.4
	49.9	45.3	34.6

Cement Section

CHAIRMAN TOWN: It is certainly gratifying to have one of the officials of the large companies with us and to feel that he is interested enough to take the time to address us the way Mr. Posselt has.

We will now take a few minutes for discussion on the paper read by Mr. Posselt and I am sure he will be pleased to answer any questions. Are there any questions anyone would like to ask Mr. Posselt? As each of us knows, these safety efforts would be absolutely impossible if it were not for the interest that is being taken at the present time by the heads of the companies. Safety in the plants is absolutely of no benefit, and it can make no strides whatever, if it does not have the earnest, hearty co-operation of the executives of the company. We had the pleasure a year ago of listening to Mr. Brown of the Alpha Company, who is president of the Portland Cement Association; and I see Mr. Brown present. Although he is not scheduled on the program, we shall be very pleased to hear from Mr. Brown.

MR. BROWN: I did not come here this morning to make a speech, although when it comes to talking about safety I can talk almost any time about that particular subject. I have been actively supporting the work of the safety committee of the Portland Cement Association since it began that particular work, and prior to the time that association began its work I was trying to do a little work with the Alpha Company in a sort of a haphazard way. Indeed, a long time after the association began its work we were more discouraged than encouraged. I think the work was given a tremendous boost when the association decided to give a trophy to the mills making the best record. You have seen the records Mr. Posselt has given you in the memorandum handed around. My judgment is that result came about through the offering of that trophy given by the Cement Association.

We have gone on from that time continually improving the work. Mr. Posselt called your attention to the fact that the mills are represented in four groups, those with the first, second, third and final quarter. Sometimes the association executive committee has thought that perhaps more active work should be taken with those particular mills down in the final quarter, but it has always seemed to me that with the amount of publicity that is given to this work, not only now by the Portland Cement Association, but by the Safety Council, and as you will notice by the technical journals distributed, there is no excuse for any executive; and he should be ashamed to be the president or other executive of any plant who is down in that bottom list. In our organization we had a couple of plants that were pretty far down the list and the president of our company took it upon himself, personally, to talk to the superintendents of those plants and tell them in plain language there is no excuse for it and wanted to see that they were changed and taken out of the last class. The rather curious thing was that the mills we had the most trouble with were not where we had a large number of foreign employees; they were all native American stock. Sometimes I think they know too much; they don't want to be told what to do.

Well, I didn't come here to tell you what to do. You probably all know what to do as well as I. I only want to tell you as a person interested in accident-prevention. I thank you all for the privilege of talking to you. I hope you gain inspiration from your visit here, telling each other what you have done, and that you will go away from here, back to your operations and work with a firmly-fixed idea that you can do just as well as anybody else; and if one of the Alpha Mills could do it—you will pardon that personal reference—we got one or two. I thank you all.

CHAIRMAN TOWN: I am sure that the words of Mr. Brown have been an inspiration and I think this Section should thank Mr. Brown for his generous efforts.

It is my pleasure at this time to introduce Mr. Walter Clinton, the next speaker

on the program, who is in charge of Safety Service, Policyholders Service Bureau, Metropolitan Life Insurance Co., New York City. I am sure we know from that that Mr. Clinton is qualified to address you.

Accident Prevention and Insurance

By **WALTER CLINTON**

Safety Service, Policyholders Service Bureau, Metropolitan Life Insurance Company, New York City

Recent years have developed a decided interest on the part of various insurance carriers in accident prevention. It has been found that a very close relation exists between insurance and preventive measures. As asserted by Professor Albert W. Whitney, of the National Bureau of Casualty and Surety Underwriters, it is recognized that the function of insurance as a preventer of loss is equally important with the function of insurance as a distribution of loss, or in other words, as a great conservatorial medium. The reactions and tendencies of our insurance carriers notwithstanding, it is believed the role of conservator has rightly been undertaken by them. The nature of the business followed, predicted by the operation of economic laws, has borne an influence on such carriers toward assuming this role.

No attempt will be made here to prove this assertion except to example one of the primary forces which govern the existence of an insurance company. Casualty insurance rates, as you probably know, are determined on the basis of past experience of any one industry for a period of years. If accident costs increase, it must necessarily follow that the rates cannot cover these costs and the carrier experiences a loss; but, should the cost of accidents decline, it may be presumed that the rates will be sufficient and afford the carrier an opportunity for profit.

Competition among insurance organizations has played an important part in the reduction of industrial accidents. Casualty insurance rates may be said to be practically identical for experience indicates that should competition be based on rates, these may become so low as to jeopardize the solvency of the carrier. The matter of policy would also be involved for the insured for it might be possible for some organizations to employ methods to secure their insurance at a lower rate while others paid more. Insurance carriers are also prohibited from competing on the basis of commissions paid to representatives because this would bring the rates too high. Competition, therefore, has been limited practically to the field of service, which has introduced our merit-rating system, that is—the establishment of rates on the determination of the physical merit of the risk after certain debits and credits have been allowed according to the schedule rate. This is a desirable form of competition and assists the insured to obtain the best possible rate, reduce his accident costs and to maintain his plant in an efficient manner.

It is not believed that all of us realize the enormity of industrial accidents until figures from some authentic source are presented. It has been estimated by the Statistics Committee of the National Safety Council that the number of fatalities for 1927 is approximately 24,000—about 300 more than 1926; and that non-fatal lost time accidents will approach three and one-quarter millions in number, or an increase over 1926 of almost 800,000.

With these estimates in mind, is it any wonder that insurance companies are vitally interested in accident prevention and are continually striving to curtail this extravagant waste of man power?

A little over thirty years ago, an insurance company hired an inspector to determine the physical conditions of the properties of the risks written. Such an innovation, as it was then, was subjected to much ridicule but the result of the move is

that today insurance companies employ thousands of engineers and expend millions of dollars on preventive work.

Now there must be some reason for our insurance companies making accident prevention a necessary part of their business. There is, for insurance cannot be underwritten satisfactorily either to the carrier or the insured on a rising loss ratio. As mentioned earlier, it is far more advantageous if the business is conducted on a falling loss ratio for price affects the placing of insurance. It is quite obvious that high rates are conducive to self-insurance among risks who enjoy a favorable loss experience, thus creating what is termed an "adverse selection" against the established carriers, or increasing materially the percentage of less desirable risks having insurance protection. So we find highly organized bureaus within our insurance carriers, carrying large staffs of engineers competent to advise employers on safety educational mediums and methods for overcoming hazards.

Two Tests for the Safety Program

Mr. Ethelbert Stewart, United States Commissioner of Labor Statistics, has given us two tests by which the effectiveness of a safety program can be measured with relation to insurance costs. First, consider the attitude of the carrier, which is: How much do we as an insurance carrier have to pay out of the premium rate which we assess against your payroll? The second test is one for the insured to inquire of himself: How many people do we hurt and how badly do we hurt them, and are we injuring fewer this year than last, and even though we may be hurting fewer people is this offset by the severity of the injury so that more lost time and actual suffering comes from the fewer number of cases than the larger number? It is believed these two tests, properly applied and determined by the insured, will not only indicate the results being obtained by his safety work but also the justification of a decrease or increase in rate.

So far in my remarks, I have brought out only some of the economic issues of accident prevention as applied to insurance. While it is a conceded fact that public interest in safety is attached to its humane aspects, it would be unfair to say the tendencies of our insurance organizations are not motivated in a large part through these same principles. Nearly all, if not all of these organizations have realized that they are social service institutions and not merely agencies for the assumption of insurance risks and the payment of claims. Their literature, posters, preventive work and other activities are designed mainly for the welfare of the general public and, excepting perhaps a small element of good will, there is very little tangible return.

Safety work has become a science and it would be pleasant to anticipate a one-fourth reduction of the present accident rate. Insurance may offer a compensation for accidents and their direct cost but it is impossible to insure against accidents, their indirect costs to industry and the suffering involved. Our hope lies then in stimulating a real interest in accident prevention in all industries but meanwhile we must find ways and means to minimize the casualties subject to our "peace time" industrial life.

Many of you will remember the practice of the old time insurance inspector who would enter the plant from the back door, make his inspection of safeguards and depart with but few people knowing who he was or what he was doing. This brings to mind the case of a large lumber company in Louisiana which carried insurance for accidents.

Contrast that procedure with the methods employed to reduce accidents by insurance organizations today. First, upon entering a plant, contact is made by the insurance representative with the highest operating official. It is highly important that this official be sold on accident prevention, his responsibility made known to him and his active support secured. Many officials entertain the thought that the

fact his company is insured for accidents, the burden of prevention rests with the carrier and its engineers. This is a fallacy for no insurance company nor form of insurance can directly prevent an accident. It is true the insurance company through its engineers can offer suggestions and recommendations which assist a plant's experience, but the responsibility and application of these recommendations rests with the operating official who places the recommendations into effect through the superintendents and foremen down to the operatives who actually experience the accidents.

Second, an analysis of accident records is begun, tabulating and charting the records to determine the cause and trend of the accident experience. This study is very important for the solution of any problem demands fact-finding and a knowledge of circumstances surrounding accidents is most essential.

Third, the engineer interviews the supervisory force and foremen to determine their safety attitude and secure their cooperation for without their constant and active cooperation, no safety program can hope to gain proper results.

Fourth, is the study of company organization and policy. This is necessary to determine that type of safety work which would be most effective. It is obvious that a program designed for a meat packing plant would not be applicable to a railroad company, even though the principles of safety in both instances are fundamentally alike.

The fifth factor of the engineer's survey is a study of the existing safety educational work, its effectiveness and possible means for improvement. This study includes safety organization, friendly competitions, advertising safety, first aid instruction and other plans to maintain interest.

The sixth step is a survey of physical conditions and mechanical guarding to remove as many "bugs" as possible from the plant's layout.

The seventh and last part of the survey is a conference with the officials to discuss the findings and to submit a plan adaptable to local conditions and policy.

Such a procedure, with few modifications, can be applied to a small plant as well as a large one. The need of safety work in small industrial organizations is indicated by statistics for generally speaking, a number of small plants with say an operating force of 1,000 men, have a higher rate of frequency and severity than the large plant with the same number of operatives.

In conclusion, may I ask that you consider your insurance carrier as a friendly agency, whether it be your own association, a state, casualty, life or other insurance body. They function as consultants and advisers and no longer follow the back-door policy of creeping in and out of your plant, unseen, unknown and unwanted. Your problems are their problems and they strive to serve you and help you eliminate the so-called by-product of industry—the crippled employee.

CHAIRMAN TOWN: In behalf of the Cement Section I wish to thank you, Mr. Clinton, for your paper this morning. We certainly realize there has been a great change in relations between the insurance companies and the insured and it is a healthy sign of the proper spirit developing in the safety work.

Are there any questions anyone would like to ask Mr. Clinton?

In reference to the committee to be known as a "Committee of Engineering"—I have already explained at that time the purpose of that committee. Is there anybody who cares to make a motion to the effect that we have a committee or another sub-committee in the Cement Section? Has anybody any word to say? Major Reninger?

MAJOR HENRY RENINGER (Lehigh Portland Cement Co., Allentown, Pa.): Mr. Chairman, I think this new Committee is very important. We have an annual report and papers given to the Council and it is the idea of the National Safety Council to have these committees go over the papers and gather material that is of use, making a regular handbook out of it. Another thing: This Engineering

Committee needs another representative to sit in on the American Engineering conferences. Now, we have had no representative up to this time and I think we should have some engineer who is familiar with plant conditions and safety work, act as representative of the Cement Section whenever it is necessary to sit in on the American Engineering conferences.

CHAIRMAN TOWN: Are you ready to make a motion to the effect that we add such a committee to our Cement Section?

MAJOR RENINGER: Yes, sir; I make that as a motion.

MR. FRAME: I'll second the motion.

CHAIRMAN TOWN: Motion made and seconded. All in favor manifest by usual sign and those opposed by contrary sign. Motion carried.

CHAIRMAN TOWN: The next thing will be the election of officers for the ensuing year. Is the Nominating Committee ready to report.

MR. FRAME: The Nominating Committee held its meeting in Allentown. Mr. Weiteknecht having been called to his home town, in his absence it gives me great pleasure to present the following report for him:

Report of the Nominating Committee

By W. H. WEITKNECHT

Chairman

Your Nominating Committee begs leave to submit to the consideration of the Cement Section of the National Safety Council, as officers for the ensuing year, the following:

Chairman—Mr. F. E. Town, Supt., Manitowoc Portland Cement Co., Manitowoc, Wis.

Vice-Chairman—Mr. Edward Parry, Director Personnel Dept., Glens Falls Portland Cement Co.

Secretary—Mr. A. J. R. Curtis, Ass't to Gen. Mgr., Portland Cement Association, Chicago, Ill.

Chairman, Program Committee—Mr. Frank Sass, Safety Engineer, Universal Portland Cement Co., Chicago, Ill.

Chairman, Poster Committee—Mr. Ross B. Fortuin, Assistant General Mgr., Penn-Dixie Cement Co., Nazareth, Pa.

Chairman, Membership Committee—Major Henry A. Reninger, Spec. Rep., Lehigh Portland Cement Co., Allentown, Pa.

Chairman, Engineering Committee—Mr. S. H. Harrison, Ass't Supt., Vulcanite Portland Cement Co., Easton, Pa.

(A motion was made and seconded for the adoption of the report and for a unanimous ballot to be cast by the Chairman of the Committee for all officers nominated. The report was adopted, and officers declared duly elected.)

CHAIRMAN TOWN: I would like to say this time, I certainly consider it an honor to be elected Chairman of this Section. Perhaps you know I was not elected before, but served as assistant chairman and upon resignation of the chairman, it fell to my lot to act as chairman for the rest of the year. At this time I wish to thank every member of the Section, and the chairmen of the committees, for the hearty cooperation they have given me during the past year. If it had not been for the support they have given me it would have been a very different story.

Before adjournment, perhaps Major Reninger, would like to say something about membership. It is the duty of everyone of us as members of the National Safety Council to interest ourselves in the extension of the wonderful work we are doing, and assist the Membership Committee. Major Reninger, would you like to say something at this time?

MAJOR HENRY RENINGER: Mr. Chairman, members of the Safety Council, Cement Section: In regard to this membership problem, I have been interested more than anybody else in it, for after all these years I can see very clearly that if the National Safety Council is to keep on, we must have an increased membership and increased income. I am happy to say that in so far as the Cement Section goes, in the past year, if you look on page 132 of the *National Safety News* for October, 1928, showing the report of the different standings, that in the safety progress as indicated by membership in National Safety Council's Industrial Sections the Cement Section stands first for the year. I think that it is up to every one of us, as we go back to our own communities, not to be selfish, but to get all those people interested.

You people who get the bulletins realize very clearly that there is no organization in this Country today that gives the information that you get from the National Safety Council. We all know that education is 90 per cent of the work, and with the continued turn-over in our plants we must keep everlastingly at it. Over at the Lehigh, where one man jumps from one plant to another, a man has had some training in safety work. This is a big problem. We all realize that it is not only humanitarian, but that it is a big saving in dollars and cents. Now, I should like very much when you men go back to your cities and towns, that you would make it your business to get at least one member during the year; and if we can get every man in the Safety Council to get just one member, we will double our membership and double our income. We are the outstanding industry, practically new,—the steel industry was of course the pioneer in safety work but during the past ten years, particularly since the war, the cement industry has shot ahead. Many times executives told me it wasn't possible, that I was foolish, that it was just an idea, a theory, but since ten plants went through last year without an accident, the cement companies are beginning to realize that plants can operate without killing and maiming their employees.

CHAIRMAN TOWN: If there is no other business to come before the Section at this time, the motion to adjourn is in order.

ADJOURNMENT

**SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL**



Quarry and Cement Sections Joint Sessions

October 2, 1928

D. C. SOUDER, Chairman

**Director, Insurance and Safety, France Stoot Company
Toledo, O.**

F. E. TOWN, Chairman

**Superintendent, Manitowoc Portland Cement Company
Manitowoc, Wis.**

The luncheon session was called to order at one forty-five o'clock by the chairman, F. E. Town.

CHAIRMAN TOWN: We have been having a great time over at this table. It has been a question of whether Mr. Souder was going to preside or I myself. However, Mr. Souder has persuaded me to take charge, and as our time is very limited, I will not take time with preliminaries.

I take great pleasure in introducing Mr. R. P. Blake, Sales Engineer, Independence Bureau, Philadelphia. He is here to tell you something new, if there is anything new under the sun, at any rate to inject a little enthusiasm into us concerning safety.

Address

By R. P. BLAKE

Sales Engineer, Independence Bureau, Philadelphia, Pa.

It is a shame to drill down the Chairman but I am going to start in by asserting that I am not going to say a thing that is new to anybody here. My view of how I can be of best service to this group is not to attempt to say anything new but to emphasize.

It seems to me that the present staff of the Safety Movement needs a little more attention drawn to them. A man who was talking with me yesterday injected that idea into the conversation, and it seemed so important to me that I changed my talk clear around to fit it.

He said the thing that is most wrong with the organized safety movement today is that in spite of all the splendid work that has been done, enough American industries haven't seen the light. President Niesz brought that out when he pointed out that about 25,000 deaths occurred in industry in America last year. Had the rate which had been preserved in those plants which are a part of the

National Safety Council been applied to the entire industry, approximately one-third, or 8,000, could have been saved.

Carrying that a bit farther, had all of the American industries done as good work as the leading members of the National Safety Council, such as Union Carbide & Carbon, Inc., and others too numerous to mention, but all doing absolutely first-class work, instead of saving 33½ per cent of the deaths, we would have saved about 95 to 98 per cent of the deaths, and presumably the lost-time accidents in similar proportion.

In trying to get the view of the thing, I attempted to sort of withdraw a bit from close contact with the Safety Movement and tried to get an outline of it as one would get an outline of a big building.

It seems to me that three things stand out as absolutely fundamental. First, enough organizations in every branch of industry in every part of the country, big and small organizations of every type have done excellent work, have achieved excellent accident safety records to prove that anybody can do it. In other words, they have proved that, practically speaking, freedom from lost time through accidents can be achieved as part of ordinary successful operation of any industrial organization or any industrial business.

The next thing is that it pays. It does justify your trying to prevent accidents. In many cases it means from one million to four million man hours of consecutive operation and in small plants without a single lost-time accident. There isn't a single executive who doesn't say that in dollars and cents (keeping off of the humanitarian note) accident prevention work of that kind has paid dividends in returns on the money invested.

You all know, of course, of the very excellent surveys made of accidents, both direct and indirect, by the insurance companies. I take real issue with them in their statement that the indirect cost was a matter of five to one against the direct cost. I believe it is ten to one or more. I am going to attempt to show that here from a brief outline.

First of all I am going to state what I think is the best definition of an accident. An accident is anything that interferes with the ordinary procedure of the work. Only a portion of such accidents cause injury to human beings, but they all cause injury to the operating cost of the plants.

Now those organizations, without exception as far as my knowledge extends, who have done the best work, whether they realize it or not, have attacked their accident prevention work by eliminating unexpected happenings in the operation. It is obvious if we can plan our work accurately and carry it out as we plan it, we are not only going to prevent all accidents from happening, but we are going to attain the lowest possible cost of operation.

The next big cost—and instead of calling it cost I like to call it an indirect saving! Whenever you analyze any operation in any plant, you try to the best of your ability to develop the routine that makes it possible to carry it on practically free from interruption. You have studied your work so that you have not only been able to effect large economies but large opportunities for improvement; and right in there is probably the biggest possibility of saving through accident prevention work. You might call it indirect cost, indirect dividend on safety organization work.

Finally, whenever you organize a plant to an extent where the men work together so well, the entire organization works together so well that you can, practically speaking, eliminate the accidents, you have thereby forged a tool of organization, a tool of personnel, that is going to be extremely effective in carrying out any measure that the management finds practical and profitable. You have formed an organization that is going to carry that particular plant and that particular organization a long way along any path it finds it well to go.

Now, I have mentioned that accidents can be prevented. I have attempted to establish that it pays. I want to draw on the point that anyone can do it. I say this in spite of the fact that only a small proportion of the American industrial organization have up to the present time gone very far in accident prevention work. If they had, what Mr. Niesz said would not apply.

I don't know just how it is best to explain what I mean when I say anyone can do it, except to again recite the fact that in all branches of industry, in all sizes of plants, in plants with all sorts of leadership—by all sorts of leadership I mean leadership with all kinds of industrial theories but reasonably successful—there appear instances where they have succeeded in practically preventing accidents. This leads me to believe that any organization whatsoever that has sufficient capacity, sufficient direction to enable it to continue to exist and make profits under the competitive conditions of industry today, can, if it chooses, prevent accidents almost wholly.

Why don't they do it? I think the first reason is that they don't see the facts. They don't have the figures. They don't get the viewpoint somehow or other, in spite of the excellent work that the National Safety Council has done. In spite of the fact that all over the country are earnest men seeking to reduce accidents, men in every district, in every place in the country, there are a large number of organizations, of moderate size and small, who still don't see the point, who are still running along having unnecessary injury to men and failing to realize the profits that they might have and should have if they are going to deserve the term of reasonably progressive and able people. I think the first reason why more don't is because they don't see it.

Second, there seems to be a widespread idea among the executives of small organizations that because they are small they cannot do it as well as if they were big. I really think that the shoe is on the other foot, because of the fact that the executive of a small plant, with from 25 to 50, maybe 200 employees, has by virtue of his very nearness to those men, the opportunity to inject his own personality, his own energies, his own mental capacity and ability to each individual employee to a much greater extent than the executive of a big plant can, operating as he needs must through his department heads, foremen, straw bosses, and so on.

There are other things that come into the picture; but I have in mind the plant of the American Tar Products Co., with some 18 or 19 men who have operated now something over four and one-half years without a single lost-time accident. There are plenty of other instances but that happened to come to my mind, and the management of that plant, as I size it up, has just the ordinary ability that you would expect to find in any small plant. It probably needs to be less able than would be the case if that plant were an independent organization, because the head of such a plant, one of a chain, doesn't have the financial and other problems that the executive in charge of an independent organization would have. So probably the actual executive ability of the small, independent plant is greater than the plant of similar size that is one of a large corporation, a large string of plants. They just don't see it.

If we should study large numbers of accidents covering all industries, it would be found that as a rule that the special hazard that many plants make so much of is one of the less important hazards, measured in number of accidents, total lost time or any such gauge you care to use. For instance, in the quarry industry, if I recollect correctly, the figures given by the Bureau of Standards, showed tripping and falling as head of the list, and the special quarry hazards such as dynamite were down in fifth or sixth place in the list; and if all of those had been saved the accident record would still have been bad where it was bad in the first place. So that the myth of special hazards as particularly significant

when measured against the total of accidents, is nothing but a myth. If we prevented all the accidents, all the deaths, all the lost time from the special hazards existing in any and every industry, we would still have prevented but a small fraction of the total.

Another point is the human element. It is human nature for us to neglect relatively mild hazards. If in the center of this room were a pair of wide open gears screaming away at us, even though they screamed only for a little while and then became noiseless and we were told that they were still there and still dangerous, we would avoid that spot very carefully, and probably, being creatures of habit, we would continue walking around that spot for a long time after those gears had been removed.

But suppose there were a small depression in the floor, and I called your attention to it and you actually looked at it. In walking around this room later the chances are not one but several that you would stumble and some might get hurt.

Why is it so difficult in many cases to get an organization, particularly an organization of size, to undertake any active accident prevention work? Simply that we have a tendency to neglect the hazards that do not appeal to us as outstanding, and continue to do mildly hazardous things, in spite of the fact that we know that if you do a dangerous thing often enough you will get hurt. The law of averages will get you in the end. There is no dodging it.

Now I have talked about why they don't. How are we to get the organizations that haven't yet seen the light to undertake an effective accident prevention work? I know of no way except to collar the executive or the executives responsible and rub his nose in it until he sees it. Gradually people are seeing it. I have paid so much attention to the saving because I believe that is the way.

In the early days of the safety movement we talked about the fine humanitarian principles. We lost sight, we failed to see practical safety from every consideration of good sense and good operation. It is not a special thing apart. It is not a special humanitarian appeal, but in the last analysis it is a chance to save money and a chance to make money. I believe in emphasizing that, because in the last analysis the most tender part of any man's anatomy is his pocket book. If you can hit that, you have got him.

Now suppose we convince our manager that he really is overlooking an opportunity for making money, and he says, "How shall I go about it?" The first thing I would say to this man is this: The first thing necessary for you to improve your accident record is that you yourself, as head of this organization, must want freedom from accidents; and you must not only want it but you must actively decide to go out and get it, because the path or the way to get freedom from accidents, the details and the endless work are so intimately tied with every operation of every organization that the drive must come from the top, the insistence must come from the top, the check-up must come from the top and the motive power must be furnished from the top.

The chief executive should plan the work. If the organization is big enough to justify a man in charge of safety, that man should report to the chief executive. He should work out his plans with the chief executive. Where it is a matter of authority, so far as is possible within the principles of sound direction of that authority, he should have final authority, and when it exceeds what it is proper to give that man the matter should be decided directly by the heads of that organization and nobody else, unless for some reason of plant policy he wishes to permit a committee to decide; and he doesn't want to do that unless he is willing to accept their decision and see that it is carried out.

Now so much for the start in the organization. He must carry on his work, plan his work with the idea that eventually the thing that he must do is to reach the mind of each and every employee in his organization. In other words, he

must weld his organization into a unit to carry out this policy of freedom from accidents. If he finds individuals in the organization—whether foreman or no matter what they are—who will not take such an attitude, he should no more hesitate, if he is unable to convert them, to separate them from his organization than he would if it was any factory management. In other words if you have an employee who refuses to cooperate in some profit making scheme the management has seen fit to follow, you don't hesitate to convert that fellow or fire him. The same rules apply for safety because I am going to show that safety work is as important as any other branch of operation that you may undertake.

I have no patience with the viewpoint that safety is a sort of special function of a committee or a safety engineer attached to a plant without much authority. It has to be a major function of the management of that plant, or it will not be effective. You will not get much in the way of results.

Each bit of work in the plant must be and should be analyzed. You should find out just what each man does, just what he has to do. As I mentioned at the start of my talk, find out what the hazards are, and find out the best way to prevent them. Right there we run afoul of a characteristic of human nature that is frequently operating to interfere with our accident prevention work; and that is, men dislike routine and monotonous work, like frequently to take chances, and we cannot, therefore, get quite as far as we would like to get. But it is entirely possible to show any man that he can afford to do monotonous work during his working hours in order to be able to do things that are not monotonous outside of his working hours.

Summing up again what I would tell this executive when he asked me what he should do and how he should go about it, I think I should tell him that he would need to use the following qualities in real liberal measure: Imagination, first because he cannot prevent an accident if he cannot imagine it happening. Second, attention to details. A tremendous amount of detail work has to be done by somebody, and probably in the ordinary organization will be done by many men under the direction of the big chief. Third, open mindedness. A man must be open minded to any and every suggestion and try to see all sides of every question. There have been some terrible accidents caused by lack of just that one fact, and I think perhaps more catastrophic accidents are caused by that than any other one thing you might mention. Such a thing as the Pittsburgh explosion which was probably caused by that thing. Such a thing as a tank car in which a number of people were injured and killed and which was probably caused by that.

A plant using a material that under certain conditions might give out inflammable fumes, had this called to its attention by the safety engineer, as a possible source of hazard. It was looked into rather perfunctorily and dismissed as a possibility. Some time later the thing that the safety engineer feared actually occurred. A tank car was put in the plant for emptying and because of improper distillation of the material it left flammable noxious vapors in that tank. One of the two men working in that tank car house crawled up on top and into it to look after something and failed to come out. His partner after a short time missed him and got up and looked in and saw the fellow down in the bottom of the tank and he crawled in and did not come out.

A little later a foreman in the next building wanting one of these men, sent a messenger after them. He came into the tank car house, looked around, didn't see them, crawled in and didn't come out. Finally the foreman came around and looked in and discovered them and called help and rescued them, using a mask and a rope. But two of those three men died.

There was a combination of lack of open mindedness on the part of the management. Failure to go thoroughly into the conditions because they didn't see. If they had probed thoroughly they would have seen the danger. Second, failure

on the part of the men on the job. Perhaps they had not been instructed and hadn't been taught to use common sense and reasonable precaution. The only man who did was the foreman who used it after it was too late to save two men and pretty nearly losing the third.

Next is the outside viewpoint. We all get blind spots. No matter what we are doing, working day after day along the same field we develop blind spots and fail ourselves to be able to see around them. Therefore, the value in having others criticize, comment on, and examine our work from time to time. The ordinary plant expects to have somebody from outside come in and audit their books from time to time, not because they expect to find anything wrong but because the subject is so important that they want the outside checkup and outside okey that everything is going as well as could be expected.

I believe the accident prevention game is so important that the organization, no matter how good work it is doing, that doesn't have such outside, unbiased checkups from time to time is overlooking a serious possibility of trouble.

The last qualification I would mention, and I mention it last because I think in the last analysis perhaps it is most important, is persistent patience. Some of the best accident prevention work that is being done today is being done in spite of the many and repeated previous disappointments and failures. I would point to the accident prevention work history of the Kimberly-Clark Co. As I got their story, they ran for a number of years trying hard to cut down accidents without much success. They finally showed one year in which they made a real reduction. The next year they were worse again. They rolled up their sleeves and kept on and finally they achieved one of the most remarkable no-lost-time accident records that we have today.

That is what I mean by persistent patience. You have got to keep at it and doing the little things and big things persistently regardless of the standpoint. We must keep our courage up regardless of whether we seem to get results, knowing all the time that we will get results if we keep at it. If you use intelligent effort, hard work and patience you get results.

In conclusion I want to say this: One of the most hopeful things in the safety game is that we are now beginning to realize and organizations are now beginning to realize the points I have made. Safety has got to be, by right and virtue of the profits to be made in accident prevention work, regarded as a fundamental feature of the executive direction of any plant, a fundamental feature of industrial work regardless of what you are doing. And I cap that off with this statement—that it is becoming and will increasingly become a measure by which the ability and standing of any organization will be judged.

In other words it won't be long until an organization that is not doing excellent accident prevention work will lose prestige and will be looked at as being not up to the reasonable standard in ability.

CHAIRMAN TOWN: As I have been listening to Mr. Blake I have been wondering whether he is a cement operator or a quarry operator. I think his talk remarkably fits all of our conditions and it is very interesting to get the viewpoint of a man who is not actually engaged in either one operation or the other.

ADJOURNMENT

October 2, 1928

D. C. SOUDER, Chairman
Director, Insurance and Safety, France Stone Company
Toledo, O.

F. E. TOWN, Chairman
Superintendent, Manitowoc Portland Cement Company
Manitowoc, Wis.

The afternoon session was called to order at two-thirty o'clock, Chairman F. E. Town presiding.

CHAIRMAN TOWN: One of the first things we will do is to reverse the order of business a little bit in order that we may take care of any unfinished business that might be necessary while everybody is here. I will ask Mr. Souder if there is any unfinished business that the Quarry Section would like to handle.

D. C. SOUDER (Chairman Quarry Section): There is one thing that the Quarry Section would like to ask. You are well aware of the fact that we are a baby industry in the National Safety Council, and the past three years we have affiliated ourselves with the cement industry in a joint session, and we go on record as asking that we still be given consideration in that respect for next year. We want to be affiliated in this joint session with the cement industry as our men feel that they secure some information in this joint meeting that is very valuable.

The only unfinished business we have is asking for that affiliation.

Joint Meetings Important to Both Sections

CHAIRMAN TOWN: I am going to assume the responsibility of replying to Mr. Souder and state what I feel positive is the viewpoint of the Cement Section in respect to Mr. Souder's suggestion.

We know that in a large percentage of cement plants the quarry constitutes a vital department. There are a few plants, of course, that do not use limestone, but in most cases the quarry is the beginning of the industry, and sad to say our records show that the largest percentage of accidents in the cement industry is traceable to quarry accidents; the largest percentage of increase in accidents during the last eight months was traceable to quarry accidents.

This shows us that something is vitally wrong in the quarry. Because it is so vitally a part of the cement industry, I think there will be no one in the Cement Section that will not feel that it is of just as much importance to the Cement Section that we continue our affiliations in at least one session with the Quarry Section at these annual meetings as it is to the Quarry Section itself. I shall at least check up with the officers of the Section and hope that the Program Committee will see that it is made possible to continue these meetings in this way.

I think perhaps one of the benefits that can come out of these meetings is a mutual discussion of the problems that are existent in the quarry end of the game as well as those that are pertinent to other departments of the cement plant, because in a great many cases they are all traceable to fundamental conditions. Sometimes things that can be worked out to eliminate accidents in other parts of the plant, can also be used in a valuable way in the quarry.

Now we are privileged to have a paper by Mr. J. R. Cline, Assistant Superintendent Universal Portland Cement Co., Pittsburgh, Pa. I am sure that Mr. Cline can handle his subject in a way that will be of interest to all of us.

Putting Safety Across in the Cement Plant

By J. R. CLINE

**Assistant Superintendent, Universal Portland Cement Company,
Pittsburgh, Pa.**

"Putting Safety Across in the Cement Plant" could be better discussed by someone from any of the 34 plants that have gone without a lost time accident for the first eight months of this year; for at the plant where I work there have been only two lost time accidents this year, the same number that occurred last year. Our best record is a period of 369 days without a lost time accident from October 10, 1926, to October 15, 1927.

Never having had a perfect year in safety, it would be better to change the subject of this paper to "How We Try to Put Across Safety in the Cement Plant." The first requisite needed is to have superiors who are vitally interested in safety, higher-ups whose first question is not, "How much clinker have we produced?" or "How much cement have we shipped?"—but "How is our accident record? Are we still free of lost time accidents?"

The first thing done in our plant was the guarding of every known hazardous place. Substantial guards were put on gears, shafts, pits, stairways, ladders and railings, and additional ones are being installed on new places constantly brought to our attention. Guards once placed must be maintained in perfect condition, as they may shake loose, wear out or be broken. If not maintained they become a hazard instead of a safeguard.

After guarding the dangerous places the next thing done was the maintaining of a number of bulletin boards in conspicuous places, with the changing of bulletins at least once a week, to teach by word or picture the sources of danger that constantly surround all employees, and to maintain interest in this source of display.

One feature display on our bulletin boards is a calendar for each department and one for the entire plant, showing for each day of the corresponding month of the previous year the number of accidents, trivial, lost time, eye, or a clean slate, as the case might be, that occurred during that month and the record right up to date of the current month. The figures for the previous day are placed the first thing in the morning and create a lot of interest.

Cleanliness of the plant property is essential. All dirt cleaned up, scrap properly disposed of, passageways properly marked and kept free of obstructions, building maintained in proper repair and grounds kept clean and provided with grass plots and trees to make the general surroundings more pleasant to work in.

Proper lighting is essential for both day and night. Windows and openings should be kept clean to allow all the daylight possible to enter as no light is superior to daylight for general working conditions. For night lighting plenty of electric lights should be at all points in and about the mill so the hazards of darkness cannot exist. Numerous places for plugging in extension lines should be accessible over the plant so there will be no excuse for a man not having proper light to do any work required.

All the things mentioned so far have been physical necessities to put across safety in the cement plant. They are all essential and should be maintained to the highest point of efficiency, but there is still another phase that is far more important. This phase is the education of employees in the safe method of working and getting their cooperation to apply these safe methods at all times so they do not get hurt or hurt someone else.

This we have accomplished best by holding group meetings and getting the suggestions of the men present at these meetings and, as far as possible, carrying out their suggestions.

Our system is to have each department in its subdivisions hold meetings. Foremen usually preside and seldom over twenty men constitute the group present. Items of interest are brought up and any accidents that have occurred, or are known about, are discussed. The Portland Cement Association report on "Significant Accidents" is read at these meetings, as well as the report of any accidents that have occurred at any of the other plants of our company. Suggestions are asked for and as many as sixty suggestions have been received from one of these meetings. We insist that each department hold enough of these meetings so that each man in the department attends at least one of these meetings each month.

A general safety committee composed of all foremen meets once a week to discuss safety problems. Here any suggestions brought up at the group safety meetings, that cannot be taken care of in the regular routine of operation, are discussed and decision made as to their disposal.

A special group of selected men known as safety officers, about one for each twenty employees in the mill, meets, one-third of them, each week so each turn has its representation, and I talk to them concerning safety and any items of general interest that should be brought up at the time. Items they have to report are listed and answers made to any questions they or anyone in the group they represent send in concerning why something has or has not been done in the interest of safety. In addition to mill safety, stress is placed on community safety and no meeting is ever adjourned without the request for each member to "Take Their Safety Home."

Safety is also discussed at the superintendent's meeting. A chart is always on display at this meeting showing the number of accidents, trivial or lost time that have occurred in each department for the previous week and the subject is regularly discussed at its proper time.

Each item reported at any of these meetings is written up on a form provided for that purpose. This form is made in triplicate, the original for the assistant superintendent's office, second copy given by head of department receiving it to workman who signs it on completion of job and returns it to his head of department, and the first copy is signed by head of department and returned to assistant superintendent who has it filed as a record of job completed.

An idea of the number of items reported at the various meetings is obtained when I say that 2,125 were written up for 1927—89.6 per cent were completed, and this year items have been reported at the rate of 2,500 for the year.

In addition to the various meetings, with their groups constantly reporting items to be taken care of, a special committee of picked men is assigned to the job of making a thorough inspection of the entire plant each spring and fall; they report on conditions affecting safety, cleanliness, structural conditions, painting and, in fact, everything that is necessary or will improve the safe operation of the plant. Usually three days is required for this committee to complete its inspection and its reports have sometimes had three hundred items.

Other things we feel have a bearing on safety are good locker rooms; periodic physical examination of all employees in addition to physical examination of applicants; a nurse on duty every day who investigates all cases of employees reported off account of sickness and does considerable community welfare nursing; a doctor who spends one hour each day at the emergency hospital and is subject to call any hour of the twenty-four, all in addition to a well equipped first aid hospital that is completely manned at all times.

To maintain interest in safety we try to have our employees attend safety schools and safety lecture courses whenever possible. Several schools are run by the Western Pennsylvania Division of the National Safety Council, at Pittsburgh, about fifteen miles from the plant. We post the schedule of the meetings and with a little personal advertising are able to get about twenty employees to regularly attend these Pittsburgh meetings. For the last couple of years there has been a

group of meetings held at New Kensington, about 10 miles distant from our plant. We made a special drive for these meetings and provided bus transportation for those not having their own cars who were willing to go. For the seven meetings held last year we had a total attendance of 2,150—average attendance 307—maximum 386—and a total of 697 employees attended one or more meetings—233 attended the banquet and 211 received diplomas for attending at least five of the seven meetings.

This year we intend to hold a series of meetings at Universal. The number of our employees willing to attend a safety lecture course of this type has become so great that we can better arrange to bring the lecturers and entertainers needed to them than to safely transport the great number to other community meetings. We also feel that by holding a set of safety meetings in our own town we will better promote safety throughout the entire community.

We have had over 50 present at each of the meetings and dinners of the Portland Cement Association Regional Safety Meetings held in Pittsburgh the last two years. A representative of our plant has been present at the last four National Safety Congresses and has also attended the Portland Cement Association Regional Safety Meetings held in Allentown and state meetings held in Philadelphia for the last two years.

For the promotion of safety in the community we have each year interested all local organizations in the November Thanksgiving No-Accident drive, and have distributed great numbers of posters for conspicuous display and have seen that each school child in the district has a small picture of the general poster with an explanation of the purpose of the drive given by the teacher or someone from our organization. Occasionally we go through our files and pick out any safety posters that we think would be of use to school children and give them to the teachers to distribute or use in any way they desire to supplement their regular course of studies.

To obtain new ideas for the promotion of safety we encourage the visiting of other plants of our company or of other companies by leading foremen or heads of departments whenever possible. By this means they can see how the other fellow guards his machinery, conducts safety meetings or runs competitions to promote safety and come back with the ideas so they can be worked into our system or make some improvement upon what we are already doing.

Each part of this elaborate system to put safety across in the cement plant, we think, is necessary and has contributed to whatever success we have had; but the one point we feel is absolutely needed is foreman responsibility. The foreman is held responsible for his group. He must be in sympathy with the safety movement and see that every man under him is in sympathy with it. He must be an example to them in safety; order them to work in a safe manner, and then be sure they carry out all the safety knowledge that has been imparted to them. The foreman must see that his group meetings are held; that every trivial injury no matter how slight is immediately reported; encourage participation in all outside safety movements, and lead his men by being present at all outside meetings himself. The success or failure of any group regarding safety is entirely in the hands of the foreman.

"Putting Safety across in the Cement Plant" is not an easy job or one that can be done spasmodically, but it requires the effort of everyone in the organization to be everlastingly at it. That it pays, there can be no doubt, as is easily shown by the results published by the Portland Cement Association and the satisfaction to each of us. "And the end is that the workman: 'all live to enjoy the fruits of his labor; that his mother shall have the comfort of his arm in her age; that his wife shall not be untimely a widow; that his children shall have a father, and that cripples and helpless wrecks who were once strong men shall no longer be a by-product of industry.'"

CHAIRMAN TOWN: I think Mr. Cline's paper has been exceptionally interesting. In fact, having gone very definitely into detail, he has undoubtedly given us a great many points that are of interest and great value to us.

Going back to unfinished business just a minute. Mr. Fortuin, will you please read your report of the Poster Committee for the benefit of the Cement Section?

Report of the Committee on Posters

By R. B. FORTUIN

Chairman

I was appointed chairman of this committee at the national meeting in Chicago, and in turn invited the following men to assist in the work of the committee:

Messrs. David Adam—Lawrence Port. Cement Co.

Fred Hunt—Nazareth Cement Co.

Paul Sandt—Edison Port. Cement Co.

Chas. Benner—Lehigh Port. Cement Co.

Chas. Roth—Plant No. 6, Penna.-Dixie C. Corp.

The chairman of the committee wishes to express appreciation for the fine cooperation of the members of his committee.

A form letter was sent to every member plant on the mailing list of the National Safety Council, asking suggestions for posters. Twelve replies were received, and acknowledgments made to these companies.

The committee adopted a policy that all cement posters should be made up from actual photographs of significant accidents that occurred in the past in the cement industry. To date a total of eleven suggestions, together with photographs, have been sent to Mr. Lee Gardiner, in charge of the Poster Division of the National Safety Council—two more suggestions and photographs will be sent in, in a few days, thus completing the work of the Committee for the past year.

It is very difficult for a small group of men to make up posters that are applicable to the industry throughout the entire country, and the committee would like to suggest that the member plants of the National Safety Council be more liberal in the future with their ideas of how posters should be made up, which will be entirely pertinent to accidents and hazards in the cement industry.

The chairman has considered it a pleasure to carry out the work during the past year.

MR. FORTUIN: I would like to say an additional word to that, gentlemen. It is very hard for any group of men to make up posters that are entirely pertinent to the cement industry and which are of particular interest to your individual plant. The committee sent out these form letters asking for, I believe, five suggestions from each member plant, and out of the 200 members of the cement industry we received only 12 replies. That indicates possibly a small interest on the part of executives in the cement plant, or it may indicate that the form letter did not get to the proper person in the organization.

I would like to ask for the organization that each one of you gentlemen here today make it a point to have some one in your organization send to Mr. Lee Gardner, of the National Safety Council, or to myself personally, suggestions for posters for the coming year.

The posters in the past have covered a wide field. Some of them have not covered the field adequately, and others in possibly the wrong manner. What we would like to do is to pick out the real hazards and significant accidents of the past and have them portrayed on a photograph and then have that made up into a poster. During the past year you have seen a number of the posters that we

made up as appeared in the *National Safety News*. Possibly these posters are not entirely in accord with your ideas, and if not, we certainly will welcome constructive criticism on your part.

The committee gave their time freely and willingly. I know that the members with whom I worked were very pleasant men to work with, and they did all they could to further the work of this committee, but their work is at an end and we need your help to give us further suggestions. I hope that all members will endeavor to let us know what ideas can be made up into posters this coming year.

CHAIRMAN TOWN: I wish to thank Mr. Fortuin for his report of the Poster Committee.

If he will permit, I would like to add a word. Any of you who have had anything to do with active work in the Council know very well that there must be time or energy spent in addition to your regular routine work with the company which employs you; and frankly after you have been looking after those odds and ends or those extra details of work absolutely outside of your regular company business, you realize at the end of the year that you have spent considerable time, with patience sometimes exhausted, and it seems at times like almost an uphill business, as it would be if it were not for the loyal support of active committees.

Two or three men should not endeavor or undertake to do all the work of a section. They haven't in the case of the Cement Section, but it has been delegated to altogether too few, and an important trend in our Section has been to expand. Add a committee once in a while, and now we are in the hopes that these committees by reason of the experience they have accumulated year after year are going to be able to function all the stronger in the succeeding years to come.

Knowing the efforts that Mr. Fortuin and his committee have put forth in this poster work, and also knowing something about the inside work of the National Safety Council I want to suggest that you take everything that Mr. Fortuin said strictly to heart, because the work of the poster committees of the Council depends almost entirely upon the individual efforts of the unit sections of the Council. If each Section is not able to pass in its ideas and suggestions in posters, then the work of the Council is going to be all the more handicapped.

Whenever you are appealed to for this type of work, it would be a splendid thing if you could plan for a competition within your own plant to see what can be done for the cause of this poster work.

I have just received a telegram which speaks volumes. There were three or four of the cement plants who sent word from the Pacific Coast that they regretted very much being unable to have any representative attend any of these meetings of the National Safety Council, because they are having a regional meeting or two out on the Coast this week. They are having one in San Francisco today, I believe, which includes all of the plants of the Northern Pacific District, and they send their regrets that they were unable to come on account of conflicting dates. However, I think the Cowell-Portland Cement Co. feel that they are here.

They have sent us a telegram addressed to this meeting which says:

"Today this company's plant completes 847 days without a lost-time accident.

Cowell-Portland Cement Co."

I say they are entitled to a glad hand.

R. C. FRAME (Alpha-Portland Cement Co., Easton, Pa.): I am going to ask (and you may take it upon yourself to call on me for money if necessary) that you send a telegram to the Cowell-Portland Cement Co. from the Cement and Quarry Sections combined, extending congratulations. I think the fact that they have thought of us and wanted us to know of their good success entitles them to our consideration.

CHAIRMAN TOWN: If you will do that, Mr. Frame, I will appreciate it.

Now we come to that part of our meeting that is always lively with interest and I am going to turn it over to Mr. S. Henry Harrison, Assistant Superintendent, Vulcanite Portland Cement Co., Phillipsburg, N. J. I hope nobody will find it necessary to leave because we want suggestions, ideas and good points from everybody in this part of the meeting.

Round Table Discussion

Led by S. HENRY HARRISON

Assistant Superintendent, Vulcanite Portland Cement Co., Phillipsburg, N. J.

I think we will all agree that mental causes of accidents are a problem of great importance and they are the most difficult to correct even to a comparatively small degree. A man goes to work burdened with domestic cares caused by sickness, financial troubles, or what not. Sooner or later his attention is divided, he is less alert or preoccupied, and as a consequence an accident occurs; for the same reason a locomotive engineer fails to see the danger signal set against him—he drives his train into a block into which he is forbidden to enter and frightful consequences ensue. This phase of the safety question is one of extreme difficulty to correct and one which is well worth our attention.

In starting the round-table discussion we will discuss the various other problems in connection with the safety first movement awaiting solution by the various member companies. Aside from the humanitarian phase of this question, and this is of very great importance indeed,—we find that no matter from which angle we approach the subject of safety first, we are always confronted with the same problem—How can we reduce the great non-productive expense—Compensation?

In the State of Pennsylvania alone for the first six months of this year the total compensation award was \$6,003,183.00, and the total for the year 1927 was \$13,329,557.00.

When one stops to consider the vast sums of money expended each year over the entire United States due to this vast economic loss, it is little wonder that the Executives in various industries have taken a united stand to reduce this item which necessarily must enter into the cost of manufacture of all the products of industry.

One of the large insurance companies has found that in analyzing 75,000 accident cases fully 98 per cent were preventable, and that if the industrial accident frequency could be reduced fifty per cent there would result an annual saving of \$5,000,000,000.00 to say nothing of the misery and hardship which would be avoided.

The splendid results which have been obtained by the Portland Cement Industry promise to be even more gratifying due in no small measure to the fact that the industry at the present time is in the transition stage. Mills that were using machinery of an inferior type are gradually replacing it with equipment of modern design.

Some one has said that the number of accidents on a railroad system is directly proportional to the length or mileage of the system. Such being the case it is only fair to assume that the number of accidents in a factory is directly proportional to the amount of machinery installed and also to the number of men employed.

In some of the older plants in the Cement Industry where the units were designed for comparatively small output per individual machine, it is natural to suppose that more men were required to operate a plant so designed. Today the small units are being rapidly replaced by larger units,—as for instance—Mills of the roller type turning out—say 140 bbls. of cement per day are being replaced by Mills of the Tube Mill type turning out over 2,000 bbls. per day.

The old reciprocating engine driven plant is rapidly fading from the picture.—In its place we have the modern steam turbine with its direct connected electrical generator. In a great many instances the power plant is entirely eliminated—the power being furnished by one of the great electric systems which are rapidly spreading their net work of wires over the entire United States. The old Cement Plant with its multitude of pulleys, belts, shafting, gears, chains, rope-drives, clutches, etc., is being modernized and in place of this hodgepodge of power transmission machinery we have the electric motor drive connected to its load direct or through a gear reduction device.

With the substitution of the wet process for the dry the screw conveyor is largely eliminated, and the centrifugal pump with its attendant pipe lines has taken its place.

The rotary kiln of small size is being replaced by kilns two or three hundred feet and over in length.

Even in the department where dry pulverized material is conveyed the screw conveyor is being replaced by pneumatic conveying systems.

All these changes cannot but produce beneficial results in so far as reduction of accidents is concerned. Incidentally, they also tend to show how much more difficult it is for a cement plant of the older type to come through the year with a clean accident record. Contrast one of the older plants in the Lehigh Valley with one of the modern plants in the Birmingham district and this fact becomes evident at once.

There is another question which it might be well to discuss, and that is the increasing number of low voltage electrical accidents. By low voltage I mean voltages of 220 volts and under. There seems to be a prevailing opinion among electrical workers that a circuit of 220 or 110 volts is harmless. Such is certainly not the case. With the increased use of electrical energy it is surprising that we do not have more industrial as well as more domestic accidents due to this agency.

Recently several fatal accidents have been mentioned in the press. In this city a few weeks ago a man was killed while carrying a bundle of wet hides in a meat packing house. The floor of the packing house was wet—the unfortunate man's clothing was moist, and in carrying the bundle of hides they accidentally struck an incandescent lamp which was broken—the hides came in contact with an electrical conductor with the result that the man was instantly killed. The voltage was 110 volts in this case. Other cases have occurred where men have been killed while working in the interior of boilers or other steam vessels. Death was due to contact with low voltage electrical conductors.

I am bringing this matter to your attention because there are innumerable places, especially in the basements of engine rooms, also in the vicinity of raw material blending tanks where if electrical extension cords are carelessly used fatal results are sure to follow. There have occurred too many cases of this kind where persons have been fatally injured to warrant us in treating this subject lightly.

In discussing this subject with one of the insurance companies their opinion was asked regarding a 35 volt line to be used as a special low voltage circuit in cleaning boilers,—they remarked that they were not prepared to regard 35 volts as harmless. It is all a matter of electrical contact. Perhaps it would be well to treat all electrical circuits as dangerous and have no one enter a boiler with an electrical extension cord, but to use a pocket flash light battery instead, as is the practice with most boiler inspectors.

One of the most difficult problems for the Plant Safety Committee to solve is the problem of converting the confirmed safety skeptic into an active enthusiast in Safety First. I believe that even the most obstinate cases can be cured by keeping everlastingly at them.

Another problem confronting Safety Committees is the problem of fake accidents. For instance—a man reports to work with a pain in his back,—what really ails him is, we all say, Lumbago, but he attributes his trouble to heavy lifting at his work. In this deception his physician often innocently aids him. Many a fine no-accident record has been shattered by this practice.

Perhaps the most hazardous department in a Portland Cement Plant is the Fuel Mill where pulverized Coal is prepared for burning in the Rotary Kilns. As is well known the pulverized fuel is introduced into the Kiln by means of a fuel feeding device and an air blast. Suppose while the device is functioning properly, for some cause or other there is a failure in the air supply *through* the air blast, the Coal will continue to enter the Feeder, the air blast having failed the Coal will be forced out of the Feeder and spilled on the floor in front of the Kiln where it may become ignited by the hot clinker dropping from the discharge end of the Kiln. Such cases have occurred and disastrous results have followed.

Would it not be well to automatically cut off the Coal supply immediately upon failure of the air blast.

Where the Waste Heat System is employed there is always more or less danger of back firing in front of the Kilns should the Exhaust Fans in the rear of the Boilers cease to function. Here too, in this case it may be well to automatically cut off the pulverized fuel supply due to failure of the Exhaust Fans.

It may not be out of place while we are discussing the danger due to pulverized Coal, to consider the subject of "skylarking." I have in mind where a workman while passing from one building into another was struck with a paper bag filled with pulverized Coal, a lighted torch placed on the ground nearby ignited the powdered Coal causing painful burns to the workman's arm and neck. The Coal was thrown from the upper platform in the fuel grinding room and was, doubtless, intended not to injure the man but to give him a dose of coal-dust. It is hard to understand why men indulge in such silly capers, but they do now and then. Needless to say a case of this kind should be treated as a criminal act and the offender dealt with according to law.

However, in a properly supervised Plant "skylarking" does not exist, or rather it is reduced to such an extent that it may be said to have almost entirely ceased. This I suppose is the case with most of the Cement Companies, and is, I believe, one of the beneficial results of no-accident campaign drives.

Before closing these few remarks I would like to dwell for an instant on the question as to the best method of securing reports of injured persons—I refer particularly to accidents which for the moment are considered as insignificant and unnecessary to be reported, as for instance slight cuts or scratches which later develop into infected cases. No reports having been made out in the first case it is difficult to determine whether the injured was really injured at work or at home, or another place outside of working hours. In this case a dishonest workman could claim compensation and the payment of his bills for medical attention, etc.

There are representatives here from many Cement Companies located in different sections of the United States, and we should be able to obtain some valuable opinions regarding the subjects to which your attention has just been called, as well as on subjects which I have not mentioned.

MR. HARRISON: We will now go on with the discussion, but please confine yourselves to three minute talks.

DR. PARLETTE (Pittsburgh Limestone Co., Pittsburgh, Pa.): With reference to fraudulent claims, the Pittsburgh Limestone Co. has a check-out board, and one side has a sign reading, "Check out uninjured" and the other side, "Check out injured." There are blanks there which have to be made out, and if the man has

been injured during the day the first-aid station will report on that patient during that day. When he checks out injured, providing he has not been taken to the hospital, his superintendent or foreman visits his home and that is followed up.

If he comes to work the next day and he claims that he was injured sometime during the day without having checked up as he should, his claim, of course, doesn't go.

I think that is probably the best scheme that I have ever heard of.

MR. HARRISON: I would like to call on Mr. Frame, of the Alpha-Portland Cement Co., and hear what he has to say.

R. C. FRAME (Alpha-Portland Cement Co., Easton, Pa.): This, I think, has been another of the very splendid discussions of safety problems which have been put on for a number of years by the joint session of the Quarry and Cement members of the National Safety Council.

The Alpha-Portland Cement Co. has made wonderful progress in the reduction of accidents at their many plants. We don't have to look back very far before we can clearly recall where we had something like 300 to 400 lost-time accidents in one year. When looking at the records the other day the best that we could count for the first eight months of this year is 24. This remarkable reduction, gentlemen, has only come about through the intense interest of the management in enlisted cooperation, enthusiasm, genuine all-around good work respecting accident prevention and every phase in which it appeals to us.

It seems to be a rather easy matter, after the superintendent of the plant or foreman and safety committees all get started in this work, to post a record of each plant from month to month. Each plant sees what the other one has accomplished, they realize more their own shortcomings and they wonder why they cannot do as well at their plant as their neighboring competitor has done. After all when they start thinking we can look for results.

Mr. Brown told you this morning that the Alpha Co. last year won two trophies from the Portland Cement Association. One of the plants was at Ironton, Ohio.

I give great credit to the telegram which our chairman read a few moments ago from the Cowell-Portland Cement Co., in California, who had their last lost-time accident in May 1926, and I have every confidence in this Cowell organization from what we have learned of them that they are going to continue the splendid record through to December thirty-first.

Alongside of that wonderful performance the plant at Ironton, Ohio, had their last lost-time accident in December, 1926. They won a trophy last year and so far this year the record is clear. Of course, we hope the god of luck and goodwill are with us in our continued effort and that we too will join with Cowell, and that there will be still some other Portland Cement plants that will come through on December thirty-first, so that we will not only have two, but we may have six or eight or possibly more that will win this wonderful trophy for the second year.

Aside from this record-breaking performance at our Ironton plant we have still other organizations to which we can point, such as Bellevue, Michigan. This Bellevue plant some years ago, had their long string of lost-time accidents, permanent injuries and fatalities, but once they started in earnest, they quickly demonstrated that they could cut their safety program off the same pattern. This Bellevue plant has not had a lost-time accident since April, 1927, with every indication that they are going to be a trophy winner this year.

We have been operating a plant at Manheim, West Virginia, since 1908. They have had many problems down there, the principal one being due to mining operation. They have driven columns into the side of the mountain, which brings a problem peculiar to that line of work. With improved conditions, transportation, and light, and all the other elements that go into it, Manheim, not to be outdone

by her sister plants in the Alpha organization, is working heart and soul to attain their trophy for 1928. Their record, as it stands today, shows the last lost-time accident occurred in August, 1927. So they have already finished 365 days without a lost-time accident, but according to the Portland Cement Association code, nothing brings you the prize until you do the calendar year.

It has been felt by those in charge of the Portland Cement Association activities that it is better to set a measured time in which to make this record. Something like a horse race when they all start from a given point and finish at a given point. It seems to me that it takes a little more effort and the record means a little more to us when we get out to accomplish something within a definite period of time.

It may be of interest to you to know the viewpoint of our management at Ironton. You may ask the question, I wonder what is back of this Ironton Organization? I wonder what they are doing out there? How do you go about to produce this wonderful safety record? And it is a wonderful safety record for this reason: Instead of having the ordinary quarry from which many cement plants obtain their rock, they have a mining proposition; no ordinary job. If I remember correctly, their shaft is something in the neighborhood of 600 feet deep, from which they lead out into the rooms, take out the stone, blast the load, bring it to the shaft and hoist it to the surface. They employ some 80 men in this mine.

The records on mining have shown you gentlemen long years ago that it is of a hazardous nature. I venture the open quarry has many advantages over the mining operation, and when this mining operation at Ironton has done so well, in fact has kept pace with the plant operation on the outside, I think we should give them a certain amount of credit for their help in putting over the results.

I am going to read you just a few lines that come, I might say, from the heart of the plant management at Ironton.

Letter from the Alpha Co. Plant at Ironton, Ohio

We trust we are right in assuming that the majority of the plants represented here are members of the 1928 Trophy Club and hope they will be able to complete the year without an accident and win a trophy.

The Cement Association Trophy is a thing of beauty and means so much to those who fought for it that it is only fitting that no expense be spared in providing a suitable dedication. The Ironton plant's trophy was dedicated on May 9, 1928, and this day will be long remembered by the plant employees and the men, women and children of Ironton.

While making arrangements for our dedication we did not lose sight of the fact that accident prevention pertains not only to the cement industry but to the country as a whole, so with this in mind we decided to throw the dedication open to the public at large. Special invitations were sent to the various civic clubs as well as to our neighboring industries. Arrangements were made with the local high schools, both public and parochial, whereby the students were dismissed at noon with instruction to report back at the school at 1:30 p. m. At this time the entire high school student body, about 1200 in all, were formed in parade formation and, headed by the school fifty-piece band, marched to the plant. The day was ideal and our ceremonies were honored by the attendance of five or six hundred little fellows who had heard that there were to be "free eats" at the plant. They began to arrive about noon and immediately captured all the strategic places around the refreshment stand, which they held from noon until the refreshments were served at about 4 o'clock.

The speakers of the day included Mr. Barbazette, manager of operations; Mr. Brown, president; Mr. McKelvy, vice-president, all of the Alpha Industrial Commission of Ohio; Mr. Butler, terminal superintendent, Chesapeake & Ohio Railway

Company, and Mr. Morgan, C. & O. Y. M. C. A. secretary. All of them touched on the wonderful record the plant made and also on the value of safety not only in the mill or work shop, but in the home, on the streets and everywhere. There is no doubt in our mind but that many safety converts, if we may call them such, were made as a result of the stirring speeches.

The refreshments which followed the speaking consisted of the following:

- 2500 packages of Cracker Jack
- 2000 packages of Pop Corn
- 2000 packages of Peanuts
- 120 gallons of Orangeade
- 120 gallons of Lemonade
- 1500 bottles of Pop

Everybody had plenty to eat and drink and left the grounds hoping that the plant will be able to go through another year without a lost time accident.

The question is continually being asked us, "What did you do to win a trophy?" and we will briefly outline our method of handling the job of accident prevention although we feel sure that you find it very similar to the methods used in other plants.

Successful accident prevention is the result of cooperation between every member connected with an organization. We of the Alpha Company point with pride to the cooperation that exists within our company and we doubt whether there is a greater safety enthusiast in the country than our president. The spirit of safety is contagious only when it starts at the top and works downward. If the president of a company is a believer in safety the general manager will be also. Once the general manager is converted the superintendents will not be far behind and you will find before you hardly realize it that the foremen and men are right in line. The management must show a willingness to spend money for things that produce results. Guard rails, etc., should be installed wherever needed as we have found that men can't be convinced of a management's interest in safety if they see on all sides of them unguarded gears, etc., just waiting for a chance to bite them.

Some safety engineers argue that the installation of guards tends to make a man careless and less on the alert than he would be if the guards were not there and he would realize that the slightest sign of forgetfulness on his part meant injury or death. We cannot, however, agree, with this point of view and make it a practice to guard everything or place that may cause trouble.

Our safety committee, composed only of foremen or heads of departments, is similar, we believe, to the majority of other committees. We did considerable experimenting before so organizing our committee, but found that the foreman is the logical member of a safety committee.

Regular meetings are held once a month with special meetings added whenever necessary. At these meetings the condition of the plant as a whole is discussed and various recommendations considered. Especial attention is given to the reports issued by the Portland Cement Association and in our opinion the monthly report on "Significant Accidents" is one of the most valuable bits of information put out by this organization. This report is given a thorough study in our committee meetings and an attempt is made to visualize each accident mentioned or in other words we imagine the injured man as being one of our men. If we then find that a similar accident is liable to occur at our plant we take immediate steps to head it off.

Each foreman is given a copy of those "Significant Accidents" and in addition to this we make out another report of the accidents which are peculiar to his department. The latter are first read and explained to the men and then posted on the department bulletin board.

The Alpha Management made its plant committee's work easier when it started direct advertising by paying a safety bonus. Under this plan 1 per cent of a man's

earnings is added to his check whenever the plant goes through a month without a lost-time accident. While this bonus does not amount to much for each man still it means quite an outlay for the company in a year's time for all of our plants. The average monthly bonus for each man at our plant would be about \$1.25, but it is surprising how our men count on this addition and how they appreciate it.

Prior to 1925 we were having a great number of eye accidents, men were being struck by flying chips of stone and steel and three men each lost the sight of one eye. The committee realized that something would have to be done and done quickly if we did not want the nickname of being a one-eyed plant. So a compulsory goggle rule was put in effect in April, 1925, and each man was given a pair of goggles and a letter explaining the reason for giving them and also instruction as to when they must be worn, as well as the penalty for not wearing them.

These goggles were purchased by the company at \$1.10 a pair and this amount was deducted from each man when he received his pair. The company keeps the goggles in repair free of charge and when a man leaves the service his \$1.10 is refunded to him, providing he returns his goggles, no deduction being made for the condition of the goggles when they are returned.

At the beginning we had some trouble getting the men to wear them and we were given all the stock excuses, such as, "I can't see through them, they give me a headache," etc., but we kept driving away and each time a man turned in a pair of goggles the glasses of which were shattered by a flying chip or were covered with exploded metal we put them on our bulletin board with a full description of just how near so and so came to losing his eye sight. Such advertising proved a big help and now it is a rare case to have to call a man's attention to his goggles. We cannot say just how many eyes or lost-time accidents have and are being saved by this rule, but we do give the goggles a big share of the credit for reducing our accidents.

It is impossible to place too much emphasis on the part played by the plant doctor in holding down the number of lost-time accidents and the record we have made could not have been accomplished had it not been for our doctor.

It is a rule at our plant that every new man must be given a thorough physical examination before he is given a job and each old man is given a periodical examination. By this arrangement the unfit are kept out of our plant and a line is kept on our employees so that if anything develops which might make them unable to take care of their regular job as they should, we can transfer them to another job which they can handle with safety.

The real company doctor is one in whom the men have confidence. He should be a ready and sympathetic listener to all their troubles, both real and imaginary so that the men will be anxious to come to him for treatment. Most men think it effeminate or babyish to run to the first aid room for every little scratch, but the doctor can do more to correct this idea than anyone else. Infection, which may follow the most innocent looking scratch, is responsible for more lost time than any other one thing and will continue to be so unless the men can be educated to the importance of first aid.

In conclusion I might say that the record we have made was not due to any elaborate program carried on in the plant. The methods we use are similar to those used in most plants, but the success of any safety drive is a matter of cooperation and education, convince your men that they are the real beneficiaries of this safety movement. Inculcate in them a determined winning spirit so that they will point with pride to their personal safety record, the record of their department, of their plant and of their company as a whole.

We have won a trophy and have gone 657 days without a lost-time accident, but they only serve as an inspiration for even greater accident prevention effort in the future and we are going to prove to the world that our adopted plant slogan, "Accidents are Unnecessary," is something more than a mere pretty phrase.

In short gentlemen, what I have outlined is only a very brief review of the safety activity that is being carried on in many plants belonging to the Portland Cement Association. The wonderful record that Chairman Town mentioned this morning very ably supports this and I feel certain that the work is going to grow.

The district safety meetings as well as those of the National Council are being well attended, and the free discussion of everything pertaining to the prevention work has been the means of putting Portland Cement where it stands today.

MR. HARRISON: I see we have Mr. Fred Hunt with us, of the Nazareth Cement Co., and we would like to hear from him on the electrical side of the safety first question.

F. B. HUNT (Nazareth Cement Co., Nazareth, Pa.): This is unexpected, but I want to emphasize that whether you fellows know it or not approximately 20 per cent of the accidents occurring in the cement industry last year were due to electrical causes, and at least six—I am not familiar with the number that have occurred since June—but during the first four months of the year six of the fatalities in the Portland Cement Co. were from electrical causes. As Mr. Harrison has brought out in his report, it doesn't necessarily mean when you speak of electrical hazards that it refers to high voltage. In fact several of the accidents this year have been due to low voltage, down as low as 110.

You folks are all familiar with the accidents that occur in the home, such as a person coming in contact with the water line and electric socket at the same time. Well, get in direct contact perhaps with some high tension side or high side of a transformer which you know absolutely nothing about. You may think there are only 110 volts in there, but maybe there are 22,000 or 33,000.

No doubt you know that last evening the papers carried an account of a joke that was intended for a fraternity initiation down at the University of Texas. This is entirely out of the cement line, but you can see what it may lead to.

For a fraternity initiation down there they took two bedsprings and connected the two sides to 110 volts and put a resistance in there. They put the first four men on these springs and gave them a little shock. That was funny. All the other fellows got a big kick out of it. But when the fifth man went on the springs, it wasn't quite so funny. That man died just four hours later from the shock received from those springs. That was supposed to be 110 volts.

Going further into the boiler question, a number of plants have considered the installation of a transformer, dropping a line from 220 or 110 down to 32 for using an extension while cleaning boilers. I believe that is also wrong. Just as Mr. Harrison said, the insurance companies will not agree to even a 32 volt installation.

Go into your boilers with high powered flash lights. It may cost a little more for batteries, but it will be a saving of human lives in the long run.

Just before closing I would like to ask some of the men, especially Dr. Corlett, regarding plants that have gone into the physical examination and examining every man in the plant, what results they have obtained, and whether they have any definite information or definite figures showing what those physical examinations have done?

DR. CORLETT: I just don't know how to answer that. I examined 1,700 men and I found heart conditions 28 per cent, 13 per cent hernia, 78 per cent pyorrhea, and I have forgotten the other figures.

Last week I examined quite a number of men between the ages of forty-five and sixty, rather above forty-five years of age; and 98 per cent of those men had high blood pressure, valve leaks and hardened arteries.

The Carnegie Steel Co. has put on a drive to have men in the high places physically examined at least once a year, and those over sixty years of age examined twice a year, and I think that is entirely proper.

Those with hardened arteries and high blood pressure who have to climb to high places may become dizzy, and they even suffer strokes of apoplexy if required to climb to those high places. It is very hard to tell some times whether the man has died as a result of a fall or the result of apoplexy.

MR. HARRISON: While we are on the subject of electricity, I saw it stated somewhere that a current of about one-tenth ampere, going to the vital parts of the body, is sufficient to kill the person.

DR. CORLETT: That is a question. I was talking not long ago with quite an electrical expert and he told me that 110 volts certainly would kill if the person didn't happen to be in normal physical condition. I am not prepared to say.

It may be possible for us to tell whether a man is in perfect physical condition from the standpoint of the salts in the blood stream, valvular leakage, which uncompensated makes very little noise, and from other standpoints. I do know, however, that 110 volts have killed a sufficient number of people in the United States that we should consider 110 volts hazardous on all occasions.

MR. HARRISON: I have seen it stated also that in judicial electrocutions where 1,500 volts were applied to the head and the lower extremities, a current of ten amperes passed through the criminal's body would indicate that his bodily resistance was only fifty ohms. If such is the case, a 150 volt circuit, if properly applied, would produce one ampere and that surely ought to be sufficient to do away with anyone.

R. C. FRAME (Alpha Portland Cement Co., Easton, Pa.): Some years ago I visited Dr. Lauffer, of the Westinghouse Co., who is an authority, I think, on the resuscitation of those electrocuted. He showed me the apparatus and told me of some experiments he had made to determine the resistance of a person's body. He found the resistance varied with different men's measurements, such as testing a man through the body by his two fore hands, by putting on gloves soaked in brine, etc.

He was able to get resistance as low as 60 ohms, and in his opinion one-quarter of an ampere would kill any man. In other words, I think the evidence is very definite that a man not in the very best of physical condition, if he gets the right kind of contact can be killed easily.

I have personal knowledge of a man being killed on as low as 56 volts direct current. The man got in contact with a large plate of zinc when he was standing in water to his knees, and the current passed through him. He was so cramped that he was not able to get away from it. We don't know how long it took him to lose consciousness—he probably lost consciousness gradually—but he was dead when we found him.

We must regard any voltage above 50 as undoubtedly dangerous under the right conditions, and so handle our low voltage work that we can avoid this condition as much as possible.

MR. HARRISON: I haven't the names of the gentlemen in the Quarry Section but we would like to hear from some one in that Section.

A. C. GOOD (American Limestone Co., Belfont, Pa.): The matter of extension cords is a very vital subject to practically every plant, and I would like to inquire whether anyone has ever used or whether there is such a thing on the market as a cord totally shielded? There are a number of cords which have a ground wire strung through them intended to ground the socket at the end of the cord, but I wondered whether a cord had ever been developed which had a shield around both the conducting wires?

H. W. FRAZER (Charles S. Warner Chemical Co., Wilmington, Del.): One of the greatest difficulties of the quarries is to get a good ground. In cases where the stone deposit has only one or two feet of dirt, one of the hardest problems is to get a good safe ground.

MR. HARRISON: We would like to hear from Mr. Fortuin, of the Pennsylvania-Dixie Co.

R. B. FORTUIN: (Pennsylvania-Dixie Co., Nazareth, Pa.): There is one point I would like to bring out, but before going into that I would like to give you an idea of our experience this year.

In our seven plants we had approximately 50 lost time accidents in 1927. To date in 1928 we have had exactly 10, which I believe is a very good reduction.

During the last three months we conducted a three months' No Accident Campaign among our four plants in the Ludington Division, in addition to the Hercules Cement Corporation, the Nashua Cement Corporation and the Lone Star Cement Corporation, all those plants being located in the Nashua Division. In 1927, we had 20 lost time accidents in those plants, and in 1928, we have had exactly three.

Now the point I want to bring out is this: I firmly believe that our success in accident prevention work is entirely due to bringing out the old idea in new clothing. Each year and each month we bring out the old idea of safety work and accident prevention in entirely different form.

The first of July, for example, we were at a loss to know what we could start or what we could change to make it new. So we started what is called our "Good Housekeeping Campaign." Each month a man is drawn from each of the plants in another division (there are four in number), and that committee goes to each plant and thoroughly inspects it from start to finish. They inspect for sanitation and safety hazards and then cleanliness; and I don't believe there is any single thing that we have ever done that has given greater impetus to the reduction of accidents than those inspections each month.

Cleanliness naturally takes into consideration cleaning up all sorts of debris around the plant. Tidiness takes into consideration the storing of machinery parts throughout the entire mill. Fire hazard takes into consideration the fire hazards in the various departments such as waste paper baskets and the accumulation of combustible rubbish. Sanitation takes into consideration rotten apples and milk bottles that still hold some milk, and all sorts of garbage that may be distributed through the plant by the workmen. Safety hazard takes into consideration those machines where guards have been supplied and are not in place at the time of inspection.

The committee does not recommend new guards or new safety arrangements no matter where it may be.

This inspection runs in competition between departments in the individual plants and in competition with the other plants in the organization, and I want to say that the interest is very keen and no one department wants to have a lower percentage than any other department. Our superintendents are here today and they will vouch for that statement.

Another thing we created this year was a three months' No Accident Campaign running through the months of June, July and August, and had in addition the three independent plants; and the campaign has an appeal not only to our own organization but to the members of the independent organizations. It was something that had never been carried forth before and it created an interest which was unheard of in the past.

When we started the campaign, we had a mass meeting of the employees of all the plants and we finished the campaign in the same manner; we had as speakers men who talked the language of the men in the mill. Our main speaker for the opening of the campaign was Mr. Thomas Quigley. We ended the campaign with the executives of the cement plants only and we awarded a trophy to each plant completing the three months without a lost time accident.

For next year we have in mind our campaigns and also to go into the matter of physical examination. We are preparing that now and expect to put it into

effect on January first. It is the old ideas that we are trying to bring out in new clothing, and that I believe is the reason for the interest that we have carried along in our organization since the inception of the Pennsylvania-Dixie Cement Corporation.

MR. HARRISON: We would like to hear from some of you gentlemen in the Quarry Section. I haven't a list of your names so I cannot call upon you individually.

The Industry in Pennsylvania is Praised

THOMAS J. QUIGLEY (Department of Labor and Industry, Harrisburg, Pa.): By invitation of Mr. Fortuin, I got up here. I want to say that I feel at home in this meeting because looking around me I see so many Pennsylvania people here.

When it comes to accident prevention work, not because this is the cement meeting or joint cement and quarry, I want to say that no industry in the state of Pennsylvania is doing more for accident prevention work than the cement industry of Pennsylvania. They tell you about the wonderful records that some of the steel mills have established in Pennsylvania, the railroads in Pennsylvania, and other industries; but I say that the cement industry doesn't take second place to any industry in the state of Pennsylvania for accident prevention work.

During the No Accident Campaign in the month of June, it was my pleasure to attend about 44 different safety meetings in the interest of the No Accident Campaign. Not only did I attend meetings of the general quarrying industry, but limestone and everything else. For the first eight months of 1928, as compared with the first eight months of 1927, we have shown a reduction of 25 per cent in fatalities in the state of Pennsylvania. For the first eight months of 1927, we lost 28 lives in the quarry industry, that is quarries of all kinds, and for the first eight months in 1928 that number has dropped to 21. In 1927, we had 2,483 lost time accidents in the quarrying industry and for the first eight months of this year, we have dropped down to 1,318.

If we can continue in the quarry and cement industry for the balance of this year as we did for the first eight months of 1928, the cement and quarry industry of Pennsylvania, I believe, will lead all other industries in percentage of reduction in accidents, fatal and nonfatal.

To accomplish that we have had the most wonderful cooperation from all of the quarrying and all of the cement industries. Last week I attended eight meetings in the Western part of Pennsylvania. I went into a new field, into virgin territory to preach accident prevention work.

I went in among the refractory corporations. Never before had safety meetings been held; never before had any person attempted to talk safety to them or to show them how accidents could be prevented in refractory industries. Every plant that I visited had closed down their plants for one hour, paid all the men for their time and some of them even paid the contractors for their loss in the day's earnings to attend the safety meeting. When you get that kind of cooperation, gentlemen, whether it is in Pennsylvania or in Texas, in Missouri or Michigan, you cannot fail to have real, honest-to-goodness results. You are bound to make a success of it. You certainly cannot fail when you get that kind of cooperation.

But to the Cement Association in Pennsylvania belongs the credit for getting all the other quarrying industries working for safety. We can point with pride to the record made by the cement industries and they never failed to come with testimonial and information whenever we called upon them. I say that the records made in accident prevention in the state of Pennsylvania this year and the reduction which we have shown have been accomplished only through 100 per cent cooperation from the cement and quarrying industries; and I am satisfied that our new program which goes into effect January first for a continuous drive for

twelve months in 1929 will put Pennsylvania on the map and we will make the most remarkable showing for accident reduction that has ever been accomplished in this country.

MR. HARRISON: We would like to hear from Mr. Adam of the Lawrence Portland Cement Co.

D. A. ADAM (Lawrence Portland Cement Co., Northampton, Pa.): I just want to say a word this afternoon about something I have talked on before. That seems mighty easy, because if you repeat a thing several times, the sub-conscious mind comes into play and you don't need to care. But I do this because I see today, quite a number of new faces. Not new in accident prevention, but new in our cement and quarry meetings.

Interpreting Safety in Simple Terms

Some three years ago the idea occurred to me: Do the men grasp and know thoroughly what it is the foremen tell them? We all appreciate that the foreman is the key to the accident prevention work in a plant. I thoroughly agree with that; but when we place the responsibility on the foreman we put him in a position that he must answer for every man under his control.

Now, as I said, three years ago the idea occurred to me: Do the men in our particular industries know exactly what the foreman means or what he says? It puts me in mind of a story that illustrates the point.

It was at a dinner party and it was very quiet. One of the guests, to break the monotony, said to the hostess, who was a wonderful piano player, "Would you play for us?"

She played a selection of the great Wagner's and when she finished there was a dull lull. You all know. You have been in circumstances, where a dull silence comes over a company, and anything might happen. Well, that happened there. The lady who had been playing the piano said to the gentleman on her right, who was rather deaf, "Would you care for another before your dinner?", and he said, "No thanks, I had two before I came in." So I think the men sometimes do not really know just what is being said.

So, I decided to call the men together at twelve o'clock just after the dinner hour is over; I sit down and just talk for half an hour. I try to show those fellows why the foreman tells them to do certain things and why they should do them and also the reason why the foreman tells them to do them.

I also ask ever so many of our men questions about the regulation of our plant. "Do you know why you are asked to do that?" "No, I don't know. The boss said to do it."

That is the wrong attitude. If you tell a man to do a thing mechanically, you are certain to get results to a point, but you do not get the full cooperation that you ought to get and must necessarily get to put safety across.

It is the man who does the work that is apt to get hurt and not the foreman, and I felt that I was doing in my humble way a service to help the foreman, on whom we put the responsibility. I don't know whether it is these Thursday talks, but our accidents have tumbled down faster than ever before.

Ladies and gentlemen, we often hear people say, "Well, what is the good of going to a safety meeting? There's nothing new." I agree there, and I feel that when I come to a safety congress, I don't come with the intention of taking something new back to my plant in the way of ideas. But I do feel that I want to come to these meetings to go back with the encouragement and the endorsement given me by those meetings which are sponsored by the National Safety Council and those meetings which are sponsored by the Portland Cement Association.

I feel that when I go back I am on the right road, and it is up to you and me

and every one of us in our respective organizations to solve our own problems because in each and every plant the problems are entirely different. The superintendent and the foreman and the men are different and the environment is different. So I say it is up to ourselves and we must do one thing. We must think.

I read in the paper the other day that only 53 per cent of the American people in organizations think. That is just about right because they say only 51 per cent vote. Out of that 50 per cent, 30 per cent don't get anything out of the thinking, which leaves 20 per cent. Now, I am not going to tell you about the 20 per cent.

MR. HARRISON: I would like to call on Mr. E. H. Perry, safety director of the Glens Falls Portland Cement Co.

A Long Hard Pull to Safety Success

E. H. PERRY (Glens Falls Portland Cement Co., Glens Falls, New York): I really don't know what I can say to you unless I give you a little personal history of the safety work in my own plant. We are rather out of the line entirely and we don't have a great many visitors, and unless one of our men happens to be at one of these safety meetings perhaps our progress in accident prevention is not very well known.

About three years ago, my company went into an extensive accident prevention campaign, with the idea of not getting large results the first year, suffering a reaction the second year and seesawing back and forth like that. We have tried to lay our plans so that we would have a good substantial reduction each year and keep up that reduction until we got down to what might be called the irreducible minimum, and since I have been identified with the company, I have been able to report that we were making improvement; but I never have been able to report that we were in the trophy club for any great length of time.

Three years ago we had some 42 lost time accidents. We went over the problem and the year after we were able to show a record of 18, which was a good improvement. Since then, we have cut it down to 10 and so far this year, we are down to two; so we feel that our plan is more or less sound and that we are gradually getting over our proposition to the men.

The men are taking hold of it and our accident prevention work is getting down to the point where we must scratch right down and get at the cause of these accidents.

Now the peculiar thing is we started out with all kinds of hopes this year of being a member of the trophy club; and we were until May 30th, a holiday, when a man was injured. We were pretty discouraged but at the same time we went at the job and continued until Labor Day when we had another accident. The peculiar thing about it was that both accidents were fractures of the same bone of the same foot of these two men, and they both happened on holidays when no man was supposed to work. Whether that had any connection with the accidents or not, I don't know but they were not necessary accidents at all.

We are most discouraged and regret the fact that we cannot come to one of these meetings and report that we are members of our Cement Association Trophy Club. At the same time we are interested in climbing up in the list, and while we are not contenders for any trophy, we do feel that our safety work is getting results, and that really is the purpose of all safety work.

I don't think that there is anything else that I can tell you fellows except that I want to express my appreciation for being selected as vice-chairman of the Cement Section. I don't admire your choice but at the same time, I am glad to be mixed up in it and glad of the opportunity to do a little more work. I am sure if Mr. Town is in need of a good vice-chairman, he will find me perfectly willing to help him out in every way I can.

MR. HARRISON: Will Miss Weeder, of the Jay & Portland Cement Co., tell us something of the welfare work they are doing?

MISS J. A. WEEDEE (Jay & Portland Cement Co., Egypt, Pa.): I have nothing special or exciting to add to what has already been said. We are not members of the trophy club but we hope to become so during the coming year. We are gradually coming down from a rather high record to two in 1928, and we are going to make every effort to get one of those trophies.

MR. HARRISON: Mr. Cline, of the Universal Portland Cement Co.

J. R. CLINE (Universal Portland Cement Co., Pittsburgh, Pa.): We give every man in our plant a physical examination. This week we have just finished the second examination for the second year. It pays. The men like it and there have been a number of them benefitted by the suggestions given by the doctor. The first few of them who knew they had physical weaknesses of some kind, tried to keep from being examined, but they have come around with suggestions of how they can be benefitted.

We also have group life insurance.

MR. HARRISON: Is Mr. Switzer present?

E. C. SWITZER (Petoskey Portland Cement Co., Petoskey, Mich.): Our experience has been that in 1925 we had a very bad year in lost time accidents and one fatality. We have since that time been improving our record; in 1926, we had three lost time accidents and in 1927 two, and we have had one so far this year, so that we are making progress. We hope to get in the trophy class. Our expectations are to keep at the thing and work until we do. The contest for the trophy has been a very great incentive to progress in safety work with us as with all the other plants of the Association.

Accident Frequency the Important Guide

H. W. HEINRICH (The Travelers Insurance Co., Hartford, Conn.): I want to say just a word in regard to the value of the so-called lost time accidents as a guide to effective accident prevention work in the quarry and cement industries.

It is inspiring to hear man after man get up and recite the experiences in his particular plant. I have no quarrel with that. Surely the reduction of lost time accidents is a very good measure of effective safety work. It is the result we hope to attain, but as a guide to accident prevention and lost time accidents, it is not so good a point to use. It is not so good for instance as frequency of all accidents.

In the very interesting meeting the Metals Section had this morning, one of the speakers referred to the common type of traffic accident where a man driving an automobile across a railroad grade crossing is injured by a passing train. It was referred to in one sense as an unavoidable accident. I want to use that as an illustration in regard to the value of lost time or serious accidents.

In the case of that kind, it is possible of course that a man may, the first day he buys a car, the first mile he drives it, and the first railroad grade crossing he passes, be struck by a train; but it is much more likely that he has driven across railroad crossings many times without stopping to look or listen and is finally struck.

The point I wish to make in connection with that is that the one accident that finally results from a long series of unfortunate mishaps is merely the result of a great many setups of the same situation, and so when it finally does occur, a man is hardly justified in saying that this is the first time I have ever driven across a railroad grade crossing without stopping to listen. He has done it many times before. An effort has been made to determine how many times a man does the same thing that finally results in an accident, or finally results in injury (let me put it that way), and it has been estimated to be from 30 to 40 times.

The point is that there are 30 or 40 opportunities for a good live supervisor who has accident prevention work at heart to see and to control and to observe and to correct these conditions that run along so many times before they finally result in accident.

To go back to my first point, as a better guide to effective accident prevention work, I would take any accident, because not having an accident is nothing but luck and cause is nothing but luck. The accident, however, is not luck. The accident is controllable, but whether through inattention or through some extraneous circumstances, whether the accident results in a serious injury or minor injury, is purely a matter of luck; then why choose the one accident out of 30 or 40 as a guide to prevention instead of 30 or 40 all of which are the same and all of which may lead to a serious accident?

If a man slips and falls or drops something or knocks against an obstruction, those are so-called causes of accidents. A man fumbles something in his hand and lets it drop; it may result in only striking the foot, it may strike one toe and cause a slight injury, and it may strike his instep and cause a lost time accident; but either there is no accident, a slight accident, or a serious accident, and all three of these are a better guide than the one accident which happens to result in lost time.

Improper Use of Electricity Causes Accidents

In this meeting reference has been made to electrical apparatus as a cause of accident. I want to point to the fact that electrical current is a friend to industry if properly used. It is a powerful, effective and useful giant, and a friendly giant. Far from being the cause of accidents, if properly used, electricity might be easily considered the reverse. I understand thoroughly the position of the gentleman who made the remark about 20 per cent of the accidents in the cement industry being caused by electrical current, but he used the term "caused" and although the mere matter of words is of little moment, yet it means something in so far as we use causes in order to correct the conditions that promote injuries.

Electrical current in the instance that he cites was properly not the cause at all. If, through mishandling, electricity causes injury, then the mishandling is the thing that we want to drive at and we needn't necessarily be afraid of current. If the wiring was improper, if sufficient ground was not provided, or if the installation was imperfect, those things of course through the medium of electricity may cause injuries; but I assert that the cause is something other than electricity. And so again in closing, I want to say that the value of any accident, the value of minor accidents, the value of all accidents is a much better guide than is the lost time accident.

The result that we are aiming at is, of course, the reduction of lost time or the serious accidents which we can achieve through concentrating our efforts upon all accidents.

CHAIRMAN TOWN: Mr. Harrison, has anyone any suggestions that he can give to help us out concerning the screw conveyor accident? We all know that the screw conveyor constitutes one of the greatest hazards in the cement industry, probably around some of the crushing plants and quarries, but certainly around cement plants. Has any one anything favorable to offer on the proper avoidance of accidents due to screw conveyors?

WILSON W. RITTER (State Workman's Insurance Fund, Harrisburg, Pa.): Being quite familiar with conditions from an accident and frequency standpoint throughout Pennsylvania, if I were to leave this meeting without saying a word of commendation to the cement industry in the Allentown district, I would really feel condemned.

My friend Mr. Cortell, from Pittsburgh, has said quite frequently that there is more safety per square foot in the Pittsburgh area than any place in the United States. I cannot agree with him. I want to say that there is more safety per square foot in the Allentown district than any place, I believe, in the whole world.

Now, why are they obtaining such remarkable results? Briefly, simply because every man from the general manager on down to the fellow in the ranks is 1,000 per cent strong for safety always. They are obtaining these results by proper safeguarding, by education, proper medical facilities, etc.

A. E. SNODGRASS (Louisville Cement Co., Louisville, Ky.): We are not members of the trophy club but we have a record of thirteen months without an accident. The reason why we are not in that bunch of plants is because we endeavor to get it within a calendar year.

We have our regular monthly meetings and discuss the near-accidents, and it is very amusing to hear the men talk about those accidents which might have been serious but which got by without hurting anybody.

One of our men spoke about putting three or four tons on a one ton chain block, and they put it up to the foreman: "If you saw your men putting a three or four ton block on a one ton block, what would you do?" The foreman said, "I'd tell them to go ahead this time but don't do it any more."

This gentleman's remark impressed me that we are playing in mud rakers. In other words it's the frequency that we should work on. We had 608 accidents in 1926 and one lost time accident; and in 1927, we had 354 accidents of all kinds and one fatality. So it is the number of near-accidents or minor accidents that is the barometer. In other words we had 354 chances and killed one man, and we had 608 chances in 1926 without killing a man. So, I think, as the gentleman who preceded me says, it is the number of chances we take rather than the severity that measures our progress.

An Exception to the Word "Luck"

G. E. DAVIS (Universal Portland Cement Co., Chicago, Ill.): I cannot help but take exception to the word "luck" being used in accident prevention. If we are going to accept it as luck, we had better stop right now. Accident prevention and the reduction of accidents must be the result of work. We must get behind this movement. We must reach the working man.

We all realize that we must start at the top, with the management. We have been doing that for the past twenty years in the United States Steel Corporation. Start right at the top and go right down through the superintendents and the foremen. That is the key to success, but you must get down to the man himself, and that is the question and the problem today—how to keep interesting the man in safety?

I often tell our men that there is a right way to do everything. There is a right way and there is a safe way, and we keep working to that end, working to prevent all accidents no matter what they are.

H. W. HEINCICH (Travelers Insurance Co., Hartford, Conn.): May I reply to that gentleman? I know that I have difficulty in expressing my thoughts, but I am quite sure that the audience in general hasn't taken the same interpretation of my remarks that the gentleman has. However, it may be so and I would like to repeat again I most certainly agree with this last gentleman who has spoken.

Accident prevention is not luck, not by any means. Accident prevention is not luck, not by any means. Accident prevention is a science. It is based upon known laws, and boiled down to its simple fundamentals, it is nothing but finding the cause of a certain trouble and removing that cause if possible.

What I did say about luck, however, was just this: That once the accident happens, which we gentlemen are here to prevent not through luck but through work

—once that accident has happened, its degree of severity is largely a matter of luck.

A. J. EALES (Bessemer Cement Corporation, Bessemer, Pa.): With regard to that, I take exception. I think there is such a thing as luck. While we want to cut out accidents and are working for that, the only accident we have had this year in the cement plant was when a laborer from outside came in to work on the fountain. He put in some cast iron pipe and there was a small piece on the pipe that we wanted out. We just knocked that chip off and it struck one of the workmen in the eye and laid him off for a month. I might call that a luck accident. It was done by an outside man entirely. It loses us a chance for the trophy this year, and that might be luck.

A year or two ago, I saw a safety film showing the method of grating and chaining a hole as we used to do in our quarries. That is take four pieces of fuse and a stick of dynamite on the end and drop it into the hole. That was shown as a safety practice. Until two years ago, we had a man doing the same thing. He had been doing it for six or seven years when one day something attracted his attention and he didn't drop the stick of dynamite in the hole and it went off in his hand and killed him.

We have changed that now. We have a small battery to lower the charge down in the hole and then set it off.

In the early part of the discussion, the mental attitude of the workers was mentioned. We don't know the mental attitude of the worker in this particular case. After he was killed his fellow workers said, although he had been handling that job for six or seven years, he was always afraid of the dynamite. He always figured that he would be knocked off with it. We never knew that or we might have changed it.

A short time after the accident occurred we had a man in the packing department who was riding a car down to the packing house and he sideswiped another car and the man claimed that he had his one leg crushed between the two cars. It did not show any bruises or any damage to the limb at all, but yet he would not put the foot to the ground at all. Feeling that the best thing to do was to have an x-ray taken, we loaded him in the car and took him to the doctor to have an x-ray taken. He screamed when we carried him in the x-ray room and put him on the table to have the picture taken. I waited for the picture to be developed and it showed no break at all. I said, "There are no bones broken and you are all right." He got off and walked to the car and went right back to another car. This shows the mental attitude of the men which you must take into consideration. There are some men whose mental attitude is strange.

The fellow is an excellent worker and we kept him on the job. About two weeks ago he got some cement dust in his eyes. It was taken out locally but still he claimed there was some in his eye, and so I said, "We'll load you in the car and take you to town to an eye specialist." We took him to an eye specialist and he said there was nothing there. He put a few drops in his eyes and the man went back on the job satisfied.

So there are mental attitudes that we must take into consideration. Otherwise, we will get some real lost time accidents.

We have been very fortunate in the accidents in our quarry although we have had some fatal ones. We have been trying hard for the trophy and we rather seem to have a different spirit entirely. Last year we had one accident which cut us off from the trophy. We had one this year that cuts us out.

We had a case where the local doctor said he could not get the chip out of the eye. We took the man downtown to the doctor and the steel wasn't magnetic enough and we couldn't get it out with the magnet there. So we took him over to Youngstown where they have a larger magnet, but they weren't able to get it out either. The eye specialist suggested taking the eye out and said that was the only thing that could be done. This was over twelve hours later and no infection had

set in so I wouldn't let them take the eye out. That afternoon we took the man to Pittsburgh. They put him under an anaesthetic, turned the eyeball out and took the particle out and that man has his eyesight today.

MISS J. A. WEEDE (Jay & Portland Cement Co., Egypt, Pa.): I am awfully sorry to have to get up, but I see the doctor isn't here. You have to know all the inside story of a case in order to appreciate it.

The eye is a very delicate organ, and while the one eye may be all right, there is such a thing as having an injury in the other eye and by sympathetic action it is possible to lose the sight of both eyes simultaneously.

An Unfortunate Accident in the Quarry

G. W. BROWNELL (North American Cement Co., Hagerstown, Md.): I just want to say a word in connection with the element of luck. We have three cement and lime plants, and after plugging mighty hard for safety in 1925, we were awarded the safety trophy. In 1926, our Berkley quarry operation was awarded that trophy, and then again in 1927, our Security Mill operated from January first until November sixteenth without a lost time accident. The accident that made it impossible for us to finish the year as a member of the trophy club was undoubtedly due to bad luck. Again this year we went up until July thirteenth. It was Friday, July thirteenth, without a lost time accident.

In the case this year it was the safety man who lost his life. The first thing in the morning, about six-thirty just before the pillars and shuttle operators went to work, this man being accustomed to go over the place and look for dangerous spots in stone, was at a place where there were several over-hanging stones. He was standing above them prodding down with about a ten foot rod in, I believe, the most approved safety manner, and the stone he was standing on slipped.

About three or four ton of material, of clay and stone, dropping from above, wouldn't have been a hindrance had he been over a little ways and only thirty feet up the face, but he went down with that slide and a small stone, comparatively small—probably a cubic foot—hit him and gave him internal injuries and he died five hours later. I contend that was luck. The man had a reputation for safe working. He was doing a safety act and doing it in an approved manner. I think that was bad luck that kept our Security Mill from finishing any year to date as a member of the trophy club.

MR. HARRISON: One November, we ran 27 days without an accident and the engineer one day stuck his finger in the releasing lever. That ruined the November accident record. We thought we could obtain a clear record during December but on the second of December in going through the engine room, I asked the chief engineer how the accident had occurred and he stuck his finger in it and we had one more accident and one demonstration.

I have read Mr. Heinrich's paper on the Origin of Accidents, and I think anybody reading that article will thoroughly agree with Mr. Heinrich.

(Chairman Town resumed the chair.)

CHAIRMAN TOWN: I think that we will all agree that these discussion periods are highly interesting and educational. It occurs to me that we may possibly have fallen short in a measure from the amount of good we might have obtained, had we laid out our lines of discussion in certain definite directions, and possibly appointed a man to start a discussion along certain definite lines which had been causing the greatest trouble and perhaps been conducive to the greatest number of accidents around the plant, and then drawing out of the discussion ways of preventing those accidents. That possibly could have been worked out in a satisfactory manner and may be something for the Program Committee to think of for next year's session.

A. J. EALES (Bessemer Cement Corp., Bessemer, Pa.): Where we have a free open discussion we hear the other fellow's accidents and they logically come one from the other and I think we get further ahead that way than assigning subjects.

CHAIRMAN TOWN: Just the way they have done this afternoon. Then there is one other thing that occurs to me—one afternoon is far too short for discussions. They are certainly very interesting and much good can be derived from them.

A. C. GOOD (American Limestone Co.): I would like to voice a protest which I understand was made at your meeting this morning, and that is that the future meetings of the Quarry Section and the Cement Section not be held at the same time because there are many of us who want to attend both and we cannot.

CHAIRMAN TOWN: I think that is a very timely remark. As you say, it was mentioned this morning and I believe it will be possible for the Program Committees of the two sections to confer with each other and concur in the program arrangements which will enable those of either section to attend interesting parts of the meetings of the other section.

Is there anything else to be brought before the meeting adjourns?

I feel that this has been a very helpful session and we look forward each year to making the program more and more interesting.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Chemical Section

New Section Officers

General Chairman—DR. LEONARD GREENBURG, U. S. Public Health Service, Yale Medical School, New Haven, Conn.

Vice-Chairman (In Charge of Program)—C. F. WHITEMORE, Western Electric Company, Chicago, Ill.

Vice-Chairman (In Charge of Membership)—E. C. ROGERS, The Grasselli Chemical Company, Cleveland, Ohio.

Secretary—G. E. MINSHULL, duPont Rayon Company, Buffalo, N. Y.

Poster, Slide and Safety Kink Committee Chairman—GEORGE H. MILLER, E. I. du Pont de Nemours & Co., Wilmington, Del.

Publicity Committee Chairman and News-Letter Editor—JOHN ROACH, Deputy Commissioner of Labor, State of New Jersey, Trenton, N. J.

Industrial Poisons Committee Chairman—S. E. WHITING, Liberty Mutual Insurance Company, Boston, Mass.

Engineering Committee Chairman—A. L. ARMSTRONG, Eastman Kodak Company, Rochester, N. Y.

Statistics Committee Chairman—CARL F. COFFELT, Victor Chemical Works, Chicago Heights, Ill.

Executive Committee: THE OFFICERS AND

S. H. KERSHAW, National Safety Council, Chicago, Ill.

I. V. KEPNER, Pennsylvania Salt Manufacturing Company, Philadelphia, Pa.

J. S. SHAW, Hercules Powder Company, Wilmington, Del.

PROF. C.-E. A. WINSLOW, School of Medicine, Yale University, New Haven, Conn.

H. C. PARMELEE, Chemical and Metallurgical Engineering, New York City.

DR. H. E. HOWE, American Chemical Society, Washington, D. C.

L. A. DEBLOIS, National Bureau of Casualty & Surety Underwriters, New York City.

C. E. RICE, The Dow Chemical Company, Midland, Mich.

WILLIAM A. BAXTER, The Newport Company, Milwaukee, Wis.

H. L. MINER, E. I. du Pont de Nemours & Company, Wilmington, Del.

RALPH O. KEEFER, Aluminum Company of America, Massena, N. Y.

M. W. SCHWARZ, Consulting Chemical Engineer, New York City.

Retiring Officers

Chairman, DR. LEONARD GREENBURG, U. S. Public Health Service, c/o Yale Medical School, New Haven, Conn.; *Vice-Chairman*, C. F. WHITEMORE, Western Electric Company, Chicago, Ill.; *Vice-Chairman*, E. C. ROGERS, The Grasselli Chemical Company, Cleveland, Ohio; *Vice-Chairman*, C. E. RICE, The Dow Chemical Company, Midland, Mich.; *Secretary*, WILLIAM A. BAXTER, The Newport Company, Milwaukee, Wis.; *Poster, Slide and Safety Kinks Committee Chairman*, H. L.

MINER, E. I. duPont de Nemours & Company, Wilmington, Del.; *Membership Committee Chairman*, E. C. ROGERS, The Grasselli Chemical Company, Cleveland, Ohio; *Publicity Committee Chairman*, CARL F. COFFELT, Victor Chemical Works, Chicago Heights, Ill.; *Industrial Poisons Committee Chairman*, S. E. WHITING, Liberty Mutual Insurance Company, Boston, Mass.; *Program Committee Chairman*, C. F. WHITEMORE, Western Electric Company, Chicago, Ill.; *Engineering Representative*, A. L. ARMSTRONG, Eastman Kodak Company, Rochester, N. Y.; *Statistics Committee Chairman*, C. E. RICE, The Dow Chemical Company, Midland, Mich. *Executive Committee*: THE OFFICERS AND S. H. KERSHAW, National Safety Council, Chicago, Ill.; I. V. KEPNER, Pennsylvania Salt Manufacturing Company, Philadelphia, Pa.; J. S. SHAW, Hercules Powder Company, Wilmington, Del.; DR. C. L. REESE, American Institute of Chemical Engineers, Brooklyn, N. Y., c/o E. I. duPont de Nemours & Company, Wilmington, Del.; PROF. C.-E. A. WINSLOW, School of Medicine, Yale University, New Haven, Conn.; JOHN ROACH, Deputy Commissioner of Labor, State of New Jersey, Trenton, N. J.; H. C. PARMELE, Chemical and Metallurgical Engineering, New York City; A. L. WATSON, The Koppers Company, Pittsburgh, Pa.; DR. H. E. HOWE, American Chemical Society, Washington, D. C.; L. A. DEBLOIS, National Bureau of Casualty & Surety Underwriters, New York City.

October 1, 1928

LEONARD GREENBURG, Ph. D., Chairman
U. S. Public Health Service, Yale Medical School
New Haven, Conn.

The first session of the Chemical Section at the Seventeenth Annual Safety Congress was called to order at one-thirty o'clock by the chairman, Dr. Leonard Greenburg, United States Public Health Service, Yale Medical School, New Haven, Conn.

CHAIRMAN GREENBURG: It is hardly necessary for me to welcome the members of the National Safety Council to this meeting. To our guests we extend a most cordial and hearty welcome and hope that they will take a most active part in the discussions at all of the meetings.

The Chemical Section is but one of the activities of the National Safety Council as a whole. It is well to bear in mind the fact that the Chemical Section does not belong to the officers of the Chemical Section, to the chairman individually or to the officers collectively. The Chemical Section is your section. It belongs to each and every one of you individually. If the Chemical Section is going to accomplish a great deal in the next year it is going to do it because each and every member of the Chemical Section contributes some little bit to the help and support that the officers and the people who correlate all these activities require.

Safety Prospers Through Cooperation

I can't emphasize too strongly the fact that the Chemical Section requires help from everybody interested in safety in the chemical industry. To all of the men who act in the field with the everyday problems of safety and the prevention of the minor as well as the larger accidents, the Chemical Section appeals for help and advice.

I want everyone here to feel, and the officers of the section have asked me to call your attention specifically to the fact, that at this session and every other session you are free to discuss any one of the papers on the floor and contribute such ideas to the discussion as you seem to feel are pertinent.

During the past year the Chemical Section has made fair progress. Certain parts of the work flourished very well and other parts seem to be highly deficient. We had an excellent mid-year meeting at Newark, N. J. I think the attendance was about 150. The discussions appeared to be very well rounded and we received favorable comment from it. Based on last year's experience as well as the experience of previous years we are going to have another mid-year meeting. They usually take place in about March or April. We feel that the mid-year meeting is an important contribution to the safety movement in the chemical industry because it carries the message of safety to each particular locality. When we have a meeting here in New York it is difficult for the people in the Middlewest to take an active part; but if we can go to Chicago or Akron and have a Chemical Section meeting we bring the problem right home. It seems to us that this should be continued in the future.

Safe Practices Pamphlets in Progress

The production of the Safe Practices Pamphlets has been very successful in the past year. We have one or two of these in progress at this time and after we get a few minor points adjusted we will be in a position to release these at once. The monograph on safety in the Chemical Industry, which has been under way for some three years now, is slowly but surely coming to a finish. We hope it will be ready for the press early in 1929.

On the other hand, contrasted with these achievements, we have had poor success with the *News Letter*. The *News Letter*, by the way, is the medium by means of which we try to pass out to all the individual members of the Chemical Section the inner workings of the Chemical Section during the previous month or two. The *News Letter* must be written by some one who is in intimate touch with affairs as they progress during the interim, therefore it falls back on some one who is taking an active hand in Chemical Section matters. Unfortunately, that person is usually pretty busy and it adds another duty to his long list. But we must do something constructive about the *News Letter* this coming year in an attempt to keep all of the members in closer touch with the progress of the chemical industry.

Increasing Membership Adds Experience in Safety

I must close by asking that every member of the Chemical Section attempt to bring in as many new members as he possibly can. It is only by increasing the number of members and the facts as to how to prevent accidents in the chemical industry that we can pass the good word around and continue to bring down the rate for accidents in this very, very rapidly growing industry.

This afternoon we have one speaker, Dr. Parmelee; and after Dr. Parmelee's talk we are going to have a round table discussion on safety in the chemical industry. The primary object of this discussion is to allow everyone to exchange ideas about his problems. We hope everybody will take part in this second discussion. It is primarily intended so that everyone can benefit by the other fellow's experience and so that everyone can tell us about the unique happenings in his plant which have either made accidents or circumvented them.

It is a great pleasure to introduce Dr. H. C. Parmelee, editor of *The Journal of Chemical and Metallurgical Engineering*, whose long experience has certainly given him an extended and broad view of what each of us see as smaller problems in our own field. Dr. Parmelee has just been abroad where he has been in intimate contact with developments on the continent, and I am sure he will have something very interesting to tell us.

Safety in Chemical Engineering

By Dr. H. C. PARMELEE

Editor, The Journal of Chemical and Metallurgical Engineering,
New York City

One of my editorial colleagues likes to compare his job with that of the forest ranger who climbs to the lookout tower to get a broad view of his surroundings. Of course there are times when an editor—like everybody else—wants to keep his feet on the ground. But for this occasion I should like to detach myself as far as possible from the very important and practical details of safety work in chemical plants in order to view the broader problem of the industry as a whole.

Chemical manufacture involves, in addition to many of the common problems of all manufacturing industries, at least three types of hazards that are peculiar to the chemical engineering group, due largely to the character of the chemical raw materials used. Perhaps the most inherent hazard of chemical manufacture is that of poisoning caused by human contact with toxic material. In the case of vapors such as benzol and cyanogen, the poisoning is through the lungs. In the case of many other products, such as aniline, cyanamid and lead compounds, entrance to the human system is through the skin or through the mouth. The second type of hazard is from burns caused by corrosive liquids. In its entirety, this assumes a very serious menace.

The third, and in many ways the most serious of the chemical hazards, is that from fire and dust explosions.

For all three of these types of hazards, we have built up in this country a tremendous mass of knowledge of prevention as well as adequate physical machinery and equipment for putting these preventive measures into practical effect in our industries.

In the field of occupational poisoning, the studies of the United States Public Health Service, of the various state and local departments of health, and of various independent agencies, have been of immense value. The National Safety Council itself has played a most important role in effecting the practical application of these studies to manufacturing conditions. I am reminded immediately of the splendid cooperative work of your Committee on Benzol Poisoning. Considerable credit should also be given to intelligent management in the industries involved and to the manufacturers who have perfected safety devices and various mechanical safeguards to chemical plant hazards.

Judged by the tremendous loss in life as well as property, the fire and dust explosion hazard commands most serious study. A recent estimate based upon census figures is that 28,000 plants in the United States employing over a million persons and with an annual production of ten billion dollars, are subject to the hazard of dust explosions. In this field the splendid work that has been carried on for a number of years by the Chemical Engineering Division of the U. S. Department of Agriculture under the direction of D. J. Price, has given industry detailed technical knowledge of all of the factors involved in this important problem. Dusts and fumes have been catalogued according to their explosive characteristics. Oxygen and air ratios for safe operation are known. Simple tests have been devised which any chemical manufacturer can use in his own plant to determine whether or not a hazard exists in his manufacturing operations. And for those who are not willing to devote even this minimum attention to the problem, the Department of Agriculture has offered to test the explosive characteristics of any sample of dust sent to it by manufacturers and to report on the preventive measures that should be employed.

I am reminding you of this information and equipment because I believe that its availability places a serious responsibility at the door of the chemical industry.

Unless the chemical industry itself is willing to put its own house in order by applying this information and equipment in its own plants, it may very well expect to be forced to do so by governmental order. Self-regulation is always to be preferred to bureaucracy—no matter how intelligently or sympathetically the latter is applied. We have only to cite the foolish obstacles that the prohibition bureau has at various times placed in the path of legitimate chemical industry to appreciate the withering influence of government regulation. This sort of thing is going to spread unless industry is on its toes to prevent it. Witness the case of the so-called "caustic acid act" that a recent session of Congress put on the statute books of the country. Designed presumably to protect the woman in the household who buys a can of lye from the corner grocery or a bottle of muriatic acid from the drug store, the bill actually contains provisions so broad in character as to penalize established industry in the inter-plant exchange of chemical raw materials. Had the chemical industry protested effectively against this measure, it might very well have prevented this encroaching of bureaucratic control and inspection.

I have in mind another example which strikes a little nearer home with some of us. In May, 1925, the manufacturers of a well known brand of anti-knock motor fuels voluntarily withdrew their product from the American market because of an opposing public opinion, fanned by a hysterical newspaper crusade against its alleged hazard to the general public. An elaborate and costly investigation was made by governmental authorities and after about eight months, the company was permitted to sell its product provided it observed certain rules and regulations set down by the United States Public Health Service. This loss of business and handicap in regaining the good will of the public would have been avoided had the manufacturer anticipated the necessity for a regulation in the sale of the product.

In this case the manufacturer was penalized because he failed to recognize responsibility to the ultimate user of the product. I recall a similar instance a few years ago where a type of fire extinguisher—inherently dangerous for use in fighting a fire in a closed space—was used with disastrous consequences in extinguishing a blaze in one of the New York subways. Had the manufacturer taken the proper precautions, the extinguisher would not have been sold for this purpose. On the other hand, we do often see industries that offer remarkable examples in handling dangerous commodities. By properly recognizing the hazard and taking the necessary precautions, the explosives industry has an accident rate that is less than soap making or coal-tar distillation.

Another chemical industry just now in development offers a real opportunity for safety work and is already making remarkable progress in this direction. I refer to the new era of high pressure technique that has its principal application in the air-nitrogen industry and in the synthesis of methanol. Operations in these processes frequently use pressures ranging up to 4,000 lbs. per square inch and sometimes mounting as high as 1000 atmospheres (15,000 lbs. per sq. in.). As these reactions are carried out in the gaseous stage and as the temperature ranges as high as 700 deg. C., it requires little imagination to foresee the effect if only a single joint were to let go. And in addition these extremely severe conditions are often complicated by difficult corrosive problems. This explains in part why these processes have only recently attained special importance. Of course they have had to wait on proper development of the processes themselves and upon favorable economic conditions, but the impossibility of equipping such plants up to the last few years has been a strong deterrent.

Now, however, the metallurgist has provided the chemical engineer with new materials which retain strength at high temperatures and pressures and in addition resist corrosion to a degree which practically precludes equipment failure from this cause. Such are the chrome-irons and chromium steels. But even with

the material available, the present rapid increase in high pressure processes could hardly have occurred if the technique of fabrication had not kept pace with the improvement in constructional materials. As an example, it is now possible through improvement in welding, both electric and oxy-acetylene, to construct vessels which may be tested to the actual elastic limit of the metal whereas with riveted construction, joint leakage, so serious as to amount almost to failure, would set in at perhaps half this figure. Welded vessels may be tested to actual destruction and thus permit improved design. They may be tested to give any desired factor of safety and retested from time to time to insure continued safety of the operation. With this improvement in fabrication there have also been developed methods of testing that permit the maker and user to know that this equipment is safe. This scientific, intelligent inspection may point the way to worth while precautions in many older industries.

In closing, I would summarize these remarks by emphasizing again chemical industry's many responsibilities as far as safety is concerned. Its economic responsibility is not to be ignored. Any safety program pays directly or indirectly. Some pay immediate returns in eliminating waste and recovering products of value. Other dividends come indirectly through lower insurance premiums for these are or should be based on the results of actual experience. But greater than any other is the ethical responsibility. A chemical executive can, with his stockholders' assent, take any chances he pleases on property or equipment but just as soon as his gamble involves the possible loss of a single human life, he violates his industry's responsibility to the general public. You men through your control of this safety function have the means of building or destroying the position which American chemical industry holds in the public esteem. The responsibility is in good hands if you continue the intelligent, progressive work of the chemical section of the National Safety Council.

CHAIRMAN GREENBURG: I am sure we are very grateful to Dr. Parmelee for his very interesting and cautionary discussion. There is evidence that there is a growing tendency among chemical manufacturers in putting out new products to test the toxicity of these products before they are put on the market. Such is the case with two new products. I happen to know and there must be a great many more.

Dr. Smith, of the University of Pennsylvania, who happens to be here, has done considerable work along these lines testing the poisonous qualities of new chemical compounds being put on the market for industrial organizations.

Dr. Parmelee's very timely warning about high pressures and corrosive substances at high pressures should be borne in mind by every one who is interested in producing products by these methods.

I think that perhaps we lull ourselves into a feeling of security when everything goes well. We have had a recent example of this in New York City where the subways carry ever so many people with a very high degree of safety and only here recently a disastrous accident took place. It just means one thing, and that is that we must always be on our toes watching for the slightest break in what the surgeon calls his aseptic technique in order to prevent disastrous accidents taking place.

This subject is open for discussion and if anyone desires to contribute we would like to hear from him. I am sure Dr. Parmelee will be happy to answer any questions that arise in the mind of anyone.

R. O. KEEFER (Aluminum Co. of America, Massena, N. Y.): I was wondering if this would be the proper time to inquire if any of the men here have had experience with pitch dust explosions recently, or will that come later?

CHAIRMAN GREENBERG: That may possibly come under the round table dis-

cussion of safety, but if anyone has had any experience with it, perhaps he will tell us of it.

MR. KEEFER: That is coal tar pitch, 110 degrees.

CHAIRMAN GREENBERG: Have any of the coal tar people here had experience along these lines? I am afraid we can't answer your question, Mr. Keefer.

If there are no other questions, I will turn the chair over to Mr. John S. Shaw, manager of the Safety and Service Division of the Hercules Powder Co., Wilmington, Del., who is going to lead the round table discussion.

(Mr. Shaw assumed the Chair.)

CHAIRMAN SHAW: Gentlemen, this is rather an experiment. They tell me that they have never opened an informal meeting like this before. You should all feel free to discuss your problems and to ask questions. We will try to find the proper authority to answer them.

I am going to call on John Roach, Deputy Commissioner of Labor of the State of New Jersey, to tell us the status of the chemical industry today in regard to accident prevention from the viewpoint of the labor commissioner. Mr. Roach!

Observes a General Improvement

MR. ROACH: I think there has been a great improvement in the general working operations in plant administration and in a sympathetic plant policy toward accident prevention in the chemical industry during the seventeen years that I have been connected with the New Jersey State Department of Labor.

I don't mean to imply that the industry now is so safe that the rating board would be warranted in placing it in the same column with some of the other risks that are rated extremely low because of the lack of physical exposures, but I do say that at least in our state, chemical production is carried on in a large way on a large scale, plenty of capital back of the industry, with engineering departments organized and developed to investigate the safest methods of industrial procedure, so that a very large part of the industry is covered by the very highly skilled supervision that naturally reflects itself in a low accident frequency and severity.

Of course, the chemical industry is a little different from some of the other industries where unusual hazards are not present. It has its structural risks, its exposure to complicated and dangerous machinery, and the risk that comes from the employment of labor that perhaps is not overly intelligent and oftentimes can't understand the language of the supervisor. Then, in addition, we have to remember that the chemical industry has the risk that comes from handling poisonous, explosive, and corrosive substances that are unusual in themselves and of course offer a greater form and variety of accident possibility than most industries.

I know, through the operation of the numerous safety councils and the very intelligent engineering service that has been afforded by many of the insurance carriers in the state, a general plant policy seems to prevail, and the chemical industry of our state inspires the management to provide competent and satisfactory supervision. I would say that this is a matter of major and primary importance—intelligent, comprehensive, and satisfactory plant supervision. Where it is lacking, accidents do result, and then the moral responsibility for those industrial tragedies can't be avoided by the management.

You might say, "Well, what is meant by plant supervision?"

I was in a chemical plant some time ago where evidently there hadn't been plant supervision. It was during the extremely hot weather. One of our men discovered that in this particular plant a 1500-pound drum of phosgene was located in the open, exposed to the blistering glare of the sun. The plant manager wasn't even aware that the fluid developed pressure from heat above the ordinary room temperature, with the result that unless we had corrected that kind of supervision

the chances are that that drum would have burst and an accident would probably have resulted.

You can't get away from good plant supervision. If you don't have that in industry, all the other precautions that may be adopted are visibly neutralized.

In the old days we worked in a chemical plant and found all kinds of machine exposures. They didn't seem to know that men were liable to accidents from gears and exposed belts; but they do now, and I think if we were to traverse the state from one end to the other that we would find very few dangerous machine exposures.

After plant supervision and the application of machine safeguarding, then, I would say, we must go back on safety education, because if we can't get the man or the men as a group, as a unit, to back up the effort that the supervision has made, we can't expect to avoid accidents in the chemical or in any other industry.

Of course, if a plant manager just says, "Mike, don't breathe that stuff over there, it is poisonous and will hurt you," and the fellow is an ignorant workman who hardly understands the language, that kind of warning is worthless in the extreme. But if you warn the men properly that substances are poisonous, that disobedience to shop rule is dangerous, and you get the men to back up the movement, you are going to make the chemical industry safe in our state and other states, as safe as any other industry that is in the state, because outside of these poisonous substances I can see that there is nothing so inherently dangerous in the chemical industry that we shouldn't expect that after a proper length of time has elapsed in safety work that accident rates will be cut down to an irreducible minimum, below which, of course, we can't normally expect to go.

I heartily endorse the statement made by the previous speaker that the industry should not put out poisonous substances without due warning to the public. It is wrong to do it. It brings a black eye to the industry itself; it discredits us in the minds of normal, sane, thoughtful people, and it certainly works an incalculable hardship on those manufacturers in the industry who want to do the square thing by their labor and by the public as well.

CHAIRMAN SHAW: I am going to ask Mr. Louis DeBlois to talk to us on the same subject. About a three-minute talk, Mr. DeBlois, please, on the subject from the viewpoint of the underwriter. Mr. DeBlois is of the National Bureau Casualty Insurance Underwriters.

The Viewpoint of the Underwriter

MR. DEBLOIS: To the best of my memory, the compensation insurance rates on chemical industries in general are about flat.

Now, I would like to impress upon you one or two points in reference to insurance rates. In the first place, they do absolutely reflect insurance experience. However, there are two factors entering into that experience: one is the number of accidents, the other is the cost of the accidents.

We know that the average cost of accidents under compensation laws is on the increase, due to a variety of causes. So that if a rate maintains rather flat, that is doesn't change much from year to year, the chances are that the frequency is coming down somewhat and the severity also. That may or may not maintain in the chemical industry.

Another fact to be borne in mind is that insurance experience on which the rates are based is always about two years old, so that the present rates do not reflect current experience, but rather, past experience. So that if the chemical industry goes ahead, as I believe it is going ahead, in the reduction of accidents, and will continue to make the very fine progress it has in the past, the rates unquestionably, I think, will come down.

I could say this (I believe the insurance men who are present, company insurance men, will support this statement) that is that insurance underwriter engineers are not alarmed about the chemical industry as they are alarmed by the experience in some other industries—the construction industry, for example, where there is a very distinct upward tendency, and where we know the great body of construction men have not yet taken the accident prevention matter very seriously.

I was concerned to some extent with a recent national research in the relationship of safety in production made by the American Engineering Council under a financing by the Bureau which employs me. The chemical industry was one of the industries examined, and my recollection of the results of that study (and by the way, if you are not familiar with them you should be; they are published by Harper Brothers, under the title "Safety in Production," I believe) is that the chemical industry standing absolutely reflects a correlation between accident prevention and accident reduction, and production efficiency; that is, production per man-hour. You know yourself that efficiency of production, high efficiency of production and accident reduction are both reflections of good and efficient management. The management that can get one gets the other. You can't have one without the other. We all know that.

Now, just a few other points briefly and I am through. To the inherent difficulties in accident prevention in the chemical industry which Commissioner Roach mentioned, I would like to add two. One, the fact that the chemical industry is in a more or less non-stable state. It is in the process of development. When you have any industry which is being developed rapidly you have a danger introduced through the introduction of new processes which have been magnified, have come up from the laboratory scale to the experimental scale and then put on a large production basis. While the most intense care may have been taken to develop safeguards in the laboratory and perhaps in the semi-work scale, when you get on this big scale production you have a multiplication of factors and you may still have very serious hazards which you haven't safeguarded; and I think that is one of the reasons why the chemical industry has an inherent hazard.

The other one is, as we all know, in many chemical processes the amount of mechanical maintenance is higher than in many other industries. The equipment turnover is higher, there is more repair, more maintenance work. Maintenance is inherently more dangerous. It always introduces out-of-the-ordinary conditions where you need a higher degree of supervision, a higher degree of workman intelligence, and a greater interest and foresight on the part of the workman himself in accident prevention.

I can say, Mr. Chairman, that from the little I know of what has been done by your section in the last two or three years, and from what is being done by the industry in general, I, for one, feel absolutely certain that chemical safety is going ahead by leaps and bounds. I think you have the most flourishing group in the National Safety Council, considering its growth from a mere handful of men up to what it is today as represented by this meeting.

CHAIRMAN SHAW: We want to get some experiences, some stories of happenings or mishaps and narrow escapes, or preventive stunts. Some of you men have very interesting stories to tell. The time is going to be limited. I will ask you to cut your stories down to under three minutes as much as possible. But before we go into those stories, I see that Mr. John Spicer of the Department of Labor of the State of Pennsylvania has come in. For his benefit, I will explain to him that we have been discussing the status of accident prevention in the chemical industry at the present time. How is it in your state, Mr. Spicer?

MR. SPICER: I think there is a general trend toward reduction in our state. Beginning this month we are planning to intensify that reduction if possible, by a thorough organization in the state with the help of our department.

The latter part of October we expect to hold a meeting of all safety engineers in the state, and beginning on the first of January, put on a state-wide drive for no accidents.

We feel that we are going to get results. During the past three months we have been receiving reports from individual plants telling about their accident reductions, and in many cases these are appreciable in amount.

I think I can safely say that we are showing very good progress in Pennsylvania.

CHAIRMAN SHAW: You noticed that stress has been placed upon the importance of education. Some persons estimate that preventable accidents run as high as 90 per cent through education. That is, mechanical safeguards can't touch about 90 per cent of them. Dr. Parmelee stressed education, so did Mr. Roach.

To my mind it is little short of criminal for any of us in a supervisory capacity to fail to bring to the workman absolute knowledge in the form of simplified detail of his processes, the machine or whatever he is working with on his job. I have found it possible and practicable to teach workmen chemistry. They grasp it very quickly when you reduce it to simple terms. So when a new process goes in, when a change is taking place in operation, why not, first of all, think: What is the hazard to Bill (or whatever his name is)? Let's go and talk to him and explain the whole thing to him. Let's tell him what happens when these two chemicals come together; whether or not they generate positive or negative pressure. What will be the accident? How should he take care of it to control the apparatus and process and play the game so that he can be as safe on his job as anybody else?

Along that line, Mr. A. L. Armstrong, of the Eastman Kodak Company, has an interesting story to tell us illustrative of the unforeseen. It is the supervisor's duty to anticipate accidents. It is a shame that men have to be hurt in order that we be cautious. Mr. Armstrong will give you his story.

MR. ARMSTRONG: The accident I am going to tell you about happened in Rochester about four or five weeks ago. There were three fatalities and, I guess, up to fifteen seriously injured.

I believe it is the practice throughout the country to handle sulphuric acid in drums. This company, in order to prevent shutting down a process, stored four drums of sulphuric acid, 92 per cent, on the third floor of a building. There was no water, no shower baths provided there. The bungs in the drums were loosened.

They had been there just a year when the workmen started to move them. Two of them were taken out safely. When the third one was lifted it blew up. The man at the end of the drum was knocked forward. He stood against the wall and the drum head hit him and threw him head first into the acid. His head was nearly eaten off. The other chap was covered with acid and died from exposure. The third one was burned so badly that he died in the hospital. There were three or four others who spent quite a time in the hospital.

The thing that happened apparently was that there was some reaction on the drum. In fact, we ran experiments afterward and weighed our drums and found that drums which we were using for 92 per cent acid, after being used a year lost fourteen pounds. We figured that there was a reaction with the acid on the iron, and hydrogen probably formed, and some people have the theory that there was a spark struck when the head of the drum was blown out and that it ignited that hydrogen because there was a terrific explosion.

Dr. Greenburg spoke of the *News Letter*. I have talked to several people about this accident, and no one that I have talked to has had any experience of that kind. Just as soon as I knew about it I wrote John Shaw and Mr. Kepner, of the Pennsylvania Salt Company, and I talked to everybody that I came in contact with to see if we couldn't get some information, see if somebody else hadn't had that experience. No one seemed to know anything about it. I think the *News Letter* for that sort of thing would be of untold value.

In other words, I think you have to carry this program farther than the men. I think many of us would be benefited a great deal if we could get that kind of education. I think one of the best possible ways to get it is to have it come through the *News Letter*.

CHAIRMAN SHAW: Mr. Armstrong, what would you recommend to prevent the recurrence of such an accident?

MR. ARMSTRONG: We have designed a blowout plug for drums which are to be stored for any length of time. That is just an ordinary, extra-heavy black iron nipple with a cap. We cut the center out of the cap and put a piece of tinfoil between a lower and upper gasket. We have tested this device and found that it blows out at twenty-five pounds. So it would be perfectly possible to tip the drum over and not have an accident that way, that is, by having acid spilled on someone, and yet, if there is any pressure generated the tinfoil would blow out.

I might also add that we had a similar experience, although it was not a blowout, when we had a ventilation line plug up several years ago on our large acid tanks. The acid screens didn't take out all of the cotton and some of it started decomposition, heat and pressure were generated and the ventilation was plugged, and this ordinary blow tank (you all are probably familiar with it) stretched at the top just about two inches. If any of you come to Rochester we would be glad to show it to you. It prevented a terrible accident. One of the men went up two flights of stairs and opened another vent on the pipe. If it had not been opened nothing could have stopped it and it probably would have ripped the side of the big tank open, and you can hardly estimate the damage that would have been done in this case.

We have put in all of our blow tanks a sheet of aluminum. That sheet of aluminum is about ten inches in diameter and one-eighth of an inch thick. It is cut around the edges of the gasket and blows out at forty pounds. They have to keep their pressure down below forty pounds or they blow that out. However, those things should be inspected. They are like anything else. They must be inspected very often.

We also use that same type of blowout on some of our vacuum stills where we do crystallizing. We had one of those blow out.

There has been a lot said about pressure here today, but I think one point should be brought to the workman, and that is this: The workman (and I think I might also add a lot of the supervisors throughout the country) does not appreciate what twenty pounds of air pressure means on a drum or on a container. All they think of is twenty pounds. They don't think of twenty pounds per square inch. We have blown up ordinary oil drums with eighteen pounds pressure. I think the time is coming when we will have legislature in this country that will absolutely prohibit the handling of materials by compressed air. Other countries have it now. They have entirely eliminated the handling of any material in that manner.

CHAIRMAN SHAW: We have pressure generated through chemical action just as with the drum. We always have to deal with pressure and watch out for it and provide for the elimination of it, even though we may handle chemical liquids by pump suction, and so forth.

S. W. GURNEY (Liberty Mutual Insurance Co., Boston): I would like to ask if there was any evidence of the pressure in the drum. Was there any bulging in the head?

MR. ARMSTRONG: No. There was absolutely no evidence of it.

MR. GURNEY: I have known a number of cases where pressure has been generated by acid of that strength in steel drums during a period of long storage, but in all cases they showed evidence of it by a bulging head.

MR. ARMSTRONG: This was split down about eight inches. I saw the head before anything was disturbed. They called me in. It was not our company,

understand. It was another concern that had the accident. They called me up immediately and I saw the drum and the head before it had been moved, and the head was perfectly flat. That was the first thing we looked for.

MR. GURNEY: Ordinarily a steel drum would show quite a bit of bulge before it would give. I have known of a number of cases where they have shot a rifle ball through the head rather than run that risk.

MR. ARMSTRONG: I think that would be true if the drum is eaten thin at that point. However, apparently this drum was weakened at the top. The reaction was above the acid level and the drum was weakened at the top and that point where it was weakened opened up, I would say about twelve inches at the end of the drum and ran back to the hoops. It looked as if the drum was weaker at the top than it was at the end.

S. W. ASHE (General Electric Co., Pittsfield): I don't know but that I might have one idea that might be of a little value. With the modern tendency of using gases and other high pressure materials in manufacture, naturally we get pretty big concentrations of energy. That means that when these things let go the severity of the accident is great, and we have fatalities, just as happened in this particular case.

Mr. Byer, a number of years ago, made quite a study of accidents and their causes. Out of that he brought out two rather important things. One was that the frequency of accidents was dependent largely on the amount of educational work you carried on, and the severity of accidents was largely dependent on the amount of safeguarding you did. That is, you couldn't say do one rather than the other, for each of these things had its own definite function. Therefore you can see in the modern trend of going up to these great concentrations of energy that the job really is largely one more of management than it is of the employees. It comes down largely to one of inspection and close supervision and the careful study of those things, and the development of proper safeguards for the elimination of these very serious things. I simply wanted to leave that one idea with you because we are always placing so much stress on the value of educational work and how 95 per cent of accidents are caused by carelessness, yet when we get into problems of this nature, it seems to me the problem of controlling it rests very largely with the management itself.

E. C. ROGERS (Grasselli Chemical Co., Cleveland): I was dragged into this accident that has been referred to, and I have seen the drum that Mr. Armstrong described. The history of that thing goes back to last October when that drum was filled in cool weather. It blew up in August in a room where the temperature was over 90 degrees. No one knew or could tell me how much acid had been put in the drum, or whether an outage had been allowed, although from examining the two other drums that were still in position, it was seen that they had allowed about a four-inch outage in those two. No one could check the drum that had exploded, of course.

Now, there must have been considerable expansion in that acid, filling the drum in cold weather and letting it go on into hotter weather. It was a standard 5-A drum, built to I. C. C. specifications, and I am positive there was nothing wrong with the drum. There was no evidence of bulging in the head.

It seemed to me that there must have been two explosions, the first one a hydrostatic explosion due to the expansion of the acid, ripped the horizontal seam about half the length of the drum, perhaps a spark being caused and setting fire to the hydrogen, causing a second explosion that came so quickly upon the other that it seemed like one explosion.

That drum had been stored with the plug up, and according to the manager of this plant the plug had been loosened, allowing a vent, but after the explosion it was quite a task to remove that plug because of the formation of sulphate that sealed this vent and created, I should imagine, a terrific pressure.

If that drum had been vented every week as it should have been, I don't believe there would have been an explosion. That brings us down to this. We have had papers written and read in this section covering that very same point—papers that have been broadcast and published in various chemical publications. We have Safe Practices Pamphlets. But I have just been wondering whether this section ought not to try to do more to broadcast information concerning the storage of such explosives; whether we shouldn't consider the issuance of data sheets covering the safe handling of those materials in a concise form that could be posted in an acid-consumer's plant, and in that manner try to broadcast knowledge not only of this one commodity but every dangerous commodity.

Another thing, acid drums are not made primarily for the storage of acid. They are made as a shipping container solely, to be emptied more or less frequently and to be tested more or less frequently. That drum was two years old and it never had been tested.

CHAIRMAN SHAW: That was very interesting, Mr. Rogers. I agree with you that a shipping container should not be used as a storing vessel.

Is there anyone else?

LUKE H. SPERRY (Hercules Powder Co., Hennil, N. J.): This has led us to be in accord with the idea that our accident is due to the personality of the men and not to the condition of the apparatus with which they work.

A long time ago, out in Colorado, there was a group of immigrants who came to a river whose bed was full of quick sand. They went in and were lost to a man. The Spaniards who were occupying that part of the country at the time accordingly named the river. They didn't call it Dead Man's River. They called it Rio de los Santos—the River of Dead Souls.

It seems to me that our problem is not one of everyday education but one of the stimulation of the imagination. The trouble with our men is not that they are careless; they are not intentionally careless. The trouble is not that they do things that they should not knowingly do, but the trouble is that they don't think ahead; they don't use their imagination.

In our plant we don't talk of falling missile hazards any more; we speak of widow makers, and it seems to have a wonderful appeal to the imagination of the man who is supposed to be careful of overhead falling missiles.

I just want to make this clear: The stimulation of the imagination of your workmen! Because I think along that line lies a wonderful path toward increase in safety.

R. A. POOLE (Carborundum Co., Niagara Falls, N. Y.): I want to go back to the remarks of the previous speaker, Mr. Rogers. He said he thought the company sending out these drums should give instructions with the drum.

We had what would have been a serious accident from hydrochloric acid in a rubber lined drum. Evidently the lining gave way. A man went by and saw what looked like a cloud of thin steam coming out of it. It got him in the side of the face and he was painfully but not seriously burned. We immediately got in touch with the manufacturer and then they gave us directions as to how to handle it. Had they, when they sent the drums in the first place, given us instructions on how to handle that type of acid in those drums, we never would have had that accident.

I. V. KEPNER (Pennsylvania Salt Mfg. Co., Philadelphia): Getting back to the story of drums and drum explosions, about four years ago in Wilmington I brought up the subject of drum explosions. We had one in our plant. We had some old drums that had been washed and stored empty. A year or so after that we had occasion to ship some sludge which contained caustic liquor from our Daytona plant in the western part of the state, to Philadelphia. We had about eighteen of these drums loaded with this sludge, and they were being rolled into a car. There were fourteen or fifteen, (I don't recall which) that had been rolled

into the car, and the next drum, which I think was the sixteenth drum, exploded.

We never have found out what caused that explosion. It just brings to my mind how necessary it is, after a drum has been used, to clean it thoroughly, and I doubt very much if it isn't good policy to destroy those drums, using almost anything else but an acetylene torch to do it.

I merely bring that up to tell you that from that time on we have never used any old drums for anything else except mixed acid.

CHAIRMAN SHAW: It seems to me right there that a suggestion to have a thorough and periodic inspection would be of value, and after all, the great stimulant for thorough inspection is imagination. I can't imagine a man with an investigative nature who hasn't a lively imagination. When the imagination dies we are asleep. So of course the imagination is a very important thing in safety work. There are many things that are delightful in ferreting out when you are looking for causes. It is really happy work.

One of our small arms smokeless experts discovered some very fine particles of steel in the small arms powder. Nobody could identify these particles at first; nobody seemed to know where they came from. But the imagination of that man carried him from New England to Virginia, where he found that when they were baling purified cotton linters, just prior to wrapping a bale in nice white wax paper so that the cotton would carry through uncontaminated to another plant where it was to be converted to nitrocellulose, these bales were being brushed and combed with little steel brushes, and little particles of steel were coming off of that brush. That never would have been discovered if it hadn't been for imagination.

That gets away somewhat from chemistry and the chemical industry. Of course, it is part of the chemical industry, but it gets away from liquids and pressures, and so forth.

There are lots of stories like that, experiences that you have had. Who has something to give us on the handling of solids?

R. O. KEEFER (Aluminum Co. of America, Massena, N. Y.): I raised this question a while ago to get some information, not to give it. But the way you have put this last statement reminds me that somebody might be interested in our experience along this line.

In making carbon electrodes we use this tarred pitch that I spoke of which is very pliable. Our company has used this pitch for twenty-five years without any trouble whatsoever, and I am certainly safe in saying I believe that nobody with even the slightest imagination after twenty-five years of experience would have foretold that we should have a fatality due to explosion of this pitch dust. But we had it, and about a year later we had another in another one of our plants, and last year I heard about this pitch dust exploding in the Steamer Richelieu in Baltimore Harbor.

The initial pitch dust explosion in our plant took place under special conditions, as most first-time accidents do occur. It happened that the bucket elevator conveying this pitch to a high storage building broke down during the night shift.

This bucket elevator was a belt type of elevator and the belt, of course, fell with the loaded buckets to the bottom and they laid there until the morning gang came on and started to fasten up the belt. Of course, half the buckets were filled with pitch when the elevator broke. The rigger gang, for the most part, were stationed at the top of the elevator casing, but two members of the gang were at the bottom holding an electric light inside the casing and were threading the belt upward so that the buckets would be facing the proper way. The belt was practically lifted up to the top of the pulley when both it and the tackle broke and the belt fell. It broke the electric light bulb and also severed the lead wires to the light. I don't know whether it was the broken wires or the light that caused the trouble. I believe that Mr. Price, who was mentioned before, has since deter-

mined that a broken bulb can ignite dust if it is mixed with the proper amount of air. It was followed by a succession of explosions and a series of flames which set fire to the man's clothing and before they could be extinguished the man was burned to a crisp. His helper was very seriously injured. Fortunately he was not set on fire.

There is an accident, I think, that nobody would imagine could happen, especially after twenty-five years of experience had not shown the danger. Since that time, we have investigated these pitch-dusts and find that they are even more explosive than coal dusts, and we are now safeguarding all equipment to relieve any pressure which may be built up.

CHAIRMAN SHAW: Mr. Keefer, do you always use vapor-proof conduit for your wiring and vapor-proof globes?

MR. KEEFER: Yes.

BERNARD TRUXLER (Kendall, N. Y.): In regard to the cleaning out of drums, I recall an incident some twenty years ago when we had occasion to solder a spud on to an alcohol drum of about 250 gallons capacity. It was formerly used for alcohol. The drum was supposedly washed out with water and it was thought by the mechanic that it was perfectly safe to solder on this spud. The drum was washed out but it was not completely filled with water, thereby not removing all of the vapors. Therefore I just want to mention that it is very important to completely fill the drum so that you remove any vapors in order to make it absolutely safe.

CHAIRMAN SHAW: Right there we come to the cleansing of chemical apparatus. So many hazards arise from improperly carrying out the work of cleansing the tanks, and so forth. There is sometimes a hazard which is not apparent to the workmen. Some gas which he cannot smell, has practically no odor but a very high toxicity. He may or may not have been cautioned about it and because of the lack of odor he may not believe the danger to be there.

For over twenty years we have been cautioned that nitrous fumes are very dangerous. The victim in a great many cases doesn't know that he is receiving a fatal dose until it is too late.

I would like to ask Mr. George Miller, of duPont's, to tell us what he knows about poisoning from nitrous fumes, and give us his suggestions as to preventive measures. I understand the cure is almost hopeless, therefore what preventive measures can be employed?

G. H. MILLER (E. I. duPont de Nemours & Co., Wilmington, Del.): I imagine there are a lot of people who know more about nitrous fumes than I do, but, unfortunately, I know of two recent experiences that may be of interest to you.

In one case the acid was brought in contact with water when cleaning and the man inhaled the nitrous fumes. In the other case two men were washing out a tank that contained mixed acid and inhaled nitrous fumes. Both men were killed by the fumes, or rather, both of them died some time later.

I don't know what part of this subject Mr. Shaw wanted me to discuss. I don't know anything about the medical phases of this problem.

As far as the preventive phase of the subject is concerned, it is impossible to say what concentration of nitrous fumes are harmful, in a way that will be comprehensible to the average working man. We know, of course, but we can't tell the working man so that when he encounters those fumes he will recognize them as being harmful concentration.

In the two cases I have just cited, one was with the duPont Company and the other with a competitive company. It seemed to me that the only instruction to be issued to the men was to immediately leave the scene when any concentration of nitrous fumes were present and not return until they had put on suitable protective apparatus such as gas masks. Such instructions have been issued by the

duPont Company before, but we have again called attention of the plants to it and in probably a more forceful way than we had heretofore.

L. H. SPERRY (Hercules Powder Co., Hennil, N. J.): This is a very live question in the industry that uses a great deal of mixed nitrous acid. We have made it an absolute rule that we won't put a man in a tank which has contained nitric or mixed acid unless it is absolutely unavoidable. We have gone to the extent of cutting holes in tanks so that we can reach in with hoes and hoe out any mud that resists washing out. At the same time we play a fire stream from the top. The only time that we countenance putting a man in a tank that has had mixed acid in it is in case some other man had actually gotten in and it was a case of saving life. In that case, of course, we would take the precaution to lower the second man fully protected by a life line, and if possible, if time permits, with an adequate mask. But under no circumstances would we think of cleaning out a tank by putting a man in as an ordinary routine or repair proposition.

C. E. SEVRENS (Merrimac Chemical Co., Boston): Both the previous speakers spoke of gas masks. What kind do you use? There isn't one designed for nitrous acid.

MR. MILLER: First, I want to dispose of a statement which I probably made. Those men were not in the tanks—not inside. We wouldn't send a man in a tank, whether he had a mask on or not. I think most companies have very rigid rules outlining practices that are to be followed with the tanks. I know that the duPont Company has, and I would be very glad to send anyone who desires it a copy of our pamphlet in regard to safety practices in handling tanks, which we have practiced thoroughly.

S. H. KERSHAW (National Safety Council): Going back to the remarks made by Mr. Sperry and Mr. Rogers, the rousing of the imagination and the furthering of information are two of the fundamentals of success in accident prevention work. There is no question about that in my mind. A successful safety engineer has to have a very vivid imagination. He has to be thinking about the things that other people are apt to overlook.

In line with that, the National Safety Council is striving to do all it possibly can to disseminate information. We of the National Safety Council, of course, service the *National Safety News* which is useful for that purpose. We have various sectional news letters; we have posters which are useful for posting on the bulletin boards and serve to convey ideas and arouse the imagination of the men on the jobs. We also have payroll slips. I could go on and list any number of things, but what I want to talk about particularly is our Safe Practices Pamphlets. Most of these which have been issued in the past have been of a more or less technical nature. They have been designed to be helpful to the supervisors and to the managers of plants. The pamphlets, I think, have filled a very great need; but we are trying to carry the work considerably further.

Just recently our Petroleum Section undertook to develop a series of safe practices pamphlets; I think there are forty-eight subjects to be covered, and these pamphlets are designed to be given to the men on the job to furnish them with ideas as to how to take care of themselves in doing their work.

The first two or three of these pamphlets were published a short time ago, and within a few weeks of publication orders were received for something like 12,000 copies. They are very new but are going fast. In other words, there seems to be a need for just such pamphlets.

I am not prepared to say that the Chemical Section can undertake just that; because of the industry that is to be served; but there is at least a germ of an idea. It is working very successfully in the Petroleum Section.

There is one other thing I might mention: Aside from the posters and payroll slips, there has not been very much in the National Safety Council that could be turned over to the workers. But very recently a little pocket size magazine entitled

"The Safe Workers" was brought out. Due to the fact that it can be printed in very large quantities, the council offered to provide this service to the members at very small cost. I might say that one company, for instance, is giving out 17,000 copies of that magazine to its workers every month. The magazine is so small that we can't hope to go into technical discussions or anything of that sort, but I think it is perhaps a contribution in the line of arousing the imagination of the men, and I think it is filling a very important place.

There is just one more thing. I don't know whether or not you know it, but we have at our headquarters office the largest library of safety literature in existence today. We have a staff of four librarians and we have a staff of quite a number of engineers. All the members of the National Safety Council have a consultation service involving the use of that library and the talent of all of our engineers is available; we want the members to make use of that service. There is no extra charge for it, it is a part of the regular service to council members. Queries come into the office. We handle about seven hundred a month, and they are routed through the office.

First they go to the librarian. Every available bit of information on the subject of the inquiry is taken from the files of the library. That is turned over to one of the engineers who is best qualified to handle that subject. He goes over the literature carefully. If the problem is answered in the literature he either incorporates it in his answer by letter or else he sends that literature to the member. If the answer is not to be had in the literature he immediately tries to find out the members to whom he may go for accurate information on the subject.

In other words, the purpose of the council is to collect and disseminate information. It is the desire of the officers of the council that every member make the utmost use of that service.

C. E. SEVRENS (Merrimac Chemical Co., Boston): Getting back to nitrous gases again, I will tell a couple of experiences that we had. One was cleaning a tank at the top of the battery tower. We had a colored man and a white man working at it. During the day they simply cleaned out the small amount of sludge which is in the bottom of the tank, and they went home at noon time, reporting no ill effects of any kind from the work. That afternoon we received word that the colored fellow had passed away. We immediately checked up the white chap and found that he was suffering some but he didn't seem to be suffering a great deal from the effects of the gas.

We also had another occasion where a black man and a white man were working in a tank and we had the same thing occur to the colored chap. It is evident to us that the colored chap is more susceptible to nitrous fumes than the white chap might be. I don't know whether anybody else has had a similar experience or not.

Another thing that we don't want to lose sight of is the fact that sulphur dioxide fumes can be quite serious. We had a case recently where a young fellow came in to a change and unbeknown to the foreman the chap had quite a heavy cold. He said nothing about it and went to work. The clean gas so irritated that cold that pneumonia set in and he was gone in four days. So that is another thing that it probably might be well to watch out for.

CHAIRMAN SHAW: Prevention, gentlemen, is the stunt.

Mr. Chase, of the Atlas Powder Company, might tell us something about the precautions they have taken against nitrous fumes poisoning.

A. N. CHASE (Atlas Powder Company, Landing, N. J.): We had a case in one of the plants which leads me to believe that the question of the susceptibility of a man to fumes is a very important factor.

Two men were working on an outdoor tank, washing it out with water, and one of them had opened the tank and worked through the worst of it and came through all right with no ill effects. Another one who was sent in to help him, because we knew that the work was dangerous, was dead before the next morning. Afterward

we found that this second man within about two months had had a rather severe attack of flu, and it is very apparent that he was easily susceptible, even to a small amount of gas. The first man who undoubtedly had breathed a good deal more of the gas was in no way hurt, as was determined by examination.

We use the gas masks in all work now where a man is exposed to a possibility of coming in contact with it even in outdoor work, because on damp days or even where there is a shed, the fumes will hang down around the men in spite of the fact that we try to get away from it; and it is the accumulated effects that cause the gradual breaking down of the lungs.

CHAIRMAN SHAW: Have we any more volunteers? If not, I take it the meeting has about run its course. Dr. Greenburg, the chairman of the section, would like to speak to you a moment before we adjourn.

(Chairman Greenburg assumed the chair.)

CHAIRMAN GREENBURG: The sum and substance of all this discussion seems to me to be this: The modern chemical plant, no matter what its nature, has certain inherent and peculiar problems of safety and health hazards, and to you gentlemen who are the supervisors of the human element which comes in contact with these hazards, to you there falls a very sacred duty. If a man is injured, or if a man suffers pain, or if a man meets death in any one of your plants, it means either that somebody has been remiss or some unavoidable accident has taken place. Now, nobody pretends to place the blame for the unavoidable accident, and there are such things) on any of the supervisors of safety or health or any of the officers of the modern industrial organization. But if a preventable accident takes place in your plant, you ought to search your own minds carefully to see whether you should be able to rest easy without making certain that such an accident can't take place again.

There is only one cure for these accidents, and that is a peculiar type of mental alertness which has to characterize the mind and the make-up of every one who hopes to keep from the stigma of causing pain and death in the plant. If you are not mentally alert you won't see these sources of accident, and you won't prevent somebody from suffering undue pain or perhaps death. It is needless to say to anybody who employs many workmen that accidents are everyday occurrences. If this mental alertness is lacking the accidents are going to be repeated.

Now, what can be done if the mental alertness is there? Backing that up you have to have a certain fundamental amount of knowledge, and that knowledge has to take such a course as to lead your effort to supervise each and every operation in your plant so as to make the accident impossible. The accident that happens once is a forerunner in the good plant of excellent safety precaution.

Next, you come to that type of accident which Dr. Ethelbert Stewart, if he were here, could tell us is an unpreventable accident. There are many such accidents. The only thing you can do about the non-preventable accident is to educate the worker. The means of education are many. They have special application in this plant or that plant. They require all kinds of means and expedients, and it is up to the mentally alert foreman or officers of the company to find out what he should do in order to educate his workmen properly.

In addition to this, a certain amount of medical supervision is necessary. It may be of a minor character, from the first aid cabinet up to something more elaborate, such as the medical facilities employed in some of the larger plants.

Lastly, you come to the other aspect of your duty, and that consists in pooling your knowledge with everybody else so that we may build up a ~~very~~ total of knowledge where everyone may enjoy the benefit of it. As Mr. Kershaw explained to you, the National Safety Council is attempting to serve as this agency for the pooling of information. It is a highly cooperative, non-profit-sharing organization, as you all know. The amount of money that each company spends is put in a general fund and expended under the direction of the Board of Directors and

the Executive Committee in a way which seems to the committee will produce the largest and best service results. Everyone is free to bring up through his sectional chairman and officers any suggestion he desires about the way in which he thinks this money should be expended. This is your organization, and if it is going to help prevent accidents in the chemical industry and promote safety in the chemical industry it depends largely, if not completely, on you.

MR. SHAW: Gentlemen, Mr. Armstrong has a little stunt that I think is too good to pass up. He is going to tell you how he gets rid of lacquer drums when they are old and unsafe. It is dangerous to burn them, and he has a little stunt which may be interesting to you.

A. L. ARMSTRONG (Eastman Kodak Co., Rochester): We have been in the lacquer game long enough so that we have had a number of drums that we had to dispose of, and the question came up what we should do with them. The first thing suggested was that we burn them, but that is rather dangerous because we found that several of them would explode. We had enough lacquer and fumes in them so that we would get a terrific explosion. So to prevent that, when these drums get so old that they are unfit for further use, we immediately fill them with water and take them out in the lot some place away from the plant and leave them there during the winter and they freeze up and burst. In the spring they thaw out and we subject them to heat and throw them into the dump.

I thought that might be of interest. That question has come up a great many times before. If anyone knows of a better scheme I would like to know it.

JAMES BRADY (Hercules Powder Co., Kenvil, N. J.): We have some TNT tanks that we destroy by filling with water. That is, we fill them up all the way. I don't believe there is as much danger from explosion when you have them equipped with a ventilator. We fill the tanks completely with water.

MR. ARMSTRONG: In answer to that I would like to say that we had an explosion with a drum filled with water, and it happened because the nitrocellulose had gotten up in close to the top where the water couldn't displace it, and when the heat was applied from the outside it blew the head out. When the lacquer drums are banged around (I don't know about your drums) they have a small space around the top that fills with nitrocellulose and it dries out hard. You can fill that up with water, but if the heat is applied from the outside you will get a slow decomposition and an explosion.

ADJOURNMENT

October 2, 1928

LEONARD GREENBURG, Ph. D., Chairman
U. S. Public Health Service, Yale Medical School
New Haven, Conn.

The second session was called to order at ten-fifty o'clock by the chairman, Dr. Leonard Greenburg.

CHAIRMAN GREENBURG: The first paper on the morning program is by Mr. J. H. Shapleigh, Chemical Engineer of the Hercules Powder Company.

Gauging and Sampling

By J. H. SHAPLEIGH

Chemical Engineer, Hercules Powder Company, Henvil, N. J.

The chemical plant has definite organized operations. Associated with them in an inseparable manner is the operating personnel. In general, chemical operations are subject to sudden, serious changes unless properly supervised and controlled. Safety is largely efficiency of supervision and control.

A properly supervised and controlled operation includes well chosen procedures covering gauging and sampling. It further includes selling that procedure to the personnel in such a manner that cooperation arises. An operation so conducted and established appreciates the benefits derived from safe gauging and sampling.

Gauging and sampling is a daily performance in our industries. Properly performed it is not a routine operation, although it is often so regarded. It is a procedure having more potential risk than one usually classed routine. It is this element or risk that makes the subject worthy of review.

Gauging is carried out to determine a condition with reference to capacity. The safe capacity may refer to a quantity of liquid, solid or gas. If gas, gauging is related to pressure. If liquid, it is likely related to level. In either case, the object is to facilitate the safe handling or storage of material.

To fail in properly gauging material may cause tanks to overflow, burst or even collapse. Every one is familiar with the picture presented by spillage. One sees the floors covered with a liquid, possibly fuming sulphuric acid, or molten nitre-cake. Fumes are all about. It is likely dripping through the floor below. Workmen are rushing here and there, warning those below. Others are frantically trying to stop the flow of acid or other material. Opportunity for accident is all about. The overflow is stopped and the clean-up process begins. The hose plays water upon the material. Sputtering caused by water on acid begins. Acid particles fly and fume rises. Then, finally, it is cleaned up. What has been the result? Possibly acid burns on the face or body. Possibly burned feet or hands; perhaps more serious, all the result of improper gauging.

Elimination of these happenings, which everyone engaging in operating practice has seen, requires the adoption of a gauging procedure. Since gauging molten nitre-cake is different from gauging oleum or from gauging an organic chemical, it is readily seen that a study of each particular gauging problem becomes necessary.

With each problem, there is associated a definite number of chances for accident. These should be known and provided against. For example, goggles may be called for to protect the eyes against a spurting liquid. Rubber gloves may be needed in the case of handling nitric acid. Shielded sampling points may be required for protection against gaskets giving way. These possibilities should be studied and if found present, protection must be provided as a part of a gauging plan.

Gauging procedure requires consideration of many phases. For instance, a study of mechanical conditions surrounding equipment; chemical effects upon mechanical equipment; physical effects upon chemical properties, and combined effects as related to the human equation.

A detailed consideration of the individual case should result in the selection of a method best suited to the conditions prevailing. Then, there is required a plan for effectively putting it in use.

Real benefit is derived from the adopted procedure only when cooperation exists. This must be obtained from the personnel by selling the procedure to them. They must realize it is for their benefit. Forced adoption does not breed cooperation and does not bring about the safe conditions sought. Hence, the educational program is a definite part of gauging.

To provide the personnel with a procedure without schooling is to make gauging a routine operation and subjects the personnel to possible accident through lack of knowledge of conditions. It should be emphasized that the entire personnel can be subjected to unsafe conditions through lack of knowledge of the individual.

The educational work in a particular case may be minor. If so there can be no objection to giving the workman that minor degree of added protection. On the other hand, if the amount of schooling to be done is large, then there is no question but what the hazard warrants it.

Both the study and the educational work should consider possible unsafe conditions from factors such as: temperature, pressure, flammability, corrosiveness, volatility, sensitiveness to reaction with other materials such as water or other chemicals; susceptibility to freezing and separation; presence of contamination; toxic or noxious vapors and gravity.

It is desirable to touch upon some of these factors. Effects produced by temperature are of extreme importance. Change of temperature affects corrosion; volatilization; condensation; creates pressure; causes vacuum; freezing and expansion.

Molten nitre cake is a good example of a material where temperature is important in gauging. This material is pumped around at 500 degrees to 600 degrees F. Not only is it corrosive but it has an immense quantity of heat stored in it. Consider, a process wherein this material is used and let us assume the material is gauged periodically. It is extremely important to keep that material where it belongs through gauging, but to what unsafe conditions can a man be exposed in this case which are outside his immediate gauging problem. First, let us assume the man gauging is helping in the filling of a storage for molten nitre-cake. His part is to determine the quantity to be received and to see that only that quantity is received. To do that, he must be nearby, at least.

Now, let it be assumed that pumping has started, and that molten nitre-cake is on its way. What can happen? Nitre-cake starts at say 550 degrees F. through warm lines but not hot ones. First, it must heat the lines; then they must expand tremendously due to the change in temperature. This expansion has broken many lines, causing streams of molten nitre-cake to pour out. These in turn have caused fires.

However, in this case, let it be assumed that the batch was delivered safely, and some time later a second batch was started on its way. Possibly this batch is going to be switched to a different storage by valve changes. Experience has shown that a wall of hard nitre-cake will build up against the previously closed valve within 15 minutes and although the valve has been opened, the line is now blocked; the fresh hot nitre-cake will not melt it before it overflows from the first point possible and again a spill occurs.

One more illustration of a temperature effect: Let it be assumed that the previous pump line has had access to air over several days of idleness and that the line through insufficient slope is one-third full of solid material which picks

up considerable water from the air. Again, molten nitre-cake is started through the line. The solid material in the line is heated. The water present turns to steam, thereby increasing in volume; a pressure results and nitre-cake is sent forward at a tremendous rate. If there is a vent in the line, the material will be thrown from the vent until the pressure relieves itself.

During these happenings where is the man gauging? Is he still there, or is he on the way to the hospital? In any case, temperature conditions require careful consideration.

A brief summary of other effects is as follows:

Corrosion weakens mechanical equipment; it causes gases to be formed that are highly explosive. Volatilization can cause pressure; it can produce toxic or noxious gas. Condensation may promote corrosion; it can cause partial vacuum. Either pressure or vacuum can cause rupture or collapse of equipment. Freezing may cause cracking, or it can produce critical operating conditions. Expansion can cause rupture, or otherwise weaken constructional material.

Installed equipment is carefully chosen to safely withstand definite conditions. It so happens that such equipment is sometimes placed in a service for which it was not designed. Gauging such equipment is safe only when a study shows the equipment satisfactory for that service. If the service is not proper for the equipment with a wide safety factor and is still used, it is necessary for the critical conditions to be thoroughly understood.

No more important effect is related to gauging than corrosion. The tank, or other container of material, connecting lines, sampling and gauge connections are all subject to corrosion. Careful consideration must be given to the material stored, or in process, and to its corrosive action upon the container walls and connections.

Whether it is active equipment used in a process, or storage equipment, those employed in gauging are subject to accident from corrosive action. It follows that not only should those so engaged be thoroughly alive to the dangers of corrosion, but they should be constantly on the watch for signs of structural weakness. In following this policy, they not only protect themselves but their fellow workers.

Volatile liquids are subject to vapor pressures depending upon temperature conditions. Due to losses involved in storing such liquids, safety seals are generally provided. If the rod method of gauging is used on such a storage it involves having a gauging connection. Upon the removal of the gauge cap, the excess pressure sends out vapors. The built up pressure is slight, due to the safety seal eliminating it, but where the escaping vapor is likely to be inhaled, an unsafe condition exists. An example is ammonia liquor and such materials should be protected from excess temperature, thereby reducing volatility. Covered storage is provided for this material.

The mechanical condition of equipment to be gauged is of direct interest to those employed in gauging. Equipment has a natural life and should be replaced at stated periods. Knowing the mechanical condition of equipment to be gauged is knowledge that should be shared by the personnel, and dangerous equipment should be carefully approached. For instance, the condition of gaskets and pipe threads are illustrative of everyday troubles.

Pressure is used for moving bodies of liquids. An illustration of where pressure and gauging meet in common practice is the blowing of acid eggs by air and the receipt of the material in storage. Sometimes a workman attempts to blow into storage and to gauge while blowing. In so doing he is exposed to the rush of displaced air, but suppose the egg is blown completely while he is gauging. Then the entire built-up air pressure rushes into the storage tank. As a result, much of the material has been known to leave the storage by both gauge opening and vent. Of course, gauging, should not be attempted in that manner, but the after blow can be reduced. Many times the after blow is prolonged due to the size of the air

line feeding the egg or blow case. An orifice plate in the air line will reduce the air inflow and will allow the after blow to quickly reduce to low pressure flow, which can be handled with more leisure.

Pressure can also be built up by increase of temperature in closed tanks. The sun shining upon tank cars containing readily volatile materials is an example. For a workman to gauge such a tank without releasing the pressure is likely to cause serious injury.

The man employed in gauging is open to various injuries unless precautions are taken. He is open to toxic poisoning and asphyxiation, where even small gas concentrations exist. H_2S gas is one example of a material that can kill a man without his realizing the state of his affection. Such gases should not be allowed to escape into closed places or where good draft is not present. Equipment containing vapors such as H_2S should be under suction and connected with a stack for disseminating the gas over a broad area. The atmosphere will then reduce it to a harmless concentration.

Where a man must enter a gas area of toxic concentration he should be equipped with a mask and properly filled canister. Incidentally, the man gauging should understand the use of the gas mask and have one available, as it sometimes happens while gauging that mechanical troubles will cause an abnormal flow of gas or fumes and serious injury can be caused in attempting repairs.

In gauging the eyes are subject to splash, spray and fume in many locations. A more general use of goggles is needed.

The hands are very susceptible to injury through the handling of samples, and sampling and gauging equipment. Gloves are needed more generally for use in such service.

Every now and then, one hears of the death of a man through coming in contact with the 110 volt circuit. The man gauging is handling wet materials and usually working around equipment that form good "grounds," particularly if wet. He also is the user of the extension light. The combination requires extreme care and it is far better to equip the gauging and sampling points with an adequate supply of light.

The examples emphasize that those employed in gauging should be taught to have a wholesome respect for the potential risks existing. They should understand that their information is for the purpose of operating the plant in a safe as well as an economic manner for the personnel employed.

Having considered in some detail conditions surrounding gauging it is desired to select a method for use. There are a variety of methods, both crude and refined, and again the individual case calls for the one most suitable.

The following methods are subject to consideration: The float; pneumatic methods; the sight glass; the measuring rod.

For a particular case, a method should be selected that is well adapted to the conditions existing and which offers a proper degree of safety. For instance the "float" may be deemed desirable to use. This method is justified after proper assurance is had that conditions are reasonably safe and extreme reliability is not required. Where positive gauging is required, the float is not recommended. The float has, however, very useful application in automatic gauging and pumping, and if accompanied by further protection it serves many good purposes. Floats are used in this manner as warning devices, but too much dependence should not be placed upon a single float. They are susceptible to sticking and are not reliable where much is at stake.

Pneumatic methods have extensive use and are theoretically sound. However, in the chemical plant where conditions for their use are naturally difficult, limited use of pneumatic methods is found. Homemade pneumatic equipment in inexperienced hands is particularly to be guarded against, as there is a very great chance that trouble will occur.

A word can be added here as to the principle of the pneumatic method. If a pipe is installed vertically in a tank of liquid, with the bottom end of the pipe open, and then air is forced through the pipe in just sufficient quantity to cause bubbles to pass through the liquid, the pressure required to displace the liquid within the pipe is a measure of the depth of liquid present.

The difficulty of using this equipment in the chemical plant is not with the method but with the equipment used and its maintenance. If for instance, the air valve is one that will not allow a sufficiently small quantity of air to pass but instead a real flow, then the pipe resistance becomes a factor and the correct reading is not obtained. With such a condition the reading will vary with the depth of the liquid in the tank, but it will not be the correct reading and can cause serious trouble.

A small hole corroded through the pipe will also cause incorrect readings. Mud around the base of the pipe is likewise troublesome.

The use of this method requires that it be understood and it is more confusing than the more common ones. Even at their best pneumatic equipment must be kept free from corrosion, from blockage and improper use. The chemical plant is not the place for obtaining such constant conditions. However, there are exceptions, and if conditions are right, pneumatic gauging is very convenient.

The application of pneumatic methods to storage tanks or operating equipment where safety-overflow pipes have been provided is a very useful one. Other examples can be found where the method provides a satisfactory gauge upon operating conditions. Such installations are well justified, but caution is urged against the use of the pneumatic method for positive measurement without first thoroughly investigating the equipment to be used and the care with which it is to be maintained.

The sight glass has very broad use. From its very nature it is installed with a connection below the liquid level. For this reason it requires careful installation which includes protection for the glass. A valve between the gauge glass and container should be provided as further protection and also as a means of allowing repairs to be made when necessary.

The method is quite safe and insures positive gauging where properly adapted. There are cases where the gauge glass is susceptible to freezing. If so it can be protected against freezing without difficulty. The major objection to the method is not in the glass itself, as the glass has proved its value; but in the "below the liquid level" connection. For critical gauging the sight glass should not be used.

Gauge glasses can be obtained that have been tested under 1,000 pounds pressure. They are glass and if cracked in use glass splinters can be driven a considerable distance by the contained pressure. Where pressure is used, safety screens should be provided. These permit easy reading of the gauge and at the same time protect against flying glass.

The measuring rod is a long established institution. Where other methods fail, it functions. There is nothing scientific about it. For that reason, it is such a simple method that it is available for wide use. On the other hand it requires care, as every other method does; but with a moderate degree of care it gives positive results.

This simple method is probably the most exact one in use. Where the material being gauged is such as to cause uneasiness, due to its nature, the method gives maximum assurance of correct gauging.

The method has its limitations. It is an atmospheric pressure method. For measurement under pressure one of the other methods must be used.

From one of the above four types of methods, one can be applied to a given case, which will give positive gauging. It is through positive gauging that safety is realized. Hence, it follows that gauging is a matter for careful thought and wise decisions.

One must sample gases, liquids and solids, and a great variety of attendant conditions exist. Of these, pressure and temperature conditions are particularly important. The chance of accident while sampling requires similar care be taken in organizing sampling as in gauging.

Prior to deciding on sampling methods it is good practice to consider the material to be sampled and the conditions of temperature, pressure, etc., present at several possible sampling locations in order to select the one most desirable. The zone of possible accident about the sampling point needs to be restricted and that zone provided with safety protection. Inspection of the location must be thorough and it should be kept in a satisfactory condition.

The sampling station should be so designed as to allow of free movement. It should allow of egress from more than one direction. Such a provision eliminates the necessity of a man passing across the line of sampling. It should be well lighted and ventilated or under suction to remove injurious vapors.

Possibly, sampling points have been seen located at the top of open tanks in which for instance soda ash was being mixed with acid solutions. At such a time, was the fan providing suction for the mixing tanks operating? If not, was it in condition for operating? Assuming it was running, what about the soda ash feed? Was that too fast for the fan to remove the CO_2 given off from the mixture. If so, how much oxygen was present immediately above the opening of the tank? Such conditions exist and sampling is done at the open top, where a man is liable to be overcome.

The sampling location should have proper ventilation. To provide otherwise caters to lack of care, a hurried job, or poor sampling. While in the latter case the object sought is not obtained, in the first two cases unsafe conditions can be either met with or created.

As in gauging, we find the question of sampling related directly to the consideration of the potential sources of trouble and how to get around them in order to safely perform the assigned task. As before, each case requires individual consideration. In one case, fumes are taken care of by suction hoods, in another, strength and choice of material provides for pressure. In each case is found a planned procedure. The personnel engaged in sampling should understand the care that has been taken to make conditions safe, and should be encouraged to know the situation surrounding their particular task.

In tap sampling, movement of equipment is usually confined to the valve. Moving equipment always provides troubles and the valve is no exception. The sampling valve can be the object of abuse; often it is the object of neglect, but it will itself depreciate. Abuse and neglect should have no place in sampling, but it has to be given consideration in the selection of the valve. All sampling equipment requires careful selection, requires watching in service and must be kept in operating condition.

In choosing equipment for tap sampling, consideration of the type of valve is important. Sometimes gate valves are satisfactory; at other times needle valves are required. Suppose, on account of pressure, a needle valve is desirable but due to contamination such as floating particles of dirt, a larger opening is desired. To provide the larger opening with pressure behind the valve is likely to result in serious injury to the man sampling. If the valve is followed up with small pipe, conditions are improved, but it is better to keep the dirt from reaching the needle valve by using a screen that can be removed for cleaning.

Simple mention has been made to "tap" sampling. The other common method is "dip" sampling. Obviously, the latter is used only in open type equipment, and safety measures relate to protection from splash, danger of falling into the open equipment, and danger from handling the sample. These conditions require planning and regulation, but the problems encountered are easily foreseen and with proper instructions and reasonable care safe routine procedure can be established.

The tap method is widely used. Trouble may come from pressure, poor mechanical or sampling equipment, inexperience, blockage, freezing, or poor sampling conditions. Inexperience implies insufficient knowledge of the pertinent facts. Blockage and freezing are quite closely related to pressure, yet there is a difference in the method of handling. Both blockage and freezing of sampling lines require great care in handling. The seriousness of a case depends upon the material handled, and the ease of handling the trouble and the type of labor used. If the blockage occurs in the handling of hot or corrosive materials the problem is serious. If pressure is also a factor, it is more so. In either case, exceptional care is necessary and a responsible man should supervise the opening of such sampling lines.

A picture associated with sampling is, a workman standing in front of his sampling line, the sampling valve removed. No sample comes forth. The workman is preparing to ram a wire or rod into the pipe to remove a blockage. Have you seen the result from such methods, perhaps the man lying in a bath-tub having his burns washed and treated.

Such accidents indicate that sampling is more than a routine operation.

Sampling under light gravity pressure should be an easy task and requires but brief mention. An experienced man knows that under such conditions a moderate propelling force exists. However, does he keep fully aware of the mechanical and physical conditions of his sampling equipment. The use of a wet sampling bottle for material that water decomposes violently is an example of a poor physical condition. Worn or corroded pipe threads inviting the breaking off of the sampling line illustrate poor mechanical conditions.

These accidents are likely to happen where the tap method is used. The dip method is practically free from these liabilities. Hence, where it can be used, the dip method has much in its favor.

Where higher pressure exists whether moderate or heavy the tap method is practically a necessity. Under pressure the chance for accident is present in two ways, first from conditions directly attendant with the taking of the sample under pressure and second due to the fact that the man sampling is exposed to conditions surrounding pressure equipment. The latter requires that he be aware of the chances existing for sudden leakage or blow-outs from gaskets, rivets, welded joints, gauge glass, etc.

The sampling line should be strong and properly braced to withstand pressure exerted upon it while opening a valve. The material from which the line and valve are made should be chosen with due regard to corrosion and fragility. Depending somewhat upon the pressure, the type of valve should be chosen with care such that the stream emitted is easily within control. Needle valves are particularly adapted for sampling wherever a fairly clear liquor is present and also if a filter or screen is provided before the valve.

The container into which the sample flows should be of a wide mouth type to allow pressure release. Where the pressure back of the stream is sufficiently high to cause splash, the sample can be drawn through a shield.

In sampling, material is likely to drop upon lower levels such as floors, and splash upwards. It may break its fall upon pipe lines and on rebound reach the face level. The eyes are then in the danger zone from indirect results. Such conditions can be remedied by installing the sampling equipment in locations either free from or specially guarded from splash.

Occasionally, sample valves will not re-seat. If the material handled is one that causes particular annoyance that way, a type of valve can be installed that is double acting. One movement will give a seat grinding effect and the other movement will close the valve.

The conditions surrounding the sampling of solids are far more favorable than with liquids.

With solids the chance for accident is largely associated with motion on a different scale than with liquids. Machinery plays an important part in the handling of solids, and sampling of solids usually implies working around types of mechanism.

In general, solids will not flow as liquids do, hence, the methods used for liquids are not suitable for solids. It is usually necessary to go after the sample, to sample direct from the path of moving solid material. If this can be done in a relatively open and well protected portion of that path, conditions are relatively safe. However, plant equipment is not usually planned with an eye to providing secure sampling locations. Too often, it is necessary to sample at inadequate locations, and here we find the quick motion of sampling in its attempt to snatch solids from in front of an approaching crushing roll, or from in front of moving rolls, either type of roll just as unwilling to distinguish between a human arm and the solids being drawn into them.

In such cases there is an obvious need for well planned procedure. Such includes safety protection at every sampling point.

Before closing this discussion just a word should be added from the economic side. First, it costs but little to organize sampling methods; second, it costs less to keep them going; third, it pays.

CHAIRMAN GREENBURG: Is there any discussion on Mr. Shapleigh's paper? Does anybody want to add anything to it? Has anyone some personal experience to recount?

G. H. MILLER (E. I. du Pont de Nemours & Co., Wilmington, Del.): I might bring out one point in connection with gauging—I don't know how widely the practice is followed but some know about it and it will be interesting to hear about it.

Gauging with a rod, of course, is attended with a certain amount of danger if a man's hand is in contact with acid, and sometimes we have used a little neck of iron with a pulley and the rod is suspended on that and is let down with a chain into the tank and pulled out again so that it is not necessary to touch the rod with your hand.

W. C. REIBLING (American Tar Products Co., Cicero, Ill.): Last year we were told of a light reducing transformer which could be put into the socket of an extension line which would reduce the voltage from 110 volts to 35. We were told that that voltage was not a hazard and would not injure a man. I have been trying to locate those socket reducers and have not been successful, and I wondered if somebody here could advise me.

A. L. ARMSTRONG (Eastman Kodak Co., Rochester): The General Electric or Westinghouse will furnish those and make up anything you want. I may be mistaken, but we use a great many transformers in different places in our plant. In fact, we use a transformer and reduce it to six volts. I am sure those transformers are purchased. However, if you care to drop me a line after the conference I will get you all the information on that you wish.

CHAIRMAN GREENBURG: Is there any other discussion or question?

If not, we will pass on to the next paper which is on "The Treatment of the Effects of Irritant Gases and of Superficial Burns." Professor Underhill, of Yale University, has had perhaps more experience with this particular problem than anyone in this country or in Europe that I know of. The problem of the treatment of the effects of gasings assumed immense importance in the early stages of the war when poison gases came into such widespread use. At that time the United States Army conducted experiments on the treatment of gassed animals; Dr. Underhill was responsible for this work. I think we are all highly privileged to have Dr. Underhill with us this morning.

Treatment of the Effects of Irritating Gases and of Extensive Superficial Burns

By FRANK P. UNDERHILL

Professor of Pharmacology and Toxicology, Yale University,
New Haven, Conn.

It is my purpose to attempt to point out very simply the conditions that are induced in the body by the inhalation of irritating gases on the one hand, and, on the other, the effects of superficial burns, and to endeavor to indicate a logical and successful method of treatment which is applicable to both these apparently unrelated conditions. It will be developed that these conditions are only *apparently* unrelated; in *reality* they are most intimately connected in their fundamental bases.

It should be pointed out that irritating gases may be divided into two great groups, one being more or less readily absorbed by the blood and producing its most potent detrimental effects because it induces changes in the blood itself (H_2S being a representative of this group), the other group containing the larger number of detrimental compounds, such as acid and alkali fumes, which are not absorbed at all, or, if absorbed, to an exceedingly limited extent only. It must be obvious that the fundamental effects produced by these two types of compounds are radically different. The effects of H_2S are primarily on the composition of the blood, changing its character and temporarily at least impairing its power to carry oxygen. With a gas like chlorine, for example, the effects are primarily on the mucous membrane of the respiratory tract and whatever change is effected in the blood must be regarded as secondary. In this discussion it is to the second type of gas poisoning that attention will be directed for the reason that it is the form most readily encountered industrially.

Let us consider for a moment the nature of the surface of the respiratory tract upon which the irritating gases produce their effects. Reduced to its simplest terms this surface may be compared to a thin, delicate, membrane separating the interior of the respiratory cavity from a rich bed of blood vessels, the capillaries. Through this membrane under ordinary circumstances there is a free exchange of oxygen into the blood and of carbon dioxide from the blood. Exchange of fluid is probably of slight moment under normal conditions. The situation is entirely different, however, when this membrane is extensively irritated. If an irritating substance comes into contact with this membrane immediately there is a very definite response to the irritating agent. In the first place, such an irritation causes a rush of blood to the irritated spot, and fluid is poured out from the small blood vessels, the capillaries, in what may fancifully be regarded as an attempt either to dilute or to wash off the irritating substance or else to keep moist the injured area. This immediate response to irritation must be regarded as a protective mechanism on the part of the body. The degree of this response to irritation depends upon the extent of injury to the membrane and upon the degree of injury to the underlying capillaries.

Under normal conditions the fluid exchange between the blood in the capillaries and the tissues is regulated in large measure by what may be called the permeability of the capillaries—the membrane of their walls allowing substances to pass only at a determined rate according to demand. If by any means this permeability is changed the fluid regulation between the tissues and blood capillaries gets out of control and abnormal conditions prevail. This is especially true when for any reason capillary permeability is *increased* and excessive fluid leaves the blood and is poured out on the respiratory membrane. When this occurs the quantity of fluid poured out may be so excessive as to fill up the lungs of the

individual—producing what is called edema of the lungs, and it has been stated that a person may drown in the water in his lungs. It must be obvious therefore that a reaction on the part of the organism which ordinarily performs a *beneficent* influence may, if out of control, prove a distinct menace to the organism and tend to produce death.

The irritating gases under consideration must be regarded as agents producing the effects just described upon the respiratory membrane. They irritate the membrane and injure the underlying capillaries to such an extent that capillary permeability is increased and fluid rushes from these vessels onto the respiratory membrane and hence into the lungs with such rapidity and in such overwhelming quantity that the lungs are soon filled and the familiar respiratory distress is then evident. This respiratory distress is at best very painful and distressing because of mere mechanical difficulty in breathing owing to the large water content of the lungs and also because interchange of oxygen and carbon dioxide is somewhat impaired. These factors are in themselves of great importance, but of far graver significance are changes which occur in the blood itself, and which must undoubtedly be regarded as the primary cause of death.

Normally, the water content of the blood constitutes one of the body's constants. Attempts to alter the water content of the blood by introduction of even large volumes of fluid have failed to change appreciably blood composition. The water regulating mechanism is adequate to make the proper compensation quickly. It is only when this mechanism is overwhelmed experimentally or as a result of disease that marked changes in blood concentration occur. Either dilution or concentration effects may then be observed, although, in general, from studies thus far carried through concentration is more commonly encountered than is dilution.

In the blood, concentration to even a moderate degree results in recognizable symptoms. The first indication noted is impairment of the circulation. When water loss becomes great the circulatory deficiency is magnified. The thick, sticky blood finds great difficulty in passing through the tiny capillaries, the circulation here is slowed and the blood is quickly robbed of its oxygen by the tissues. Because of its slow progress through the capillaries the blood becomes an inefficient oxygen carrier and the tissues in general suffer from inadequate oxygenation, resulting in partial asphyxiation. The blood vessels are not properly filled and the heart pumps only a portion of its normal volume at each stroke. There is right sided dilation of the heart. In consequence of the partial asphyxiation of the tissues there may be alteration in the metabolic processes, and when blood concentration has reached a certain level a disturbance in the heat regulating mechanism occurs: the temperature at first, elevated, falls and vital activities are suspended.

A word as to the method of determining blood concentration may not be out of place. Of all the constituents of the blood only the red corpuscle fails to pass rapidly through the capillary wall. From this viewpoint it would appear that the measurement of hemoglobin content of the red corpuscles should serve as an excellent indicator of changes in blood concentration. A consideration of this problem over a period of years has convinced the speaker that for the purpose of observing rapid changes in blood concentration the hemoglobin estimation method is unsurpassed by any other method yet proposed provided various obvious factors are taken into consideration and that the experimental conditions are adequately controlled.

There are many conditions where blood concentration may be encountered. For example it may occur when water is refused for prolonged periods as exemplified in mental derangement. Individuals exposed to the high heat of the desert or subjected to the heat of boiler rooms or of mines often show blood concentration. Vomiting induced by any cause may result in blood concentration.

In persistent diarrhoea much water may be lost to the organism through the stools. In Asiatic cholera and certain forms of diarrhoeas in infants such loss is particularly marked and may be productive of blood concentration to a degree sufficient to lead to death. In infants especially severe blood concentration is likely to occur, partly, from the fact that they have a high water requirement which may not be covered since they are dependent upon others for their water supply, and, partly, for the reason that infection may induce refusal of food, vomiting and diarrhoea, with a subsequent concentration of the blood.

Experimentally a concentrated blood may be induced by restricting water intake, by sweating, by the action of saline cathartics and other drugs.

Aside from changes in blood composition other than alteration of water content there may be another very serious effect induced by a concentrated blood, namely, a distinctly impaired functional capacity of the kidney. This organ only occasionally shows structural changes but the functional impairment lasts as long as does the blood concentration and all evidence of kidney damage disappears with the restoration of a normal water balance. This latter fact leads to the conclusion that the kidney is unable to separate a normal urine from a concentrated blood.

The impetus for our own studies in blood concentration came from experience with war gas poisoning particularly with chlorine, phosgene and chlorpicrin, in which it was shown that the intensive irritation of the respiratory tract called forth a massive edema resulting in very marked blood concentration. The intensity of blood concentration under these circumstances became so great that the heart was unable to push the sticky, viscid blood through the capillaries at a rate sufficient to aerate properly the tissues, resulting eventually in tissue asphyxiation, fall of temperature, circulatory failure, and death. Death was ascribed to the change in blood concentration rather than to pulmonary edema. From a wide experience the impression was gained that within certain well-defined limits, concentrated blood, although not compatible with proper tissue nutrition, is not necessarily a serious condition. Beyond these limits, however, life can be maintained for only a short interval. To put it differently—blood concentration up to 125 per cent of the normal values is not serious, but when 140 per cent has been reached danger enters and life is not possible for long if this limit is maintained.

These relatively wide variations which may occur without serious consequences may be regarded as another example of the factors of safety resident in the organism. That death is due to blood concentration rather than to edema of the lungs can be tested experimentally by gassing two animals with the same concentration of gas for the same period of time. Both animals will develop pulmonary edema to the same degree and both will present the same blood concentration picture. If one is treated so as to maintain blood concentration below the danger level recovery will follow, whereas the untreated animal will die. In neither case does the treatment materially change the lung condition, at least during the critical period.

If we review our discussion we find that when an irritant gas comes into contact with the respiratory mucous membrane, not only is the membrane damaged but the underlying blood vessels are also injured—their permeability is altered and fluid escapes from them to such an extent that the lungs may be filled up. This exceedingly rapid escape of fluid from the blood cannot be compensated for by the water reservoirs of the body and a marked degree of blood concentration occurs which outside of certain well defined limits is inimical to proper nutrition and even to life—death resulting from tissue-asphyxiation. So much for the mechanism of the pathological condition induced. From the practical viewpoint what can be done about it in the way of treatment?

In general nearly all the accidents met with are induced by inhalation of acid fumes and a natural inference is that attempts should be made to neutralize the acid, or the alkali, as the case may be. Such a procedure, however, cannot be

recommended. From my own experience with war gas poisoning the neutralization of these gases by fumes of ammonium salts always led to worse results than if such attempts were not made. The irritant action of the ammonia if unskillfully used may itself add an irritant action to that of the other gas so as to increase the local injury. Moreover, the ammonia would only penetrate to the upper air passages and these would not require the neutralizant, since they would be quickly flushed by fresh air. On the other hand, in the army during the war ammonia was carried in ampoules, and a few whiffs were inhaled at intervals, during the first day after gassing. The benefits were admitted, but the effects were purely *symptomatic* since ammonia acts as a respiratory stimulant usually making breathing easier and less exhausting. Some patients on the other hand are made more uncomfortable by it.

So far as attempting to alleviate the *initial* injury by neutralization such a procedure is entirely hopeless and useless. The damage to the respiratory membrane is instantaneous and once injured neutralization of the offending agent will not help or restore the membrane. Moreover, it should be remembered that the mucous membrane, being made of protein, together with the mucus present, is itself capable of neutralizing to a large extent either the acid or basic properties of the offending agent.

For first aid treatment of gas poisoning the patient should be compelled to lie down and if transportation is necessary he should be carried. Plenty of fresh air is essential and it is equally essential that the patient be kept warm. It may be desirable to allow the patient to drink water, to wash out the mouth. Usually water ingested immediately after gassing is vomited. This is not to be discouraged since any gas swallowed will be thrown out and also probably a certain amount from the respiratory tract will also be regurgitated. Rest, fresh air and warmth are all the first aid treatments that can be given without possible subsequent harm to the patient. The remainder of the treatment requires hospitalization.

In the hospital, in so far as they can be avoided, no drugs should be given. With patients with restlessness and spasmodic cough it may be necessary to administer small doses of morphine but in general morphine should be avoided if possible since it tends to depress respiration at a time when the maximum respiratory ventilation is needed to offset the diminished lung area. Attention should be directed mainly toward maintenance of blood concentration within the normal limits. By following the hemoglobin values hourly for a few hours the state of blood concentration can be ascertained. At the first hint of a concentrating blood measures should be adopted to combat this tendency. The essential feature in the stage of blood concentration is to diminish if possible the degree of concentration, and we have found by experience that it matters little how this is attained. Thus, this purpose may be accomplished by direct venous infusion of salt solution, intraperitoneal injection of salt solution or by oral administration of large volumes of water. If, however, in spite of fluid administration the blood concentration continues to mount, venesection to the extent of 500-800 c.c. should be practised and into the vein should be introduced an equal volume of salt solution. Administration of fluid by other channels should be continued until blood concentration is within safe limits. So long as blood concentration remains stationary even though at a high level, further infusion of salt solution is unnecessary and when the concentration begins to diminish the individual is on the road to recovery. Rest and warmth should be strictly maintained.

Bleeding at the proper state apparently acts as a stimulus to the body to fill up the depleted blood volume and fluid is poured in from the tissues for this purpose.

There are many other details of treatment that might be indicated but here it is only possible to give the bare outline as indicated by an understanding of the mechanism upset by the offending agent. One point should be emphasized, that is,

that when fluid is given it should be given in large volumes and continuously for at least 48 hours—so much every hour so that during the period of a day 4-8 liters should be consumed.

It seems a far cry from gas poisoning to superficial burns and yet in the latter instance the blood may be markedly concentrated and if sufficiently so undoubtedly plays a large contributing role to a fatal outcome. The proof for this statement lies in the fact that if by any means blood concentration can be prevented or abolished the chances of recovery are very materially increased.

A moment's thought will convince one that there is not a great difference in the two conditions. In both instances there is a membrane stretched between the atmosphere and the blood capillaries. In the case of the skin this membrane is covered by a horny layer, the outer layer of the skin. An agent like chlorine which would badly injure the respiratory membrane would have but little influence upon the membrane of the skin protected as it is by the outer horny layer. When, however, an agent like heat is applied strong enough to penetrate this outer horny layer then the same type of condition is induced on the skin membrane as occurs in the respiratory membrane—fluid rushes to the surface of the skin membrane and the outer horny layer is detached, the fluid pushing it up from the surface in the form of a blister or if the force is great enough the blister breaks and fluid exudes on the surface. If the affected area is great enough the quantity of fluid that may be lost from the blood in this way is very large. In animal experiments such losses in less than 24 hours may exceed 40-50 per cent of the total blood volume.

The treatment of extensive superficial burns by heat is a matter of immediate hospitalization. There are two aspects of treatment that must be considered, first the care of the wounds themselves, and, secondly, the treatment of possible systemic effects. The care of the wounds varies according to the different surgeons in charge of such cases, the prime object being to cover the surface to keep it from contact with air, etc., to prevent infection, and to leave as little scar as possible. This phase of treatment is outside our sphere. On the other hand, in our opinion the most serious complication to be anticipated is the systemic effect, namely, a rapid marked concentration of the blood.

Our experience with the treatment of the systemic effects of superficial burns was gained as a result of observations carried through on more than twenty victims of a theatre fire in New Haven.

The patients were admitted into the New Haven Hospital* in the early evening and at once received first aid treatment and were sent to the various wards. Blood concentration estimations were made at once. From the clinical standpoint the patients were divided into two groups (a) those seriously burned (b) those not so seriously burned. The blood concentration of the first group was above the danger level, namely, more than 125 per cent. Those less seriously burned were below this level. The correspondence between the severity of the clinical picture and the blood concentration was perfect. In the first group all patients were placed upon the danger list, in the second none were included in this list. The first point of significance in this investigation is that the determination of blood concentration which takes only a few moments serves as an indication of the gravity of the patients' condition and also points out definitely the type of treatment necessary.

In our opinion the serious condition in burn cases is the concentration of the blood and treatment should be directed to reduce this concentrated blood to a more fluid state. The systematic treatment of these burn cases consisted simply in the forcing of fluids, water by mouth when possible, when the

*Through the courtesy of Dr. Samuel C. Harvey, Surgeon-in-Chief in the New Haven Hospital, opportunity was afforded to us to conduct this investigation. (The details of the work are published in the Archives of Internal Medicine, 1923, vol. xxxii, p. 31.)

patient could not cooperate because of unconsciousness, fluid was injected under the skin, directly into the blood, by the rectum, etc. The quantity of fluid taken in varied from four to eight litres daily.

In a day or two on this treatment the blood concentration fell gradually and the patients' condition steadily improved. All patients so treated recovered although of the group of those severely burned the vast majority could be regarded as poor risks.

"Although from figures and other data relative to these observations one is apparently justified in concluding that restoration of blood concentration is of prime significance in burn cases, nevertheless, to the sceptically inclined there are at least two points at which the above conclusions may be attacked. In the first place, one may assume that fluid intake has only an inappreciable influence on blood concentration, that fluid is excreted from the body almost as rapidly as it is ingested. All the available literature on the subject supports such an assumption. One point, however, must be emphasized, namely, that in nearly all instances in which this hypothesis has been put to the test the organism employed was that of a normal person. Herein lies the crux of the whole matter. It is utterly fallacious to predict the behavior toward water administration of an organism suffering from lack of water from observations made on an organism with a sufficiency of water supply. It is quite true that partaking of large volumes of water by normal man or dog does not perceptibly alter the concentration of the blood. So long as the water regulating mechanism of the body is normal such a result is to be expected. On the other hand, when an animal has been deprived of water for a sufficiently long period, blood concentration becomes markedly increased. Water administered under these circumstances causes a rapid fall in the concentration of the blood. Experiments by others and by ourselves cause us to reiterate the statement previously made that it is fallacious to draw conclusions relative to the abnormal organism when these inferences are largely based on observations on normal persons, and they furthermore dispose of one of the points of attack cited above.

"A second point of attack centers on the query, 'Did the fluid intake in these cases actually influence blood concentration or would blood concentration have returned to the normal without such aid?' To answer this question absolutely control experiments would be necessary. Such a control, however, is obviously lacking. The question receives a partial answer from previous experiments together with our experience with war gas poisoning. Death may follow, but blood concentration is not restored to near normal limits under conditions of water lack unless sufficient fluid has been introduced. We believe, however, that the question is fully answered by our experience with one burned patient treated outside the hospital. A victim of the same fire, this patient was cared for at his home by his own physician. Special attention to forcing of fluids was lacking. This case was especially badly burned and presented the typical signs and symptoms characteristic of intoxication from burns, chief among which was an active delirium, it being necessary to take measures to keep the patient in bed. This was succeeded by a period of collapse and unconsciousness, death being anticipated. After a period of eight days, consultation with the physician resulted in the active forcing of fluids. Previous to fluid administration (two litres of 0.7 per cent sodium chloride solution subcutaneously) the haemoglobin value was 163 per cent. A few hours after the salt solution had been given the patient regained consciousness, became rational, and was capable of cooperation in taking of fluid. Blood concentration fell rapidly and the patient went on to recovery. The point to be emphasized here is that this patient on the eighth day after being burned still had a blood concentration equal to that in some of our own serious cases on the first day. The presumption is valid that if this patient's blood concentration would have returned to normal of itself it should have done so within

a period of eight days, an interval during which none of our own treated patients maintained such a concentration.

"From such data it would appear that water intake is responsible for the decrease in blood concentration observed in our cases, and it is quite safe to assert that without such water introduction blood concentration would not have taken the decided fall observed in every case. We believe, therefore, that the observations recorded justify the conclusion that water introduction in sufficient quantities to restore blood concentration to within normal limits is of paramount importance in the treatment of burned cases. As a result of this type of treatment, it may be stated that only two patients gave any evidences of symptoms characteristic of intoxication in burns. In these cases unconsciousness at first prevailed; this, however, disappeared after restoration of the normal blood concentration. In all the other cases, the patients presented no untoward symptoms, such as delirium, unconsciousness, gastro-intestinal disturbance, haemoglobinuria, albuminuria, etc. Whether such facts are to be interpreted from the viewpoint that restoration of blood concentration prevented the development of conditions responsible for these symptoms or that fluid introduction caused prompt elimination of toxic material so diluted as to be innocuous or both, remains a problem the solution of which can be determined only in the future. At any rate, from either viewpoint it would appear that fluid introduction is a rational method of treatment for extensive superficial burns."

Since the initial experience gained from the victims of the theatre fire we have had occasion to treat a number of burned cases in the New Haven Hospital and have been consulted on cases in various parts of the United States and in general the results obtained from the treatment have been very encouraging.

If one analyzes the pathological states in which blood concentration occurs it must be quite evident, that the one underlying factor common to all with the exception perhaps of shock, is that an extensive inflammatory reaction is prominent, acting usually upon a more or less restricted area, as the respiratory tract, the skin, the alimentary canal, the peritoneum, etc. All are areas plentifully supplied with capillaries.

In order to understand the nature of the mechanism producing the blood concentration a word as to the character of the fluid lost from the blood is essential. From my own observations on gas poisoning it becomes apparent that this fluid partakes of the nature of plasma, diluted plasma, as it were, containing somewhat less protein than plasma, but otherwise of practically the same composition. The fact that significant quantities of proteins are present and indeed the blood proteins, particularly fibrinogen, leads to the view that the irritant factor has changed the character of the capillary wall. In ultimate analysis therefore one may conclude that the direct cause of blood concentration, in the pathological states under discussion, is due to a changed permeability of the capillary wall.

From our experience and conception of the mechanism involved in the loss of plasma from the blood a change in capillary permeability is essential—in the loss of salt solution no such alteration is necessary. We believe that any irritative or inflammatory reaction upon any extensive area of mucous membrane may, if sufficiently acute, cause a rapid loss of plasma resulting in blood concentration. In general it is this type of blood concentration which is likely to prove disastrous to the organism. We shall return to this point later.

Blood concentration induced by loss of water and presumably salts only, results in a concentration by a process of dehydration or real desiccation. This is what occurs when sufficient fluid is not introduced as by experimental water deprivation of animals, or clinically in the dehydration of infants. Again intense secretion induced by pilocarpine or purgation by the saline cathartics will cause a rapid blood concentration. It is significant, however, that this process in general does

not proceed to the point where a dangerous degree of blood concentration is attained. The concentration approaches the danger line but is not maintained. This, however, is only a general statement and is particularly applicable to the saline cathartics and to pilocarpine. If actual water deprivation is pushed for a sufficiently long period blood concentration steadily mounts and death follows. Such a result, however, can be called forth only by drastic measures.

Blood concentration of this type is obviously of an entirely different nature than that induced by an inflammatory reaction. This becomes quite apparent when attempts are made to restore the blood to its normal concentration. In the former case a single administration of fluid is all that is essential. With the concentration induced by an inflammatory reaction a single administration of fluid alone although helpful is not strikingly successful. Why? Because in the latter instance the capillary wall has been modified so that it is no longer capable to the normal extent of retaining fluid. In other words, in the one type of blood concentration the capillary wall is involved, in the other it is not, at least to an extent capable of measurement.

The potency of the agencies which may play upon the mechanism governing blood concentration are determined in large measure by the fluid content of the body at a given moment. Thus, when an animal has been deprived of water to the point where blood concentration becomes significant even though still within safe limits, the saline purgatives no longer cause purgation. With sodium sulphate and rochelle salts no immediate symptoms are in evidence. When magnesium sulphate is employed complete anesthesia takes place and unless treatment is given immediately death follows. This fact may have a certain clinical bearing in the indiscriminate use of Epsom Salts both before and after operation. The administration of plenty of fluid both before and after operations is in most instances a wise procedure. From this viewpoint if a cathartic is to be used it should be one which by its action does not draw fluid from the blood.

It is also quite probable that shock may be much more easily produced in an organism in which the blood is concentrated than in one when the fluid reserves are normal, for in peptone shock the blood concentration curve is distinctly modified and the poison appears to be more potent.

Another point of considerable clinical significance is the fact that it is much easier to prevent marked blood concentration than it is to change it once it has become established. For the prevention of blood concentration large volumes of fluid are essential administered more or less continuously. In certain instances venesection tends to keep down concentration acting as it were as a stimulus upon the reserves of the body to maintain constancy of blood concentration. In attempts of the past to maintain blood concentration the error in procedure has been that only a *single* intravenous infusion has been made or repeated infusions at infrequent intervals. The relief afforded has been only temporary since the fluid quickly left the vessels. Administration of fluid should be more or less continuous and it is essential only to attempt to reduce the concentration to the safe limits. This reduction of concentration by administration of fluid or by venesection plus fluid need be practiced for relatively short periods only—it carries the individual over a critical period—a period necessary for restoration of the normal permeability of the capillary wall—in other words the capillary wall repairs itself which takes from twenty-four to forty-eight hours. It is during this period that fluid must be pushed continuously.

In the treatment of burns, therefore, the essential object is to keep the blood concentration near a normal level until the blood capillaries in the skin injured by the heat have had an opportunity to repair themselves and again become capable of holding within themselves the fluid of the blood in a normal manner.

Just a word as to first aid treatment of *chemical* burns and I am through. Shall such burns be treated by flushing with water alone or by flushing with solutions containing substances that will neutralize the agent producing the initial damage? My own reaction to this question is that water alone is sufficient and indeed is to be preferred to any neutralizing treatment. Usually such a burn is produced by a strong acid or a strong alkali. Whatever damage is done is almost instantaneous but it is self-evident that it is essential to remove the offending agent as rapidly as possible. For this purpose water, preferably running water is to be recommended, first because it is always available quickly in large volumes and secondly because the desired end is to wash away the offending substance. *This*, water will accomplish better than anything else. To pour on a neutralizing solution means to have on hand a large supply in a definite location. Time is lost in obtaining it, and this time is very precious from the standpoint of the patient, and moreover, a chemical reaction may be set up between the neutralizing agent and the offending agent which may make the initial injury worse. I believe that nothing is better than large volumes of water. Of course, if burns are induced by an agent insoluble in water, carbolic acid, for example, then water would not be recommended as a flushing solution. In this instance, rapid changes of a solvent, like alcohol, should be used. Usually, however, the burns encountered industrially by chemicals are those induced by acids and alkalies and I believe that nothing is better in first aid treatment than plenty of water.

(In the absence of Dr. Greenburg, Vice-Chairman C. F. Whittemore took the chair.)

CHAIRMAN WHITEMORE: Our registration cards show that we have a considerable number of medical men present aside from the speakers shown on our program, and of course we have another stack of members who are not medical men. We would like to hear from both of these groups in the discussion of this paper. I am sure there is a great deal to be thought about and discussed at this time.

I. V. KEPNER (Pennsylvania Salt Manufacturing Co., Philadelphia): May I ask the doctor what he would recommend for medical first aid treatment for caustic burns?

DR. UNDERHILL: What do you mean by caustic burn?

MR. KEPNER: I mean a burn from a caustic flash.

DR. UNDERHILL: You mean an alkali. I would recommend water.

CHAIRMAN WHITEMORE: I believe Mr. Baxter, of the Newport Chemical Company, has brought to light some other views on this subject, although most of us perhaps are agreed that the medical treatment with water is preferable. We would like to hear from Mr. Baxter.

W. A. BAXTER (Newport Chemical Co., Milwaukee, Wis.): I don't want to start a controversy between the different doctors, but Dr. Hubbard, of the Ford Hospital, I believe, last year gave us a treatise on burns of the eye, and he recommended as first aid treatment the use of water in large quantities. But since that time I have picked an article from the *American Dyestuff Reporter*, April 30, 1928, written by Dr. Paul Bartholow, and he is not in accord with Dr. Hubbard's view on the first aid treatment of the eye. It is quite a lengthy article. I don't know whether we have the time to read this or not. I might read certain paragraphs and give you the slant on what he says. Would that be permissible?

CHAIRMAN WHITEMORE: A reasonable amount of it would be interesting.

MR. BAXTER: He says in one paragraph:

"I think everyone who has had much experience in treating burns of the eye must acknowledge that washing with sterilized or tap water is very painful, and increases shock. Prof. Fratin has published in the *Policlinico*, 1915, Sez. Prat.

p. 721, his results with isotonic salts solutions which he prefers both for simplicity and speed, to any of the other remedies. They have taken the place of weak solutions of picric acid which recent investigations have shown to be too irritating for burns of the second degree. Evidently picric acid had had its vogue and been passed over for more scientific agents.

"The author whom I am citing makes no distinction between burns by sulphuric acid and nitric acid. The distinction—and its relation to treatment—are well brought out by a writer in *Safety Engineering*, September, 1927: 'Nitric acid burns are different from sulphuric acid burns—they are more like actual burns.' And, 'to destroy the burning qualities of an acid, it is necessary to neutralize it with an alkali. As sulphuric acid takes up water in all proportions with great evolution of heat, it is very dangerous to throw water on it.'"

He also says: "We learn by hard experience the value of the only safe rule—to do nothing in emergencies which we are not absolutely sure is right, and in burns of the eye simply cover them with a clean bandage and wait for a physician and proper remedies. It is wonderful how the eyes escape what seems at first like absolute loss by the rapidity with which the lids close. It is most harmful, therefore, to get in a panic and use the first available solution."

I would like to hear some comments from some of the other physicians present.

W. H. HINKEL (Atlas Powder Co., Wilmington, Del.): I thoroughly agree with Dr. Underhill in everything he has said in regard to the treatment of burns, and I think that most physicians who have had extensive experience with burns of all kinds will agree that the blood concentration is the main thing.

I have done considerable work with burns from mine gases, and also with burns from acids, and I find that after the first aid treatment is finished the subsequent treatment is about the same in all of them.

I want to make one observation that came to mind in regard to the immediate treatment of inhalation of noxious gases, irritant gases.

Some years ago those of you who remember Dr. Hudson, of the du Pont Company, who is now deceased, will remember that he advocated the use of about seven drops of chloroform with a teaspoonful of aromatic spirits of ammonia in water and taken internally—not inhaled, but taken internally as the immediate treatment following the inhalation of these gases.

I have had some experience with that. I haven't found any permanent results as to cures, but there certainly is a great amount of relief following that treatment.

In regard to the paper by Dr. Bartholow which was mentioned by Mr. Baxter, I have had a lot of experience with burns about the eyes. While what he says is true, that the eyes close very quickly and there isn't very much acid gets in them, yet I think one of the main things that you have to guard against is the burning of these very eyelids on the outside; and I think that the same thing that applies to burns on the rest of the skin applies to the skin of the eyelids. Some of the most terrible results that I have seen have been in cases where the eyelids were burned and turned out so that the man was a horrible thing to observe. In some cases it took two or three years to correct that.

CHAIRMAN WHITEMORE: Is Dr. Wade Wright present?

If not, I wonder if Mr. Whiting, of the Liberty Mutual will say something. a question of Dr. Underhill in connection with some of the irritant gases. When our section was getting out some safety practice sheets on chlorine we got into considerable argument as to its irritant qualities, and the point was brought up in certain industries that are making or using chlorine, that there is a hardening

S. E. WHITING (Liberty Mutual Insurance Co.): I would be very glad to ask effect. A man develops either shallow breathing or some other element that makes him more or less immune to the exposure as compared with the person who has not been exposed for years to the gas. Does Dr. Underhill know whether

there is any technical basis for any such hardening in a person exposed to chlorine or other irritant gases?

DR. UNDERHILL: No, so far as I am aware that has not been observed. Of course, most of our experience came from acute poisoning. You are speaking of a chronic poisoning which I regret has not been investigated as thoroughly as the acute poisoning. It is quite possible, of course, that some such effect might be expected. There is a sort of a coagulation, as it were, of certain of the mucous membranes which would tend to give a hardening effect such as you describe. I think it would be quite possible. It would tend to render those individuals perhaps less sensitive to the effects than individuals who had not been continuously subjected to the action of relatively small quantities of gas.

MR. WHITING (Liberty Mutual): There is another question. Would you advise that the workmen should be trained so far as possible to breathe shallow while they are still forced to be in the exposure?

DR. UNDERHILL: I don't think they can help themselves.

DR. PEDLEY (Montreal General Hospital): The men whom I saw die in the war from irritant gases appeared to die from drowning primarily. Is that factor primarily due to the concentration of the blood, and if they do die from drowning, is not a better thing to allow the blood to become concentrated to tide them over the period of great concentration of the blood?

DR. UNDERHILL: That is the obvious feature of edema of the lung, but that is not deadly. You may have your lungs filled with water as much as you please and can inhale to get your tissues aerated in some way. The presence of water in the lungs is not a serious condition. During the war the whole story was one of pulmonary edema and it was soon found that even though that pulmonary condition was allowed to exist that if you changed the blood concentration the patient recovered in spite of the edema. Moreover, in animal experiment you can fill up the lungs with water and yet the animal doesn't die.

R. O. KEEFER (Aluminum Co. of America, Massena, N. Y.): I would like to ask a question about carbon monoxide poisoning. Is there any foundation for the statement that men who are working constantly in low concentrations of carbon monoxide become, you might say, used to it and can stand more of it than a man who is not working in an atmosphere of low concentration of carbon monoxide? Take, for instance, the man in a plant which is not modern and where there is considerable gas: will he become partially immune, or more so, than a man who has never worked there before?

DR. UNDERHILL: I don't know anything about carbon monoxide except in a very general way, but I think your supposition that he can become more or less immune to small quantities may be correct, because all of us who smoke more or less excessively must become immune to small quantities of carbon monoxide.

H. F. BROWN (E. I. du Pont de Nemours & Co., Watson, Ala.): I would like know what area of the body covered with burns would cause the blood concentration to increase rapidly enough to cause that effect?

DR. UNDERHILL: Well, that is a disputed point, but certainly, if a third of the area of the body is burned, and thrown out of condition, the chances of death are very great.

W. A. BAXTER (Newport Company, Milwaukee): I would like to ask Dr. Underhill if the giving of milk is of any value in the treatment of ortho-toluidine and aniline poisoning? I have written to several doctors and talked to them, and some say no and others yes. I wrote to a doctor who had written an article for *Industrial Hygiene*. He recommended giving copious amounts of milk.

DR. UNDERHILL: That, I presume, must be taken by mouth.

MR. BAXTER: Yes, as first aid treatment. Do you think that would be of any value?

DR. UNDERHILL: I should think it would. I should think it might have some value in more or less preventing absorption; but if you do that you should also pump out the stomach, for the milk will do no good in combination with the aniline.

MR. HOLTZ (Pittsburgh): There is a question which has been running through my mind which I suspect has occurred to some of the rest of you in connection with the Doctor's very splendid paper, and that is just how soon does this blood concentration occur? In other words, if a man is burnt reasonably bad, is the first aid for that burn the combatting of the blood concentration, or is that blood concentration something that will occur somewhat later and can be taken care of in a hospital?

DR. UNDERHILL: That is rather a hard question to give a dogmatic answer to. For example, in our cases in New Haven which occurred in the late evening, the blood concentration in some instances was at a maximum in a period of four or five hours. That meant, probably, that the initial concentration began, let us say, within an hour or two hours. Nearer than that we don't know, but from animal experiments the whole thing is over within twenty-four hours; I mean, the maximum is reached. You have a period of two or three hours before you begin to get really noticeable concentration effects.

In answer to your question, therefore, it would seem as though this whole question of treatment of burns, aside from rest and maintaining warmth and things of that sort, is a hospital proposition.

CHAIRMAN WHITTEMORE: Are there any other views to be exchanged on this subject?

If agreeable, then, to the members of the section, we have three other papers this morning and we might very well proceed. I will turn the Chair over to Chairman Greenburg to introduce the next speaker.

CHAIRMAN GREENBURG: The next subject on the program is a "General Discussion of Health Hazards in the Chemical Industry." We discussed safety hazards yesterday and to some extent today, and now we should spend some time on this question of general health hazards. It seemed interesting to discuss this problem from three particular points of view, and then spend as much time as remained on an open discussion of the subject. You see by the program that it is going to be handled "From the Viewpoint of the Department of Labor" by Dr. C. T. Graham-Rogers, of the New York State Department of Labor, New York City.

Health Hazards of the Chemical Industry From the View Point of the Department of Labor

By C. T. GRAHAM-ROGERS, M. D.

Bureau of Industrial Hygiene, New York State Department of Labor

To properly express the view point of the Department of Labor with reference to the health hazards in the chemical industry it is necessary to preface such a discussion with a brief outline of the organization of the department and the functions of a few of its component parts.

The Industrial Commissioner is the executive head of the department and is charged with the administration of the Labor Laws and the Workmen's Compensation Law.

The Industrial Board is in character the judicial and legislative body of the department inasmuch as its duties are to make, amend, or repeal rules for carrying into effect the provisions of the Labor Law, and having broad powers with reference to the carrying out of the sections of the Compensation Law.

The Inspection Bureau constitutes in effect the police agency of the department, for its main function is to see that the Labor Law and Industrial Code Rules are complied with, and likewise to secure a compliance by prosecution measures if so required.

The Compensation Bureau is concerned solely with the administration of the Workmen's Compensation Law. The personnel determine the validity of a claim, the extent of disability and the amount to be awarded the claimant.

The Bureau of Statistics and information compiles and publishes the statistical information gathered by the personnel of the other Bureaus as well as special statistical data gathered by its own personnel, and all with reference to accidents.

The Division of Industrial Codes formulates the Industrial Code Rules necessary to clarify the Basic Laws and so specifically apply the provisions to industrial conditions in that there is afforded measures to prevent accidents.

The Bureau of Industrial Hygiene constitutes the research bureau of the department. Its functions are diversified. The personnel must undertake scientific investigations of industrial processes as well as physical examinations of workers in order to determine the health hazard present in an industry so that the other bureaus concerned with the administration of the Labor Laws may be informed of data necessary in formulating or repealing laws or rules applicable to processes of manufacture and concerned with hazards.

When required, the bureau furnishes the expert testimony necessary to sustain a prosecution for failure to comply with the Labor Law.

Among its province is that of affording the referees of the Compensation Bureau advice as to the processes of manufacture and the accompanying health hazards in industry, so that quick disposition may be made of claims appearing for hearing on the occupational disease calendars.

The bureau compiles and publishes a monthly bulletin of Industrial Hygiene, manuals, and special bulletins dealing with health hazards arranged especially for the physician, industrial heads, and the worker.

Visual education by means of moving pictures and exhibits are carried out as safety measures: illustrated lectures are also given to the workers in the industry. The safety inspectors and medical inspectors are constantly engaged in activities to advise and assist plant executives in installing safety measures for the prevention of accidents. The industries as well as the workers are acquainted with the objects of the bureau and invited to make full use of the facilities, limited as they are, so that all may be impartially served.

This then is but a brief of a few bureaus of the department (and there are over twelve) with reference to accidents.

It is patent that the view of each individual bureau head cannot be expressed in this discussion. My position is of one giving an opinion as derived from observation and coordination with other bureaus; but an expression can be definitely expressed with reference to the view point of the Bureau of Industrial Hygiene.

For a proper discussion it becomes requisite that we first consider the chemical industry as classified by the Department of Labor for use as an aid in applying the laws and in securing statistical data. Such arrangement is as follows:

Chemicals, Oils, Paints, Etc.

1. Drugs and chemicals

(a) Proprietary medicines

Patented medicines and pills

Plasters medicated

Salves

(b) Chemicals

Acids

Alcohol

Disinfectants

Gas mantles

Insect powder

Alkalies	Liquefied gas
Alum	Metal polish
Ammonia	Pharmaceuticals
Baking powder	Potash
Bleaching materials	Saltpetre
Calcium carbide	Soda
Caustic soda	Sulphur
Coal tar products	Washing fluids
Compressed gases	
Cyanides	
2. Paints, Dyes and Colors	
3. Wood Alcohol and essential oils	
4. Animal and mineral oil products	
5. Soap, Perfumery and Cosmetics	
6. Miscellaneous Chemical Products	
Starch	
Glue Mucilage, etc.	
Fly paper	
Paste	
Sizing	
Fertilizers	
Matches and Explosives	
Ammunition	
Fireworks	
Gunpowder	
Photographic supplies and Photography	
Blue print paper	Photographic film
Dry plates	Photographic material (chem.)
Motion picture film	Photographic paper

Second, what is the classification with reference to the so called occupational diseases? This part is not so simple for the various authors British, Continental and American, are not in accord. Quoting one of the pioneers in this field, Sir Thomas Oliver, of England, we find that he limits the chemical industry to the manufacture of lime, bleaching powder, the acids, and also includes aniline and nito benzol, yet in Niagara Falls, N. Y., one of the acknowledged electro chemical centers of the industry, may be found graphite, phosphorous, abrasives, carbides and other plants, so it is evident that for statistical purposes an accepted standard classification becomes imperative, both as to processes as well as to the resulting health accident, a term is preferable to that of occupational disease, which in relation to industrial hygiene is meaningless and confusing.

Hence in discussing health hazards in any industry terms having a definite meaning become indispensable. We are aware that the effect or result of exposure to a hazard is an accident, but the generally accepted meaning of the term accident has been limited to a surgical injury or trauma. Within the meaning of the Compensation Law a claim for illness contracted as a result of exposure to a so called poison or other hazard must be considered as an accident, in my opinion then the terms Traumatic Hazard and Health Hazard and the results Traumatic Accident and Health Accident are more appropriate and definite. There can be no mistake as to just what is implied.

The term poison as applied to material or substance used in industrial processes is too broad and in many circumstances misleading. Under some conditions it is unfair to the industry or product. In my opinion the term harmful substance is more appropriate and should be more in use in discussing health hazards.

What, then, shall we say is a hazard? The chemical industry is similar to other industries in that respect. We consider that a health hazard is poor air conditioning, exposure to dust fumes, gases, vapors, or liquids, extremes of temperature, high or low, glare, and finally, the operation of machinery that requires certain positions. The only difference is that in the chemical industry some of these things may be accentuated. They may be exaggerated and the resulting health hazard may be more severe than that in some other industry. But even in the chemical industry we may have health hazards, that is, to a few of the workers it may be a health hazard, because of their susceptibility or their peculiar physical condition, and yet to a mass of the workers it does not constitute a health hazard. Well, then, we cannot say that the chemical industry is peculiar to itself in a certain health hazard. What we can say about all the other industries is just as applicable to the chemical industry.

Let us consider the early attitude of the Labor Department toward industry. The Labor Department was established primarily as an exercise of police power to provide healthful surroundings in industry, regulate the employment of women and children, and endeavor to maintain a better physical standard among the workers. This program was carried out through preventive measures embodied in the Labor Laws all based upon rules of Health Safety and Welfare.

The gradual expansion of the department included scientific research as to the hazards incidental to processes of manufacture and the health accidents incidental thereto. The chemical industry was not overlooked, but it was apparent that in order to determine the health accidents resulting from exposure to the health hazards present in the chemical industry, statistical data must be gathered and compiled.

The data as to the traumatic accidents are well established. The accident report records of the Inspection Bureau were valuable and the records of the Compensation Bureau in this direction are specific, but despite the fact that the Compensation Law includes some of the health accidents, the compilation of data toward this end is of little aid in determining the actual harmful character of the industry as a whole. Likewise the Labor Law contains a section requiring the reporting by physicians of all occupational diseases, despite this statutory requirement there has been but meager reports of cases occurring among workers employed in the chemical industry. Such data would seem to indicate that the industry was free from health hazards, whereas the executives of chemical plants know a hazard exists and my own experience of over twenty years official investigations confirm the facts that health hazards exist and health accidents occur.

It is manifest that the department expects statistical information be furnished in order to determine to a certainty the actual health accident in the chemical industry.

Industry must carry on and production cannot cease. Health accidents will occur. Protective or preventive measures must be instituted not only to conserve the worker's health, but the industry itself.

A multiplicity of blanket laws is more likely to impede than to aid progress in preventive work. More laws are not only difficult of enforcement, but are less likely to create harmony in industry.

Industry as a rule if properly aided does much to solve its own problems as to health hazards, and this is equally true of the chemical industry.

Notwithstanding the fact that one of the functions of the department is to secure enforcement of the Labor Laws by drastic measures if necessary, yet it must be borne in mind that another function is to ascertain if any measure works a hardship on the industry, and still another function is that of relieving industry of any undue burden, if proper cause for so doing can be established.

The department considers that laws and rules applicable to industry were enacted after due consideration, and expects industry to comply with the provisions of such laws and rules.

The Bureau of Industrial Hygiene looks upon the Chemical Industry as a hazardous one, but it also realizes that to make general statements, not based upon facts, as to the dangerous nature of such an industry is not sound economics.

Statistical data to hand does not actually show the health hazard present, but is hoped for that better information may aid in formulating industrial code rules especially applicable to the chemical industry, which will minimize or eliminate health accidents and still not impose upon the industry an incumbrance.

The industry as a whole is not the most hazardous, for many other industries have as a component some industrial process that could be considered as a branch of the chemical industry, and relying upon data, it would appear to be more hazardous than the chemical industry.

The needed labor for the chemical industry is not as available as it was ten years ago, therefore if labor is to be secured, the industry must not be unduly exploited as a most dangerous work which should be practically prohibited, and certainly the department does not view it in such a light.

Health hazards are known to exist and health accidents do occur in the chemical industry, it is a matter of official records. These accidents cannot be entirely prevented but they can be minimized and this is a matter of official investigation.

Complete Cooperation Reduces the Accidents

To reduce health accidents in the industry requires coordinate action on the part of the state, the industry and the worker. The state and industry must labor to discover harmless substance to replace those that constitute the hazard, and in addition originate preventive devices and measures as applied to the process or product.

Industry must also continue along channels to perfect machinery or apparatus that will eliminate from the process the greater part of the hazard.

The worker must likewise assist.

First: by looking to his own physical well being, this in consulting competent medical practitioners and abiding by the advice given.

Second: by observing the rules of personal and industrial hygiene as applied to himself.

Third: Obeying the instructions issued by the industry he is employed in, and making use of all safeguards as provided for the workers or connected with processes of manufacture or the resulting product.

Until such concerted action occurs the industry will continue to be the target of biased or unscrupulous investigators.

It must be conceded that adequate compensation for health accidents is neither philanthropy nor charity, but an economic duty industry owes the worker exposed to a hazard. It has a value in that the search for protective measures is stimulated, and often there is discovered new hazards for old ones.

The department in its views and action is not merely local in character, but really plays a part in the great general movement of Public Health.

A nation is strong only in proportion to its weakest manpower. There is no reason why workers in the chemical industry should not have a long span of life and be physically fit. It can be accomplished, it spells sound economic conditions in the chemical industry, and becomes an aid in developing a more virile nation.

CHAIRMAN GREENBURG: We will reserve discussion until we finish the three formal papers.

We would now like to hear from Dr. Gehrman, Medical Director of the du Pont Company of Wilmington, "From the Viewpoint of the Industry."

Health Hazards From the Viewpoint of the Industry

By G. H. GEHRMANN, M. D.

Medical Director, E. I. duPont deNemours & Co., Wilmington, Del.

The subject which has been assigned to me for discussion this morning is a very large one, and one which requires a great deal more time than we have at our disposal. I am also sorry to say it requires a great deal more knowledge than we have at the present time. It is my feeling that the actual knowledge that exists on hazards of the chemical industry is nothing short of deplorable.

A few years ago our safety movement was started forward with a tremendous impetus and gathered a great deal of force and accomplished a wonderful amount of good. It is only within the past few years that the true value of preventive medicine has been realized; and when you realize that the life expectancy of the average individual has been increased from twenty years to fifty years in a comparatively short time, you can't help but understand that there has been a great amount of good accomplished. Now, the next step we need is to tie in preventive medicine with industrial medicine, and learn just what the hazards are in the chemical industry.

I think it is safe to say in this day and age that the chemical industry includes practically every industry, because they are all based on chemical research and applied chemistry. For example, in our own organization, nobody would question or doubt the fact that the manufacture of dyestuffs and explosives is a chemical industry. The manufacture of rayon and the manufacture of fabrikoid is not thought of as a chemical industry, but it is purely a chemical process, and it has its hazards as do many other industries. And so we might go on indefinitely, bringing up the various industries, proving that they are all based on chemistry.

Now, what constitutes a health hazard? I prefer to deal with this subject in a general way. I might say that any condition which interferes with normal human health constitutes a health hazard. All of you are familiar with lead, and most everybody realizes the importance and the dangers of lead. I believe that in order to gain a thorough understanding of just what may happen, how human health may be impaired, and how best to safeguard against such results the subject should be approached in three ways: First, a complete study in order to know your industry; second, a careful study of each and every individual employee at the time of employment; and third, a continuous study of each and every one of those employees all during the course of employment.

Now, in order to know your industry, just what is to be done? You must take into consideration every process and every chemical compound which is brought into play. Are the chemical compounds which go to make up your final product individually harmful or not? If they are not individually harmful, are they harmful after you get them together? For example, in making anhydrous ammonia we take nitrogen and we take hydrogen (neither one particularly harmful) and we combine them together under pressure, and then we have a product decidedly harmful.

Are the products which you are using capable of giving off a dust? Are they capable of giving off a gas which is injurious? Will they give off fumes which are injurious? Are you using liquids which are volatile, and the gases of which may cause interference with human health? Are your processes such that you can control each and every one of these individual compounds and limit the conditions which they are liable to produce?

Then, again, you will have to take into consideration that industrial illness may be brought about in three ways: First, chemicals may or it may not be absorbed through the skin. They may produce persistent dermatitis with which we have

some trouble in the industry. They might pass through the skin and produce constitutional symptoms.

Then, again, you have to consider the respiratory tract. Do your compounds enter the system through the respiratory tract either in the form of dust or vapor?

Then we come to the digestive tract. Do your compounds get in through the digestive tract, and if so, how rapidly?

There has been considerable work done in the past on various compounds. You can refer to the literature and you can decide whether or not your compounds and your conditions come within the class which has already been investigated. But if it doesn't, and in a great many cases you will find that it does not, spend a little time and a little money and make an investigation. If you can't investigate it yourself, you will find that there are agencies which will investigate it for you and give you a proper report as to just what to expect.

The point is to study your particular process and your particular industry and know what to expect, and don't assume that everything is perfectly safe as far as human health is concerned.

I recently investigated a plant that was engaged in the manufacture of a product, which I thought was harmful; and I said to the plant management, "Do you have any industrial cases?"

He said, "No."

"Well," I said, "it seems very strange that under the conditions that you are working and the product that you are handling that you don't have any trouble."

"Well," he said, "we don't."

I said, "What is your labor turnover?"

"It is 40 per cent," he said.

"What is the reason for that?" I asked him.

He said, "I don't know."

I said, "Will you allow us to examine a group of your men who have been engaged in this particular industry for a reasonable length of time?"

He wasn't particularly keen about it, but finally agreed, so we examined 20 men, and out of the 20 we found that 18 of them showed definite signs of absorption. We found that his labor turnover was 40 per cent because the men had more sense than he had. They realized they didn't feel well after they had worked for him for some time and they quit.

That brings us to the second point, and that is to know your men at the time of employment. Unless you are in a position to definitely know what each and every individual man is physically, at the time of employment, then you are more or less in the position of being helpless finding out what is happening to him, in the course of his work.

That consists in giving him a careful examination. When I say careful examination, I don't mean a rapid, rudimentary, casual glance deciding whether or not this person is all right to come to you and won't be a hazard for you; but examine him carefully and do the laboratory work necessary to check up blood conditions, kidneys, and so forth, and then decide whether or not he is physically fit to go in a particular department.

It is perfectly obvious you don't want a man working under conditions that will irritate his kidneys if he already has trouble with his kidneys. It is perfectly obvious that you don't want a man with an old healed tubercular lesion working in an atmosphere of gas, which may break down the lesion and start him on a new course of tuberculosis.

The third point is to keep in mind that you must watch these men frequently, and the frequency with which you watch them will depend upon the type of work that they are doing and the hazard which is involved.

We have our men classified into several groups, and we find that we have some that should be examined once a week; we find we have some men that should

be examined once a month, and once every three months, and once every six months; and we find others that need to be examined only once a year. But that can only be determined after you have first studied your process and have realized your condition, and then experience will reach you just how long a period you should intervene between each examination.

You will find that your employees are very cooperative on this plan. We recently had an experience with our men who were to be examined once a week; and after examining them for that period of time for somewhat over a year we decided we were in a position to say that it was no longer necessary to examine them once a week. So we sent out word that once every three weeks would be often enough; and in spite of the fact that these men were not afraid of the process and were not afraid of the material, they sent a committee to wait on us and say that they preferred to be examined once a week; so we have continued to examine them once a week.

By careful and continuous physical check-up you can determine just what is going on in each and every employee, and you can determine just what is the proper thing to do for him—whether you should take him out of his present operation and place him somewhere, where he is not liable to be further injured, or whether he is perfectly well and can continue where he is.

So I am going to conclude this little talk by saying that in the hazards of the chemical industry we should include practically every industry, and if you will know your industry and know your men and continue to know them, we will be able to cut down and eliminate these industrial hazards.

CHAIRMAN GREENBURG: Mr. Walter S. Paine, Research Engineer of the Aetna Life Insurance Company of Hartford, has agreed to discuss this problem from the viewpoint of the insurance company.

General Discussion of Health Hazards in the Chemical Industry From the Insurance Viewpoint

By WALTER S. PAINE

Research Engineer, Aetna Life Insurance Company, Hartford, Conn.

At the Fourth Annual National Safety Congress, held in Philadelphia in 1915, some speculative discussion arose out of the question of rejected man-power from industrial disease which it was thought would occur because of the rapid development of many of the chemical industries then flourishing in Germany but gradually being fostered by American capital in the United States. In all the discussion, no indication was found that we would be attempting to solve the problem of the health hazards in these specific industries with the patience, skill and broad viewpoint that dominates the methods now actually in force. Instead of chaos from "industrial diseases" in the chemical industry, we find the layman, chemist, physician, employer and employee cooperating, for the most part, in a sane research into ways and means of eliminating the hazards and still preserve the industrial contribution of the chemist to promote our industrial arts and supply our social and economic needs.

You have requested us to review these health hazards in the chemical industry from the insurance viewpoint, which subject in a limited time can only be covered within specific limitations. The essential viewpoints of this subject, as we see them, are as follows:

- I. Is the problem of "health hazards" in the chemical industry being solved?
- II. What are the essential social and economic forces producing a reduction of early discovered health hazards?

- III. What is the attitude of insurance companies towards the "industrial disease" exposure?
- IV. Have the insurance companies a part in actually working out the remedies for these health hazards?
- V. A few of our outstanding problems in the chemical field at the present time.

Let us first consider if the health hazards in the chemical industry are being solved. In this paper the term "chemical industry" is extended to include such industries as are, for the major part, dependent upon chemicals or chemical reactions for their final product.

It is doubtful if there is a better barometer of the trend in what is generally termed "industrial disease" cases than the records of the insurance companies. The trend towards well-lighted and ventilated buildings, together with the educational program in hygienic methods as carried out by modern industry has had its effect in reducing this hazard. Having reviewed compensation cases for a period of practically twelve years, there has been a noticeable reduction in the number of industrial disease cases, such as lead poisoning, brass ague, mercury and benzol poisoning, in industries complying with the requests to remove these hazards by providing ventilation, change in processes, a close follow-up under medical advice, and the simple rules of hygiene. Two factors make these findings doubly trustworthy:

First: We are in a far superior position to detect these health hazards today than we were twelve years ago. Furthermore, may we say that industrial medicine is now on a far more efficient basis.

Second: Industrial plants depending upon chemical operations are far more numerous as a part of our stabilized industrial life than they were in 1915, and, as a result, knowledge of the exposure and its alleviation is more widespread.

II. What are the essential social and economic forces producing this reduction in health hazards of a specific type?

The interest of society at large in the human wreckage resulting in some of our industrial plants as the result of industrial progress and economic needs had its effect in calling our attention to the need of action in finding and eliminating the cause. In many cases this social interest, however, confused the problem and retarded real scientific action.

The vital force which produced results was the earnest cooperation of the chemist, physician and industrialists interested in research to find the facts and discover corrective measures.

From the economic viewpoint, the plant managers realized that unless they corrected these health hazards, the insurance costs would be no small part of their overhead. They also realized that production would decrease because of labor turnover, increased labor costs, spoilage of material and the need of increased supervision.

Before leaving this item, may we pay our compliments to the large number of industrial officials who took a real human interest in setting up the most efficient investigation to ascertain the facts and provide remedies for existing health hazards. A large number of them not only backed this work financially but contributed liberally of their time in organizing effectively these investigations.

III. What is the attitude of insurance companies towards the "industrial disease" exposure?

A number of the insurance companies are turning over every industrial disease case to their research engineer, who, after collating all available data from the field relative to the case, reviews the problem with their medical departments. In many cases the medical field adviser covers the case from the physician's viewpoint.

After a complete analysis is made of collatable data, a brief is compiled and forwarded to the field inspector or direct to the plant officials.

Our first obligation is always to the injured man, and corrective measures are suggested to our assured after a most careful survey and research of the case. Any investigation of this type should be carried out in cooperation with the plant chemist. No fact finding research is completed without his assistance, for he, to a large measure, has the key to the situation.

It is believed our attitude to the situation of health hazards can be endorsed by many other insurance companies, and I know of no better method of expressing these viewpoints than by the following:

Because of our membership on the Spray Painting Research Committee, we were asked to express our opinion relative to the place this innovation had in industry. Rather than making a hasty decision and passing out unwarranted, injurious propaganda against any advance in industrial arts, it has been our view that no final verdict should be given until a sane research had been made. Our answer in this case, relative to whether or not spray painting shall remain in industrial plants, prompted us to state that every new invention should be conserved for the use of mankind when it contributes to the social and economic development of the race.

Spray painting, which has already become a unit of production in most of our large industries, when rightly used, is an invention of this type. Every effort should be made to conserve this new development by making it safe for use through correct ventilation, electrical protection and the use of the least harmful paints. Spray painting, when applied according to the suggestions resulting from the research conducted by the National Safety Council Committee, should be less of a menace to the employees from the viewpoint of hazard to life and limb than many of the appliances now employed.

Safety in the use of spray painting must pass through the same process of education that is being used in industry relative to power machinery, electricity, etc. These innovations allow us to keep pace with competing industries of other nations. We are not forfeiting the use of the automobile, power machinery, or even coal mining, with their toll of human life, but we are doing everything possible to educate the individuals exposed to these hazards in the safe methods of operation.

We would find it practically impossible to eliminate these forces which mean so much to mankind, and it will always be thus with every innovation of economic and social value. We must, therefore, attack these problems by making practical researches and discovering the real facts as to their use, and then set up ways and means of making these new developments in industry conform to the safest methods of procedure.

IV. Have the insurance companies a part in actually working out specific remedies to offset industrial health hazards?

A "diagnosis" is essential in finding the solution of every deep-seated problem and an analysis at hand of any chemical hazard based upon actual cases often gives the starting point of such an investigation.

The insurance companies are often in a position to aid in any of these investigations because of their direct contact with cases involved. Case analyses have been furnished as a basis in former and in present researches, and we are urgently advocating the increased use of such information.

The National Bureau of Casualty and Surety Underwriters financially underwrote and personally assisted in the benzol research, which incident is only one of many indications as to their willingness to aid in fathoming these problems. The interest many insurance companies have taken in researches, such as mercury poisoning, spray painting, lead poisoning, dust diseases, etc., exhibits clearly their viewpoint in relation to the health hazards when carried out in a scientific and constructive way.

V. From the insurance viewpoint, what are a few of the outstanding problems in health hazards, as we see them, from the chemical angle:

(a) *Benzol*. While the investigation carried out by your committee was thorough and constructive, there is still a feeling in some quarters that it is not altogether conclusive. This may be said of any piece of investigation for it is well that there are some who never feel convinced that the specific field of knowledge is exhausted. A few suggestions from the field have come to us even of recent date:

1. A study of medical histories of non-fatal benzol cases.
2. Types susceptible to benzol fumes.
3. Diet of employees whose blood picture may indicate benzol poison.

As we have been closely associated with our Medical Department and our Mr. Ralph E. Prouty in a study of some 130 cases, we may at a later date be able to express a suggestion on these questions. It might be worthwhile to instruct your present committee or others to take these suggestions under advisement.

(b) *Chrome Poisoning*. With the advent of chrome plating, there has arisen another source of chrome sores which might well form a basis for a research. More than one plant has developed this hazard and the compensable cases from this cause have increased within the last few years. We are convinced that with proper ventilation, close adherence to hygienic principles and a certain amount of education among the employers and employees as to corrective measures, this exposure can be greatly reduced.

(c) *Spray Painting*. After reviewing many field reports on spray painting, one is convinced that the educational work being carried out by the N.P.P.A., DuPont's, industrial commissions, National Safety Council and insurance companies has had its effect in correcting this hazard in the larger industries. There is, however, a large field still untouched where the promiscuous large and small users of spray painting see no need of any protection either from the explosive or health hazard. It may be advisable, therefore, to appoint a committee which might place in simple form and plain English the principal hazards and methods of overcoming them.

It may be too early to make a definite statement as to the health hazard of spray painting, but our consistent review of this type of risk has failed to find a basis of alarm as portrayed in some reports on this exposure. Someone in our discussion at this meeting may have an entirely different experience.

(d) *Mercury Poisoning*. There is no doubt of the existence of mercury poison, and this exposure was called to the attention of your committee about a year ago when several industrial leaders showed a deep interest in this subject.

Here again, through the cooperation of industrialists, employees, chemists, engineers and physicians, the specific plants involved have partially eliminated this exposure through ventilation, education, medical supervision, hygiene and engineering revision. There is still room for service in this field amid industrial plants having no constructive data on this subject.

(e) *Hydrogen Sulphide Poisoning*. In the oil field and petroleum industry this exposure has, during the past year, made itself felt in our losses more from the medical costs than indemnity. The Bureau of Mines has done much to ward off the deadly results of this gas, but there is still room for constructive research. It is still too early to compile any amount of data on this subject, but as the Chemical Section is bent on safeguarding industry, this field of research may be worthy of your attention.

These are only a few of the health hazards which are now before us in this chemical age. There is still much to be done in the way of research into the dust problem from abrasives, stone dusts, etc., in an effort to reduce our number of tubercular cases. This field, however, is being developed by other departments interested in health hazards and their findings supplement our efforts in our own field.

ADJOURNMENT.

October 3, 1928

LEONARD GREENBURG, Ph. D., Chairman
U. S. Public Health Service, Yale Medical School
New Haven, Conn.

The third session was called to order at ten o'clock by the chairman, Dr. Leonard Greenburg.

CHAIRMAN GREENBURG: The first paper this morning is to be by Mr. Armstrong, Safety Engineer of the Eastman Kodak Company.

Status of the Chemical Industry as Revealed by Accident Experience

By A. L. ARMSTRONG

Safety Engineer, Eastman Kodak Company, Rochester, N. Y.

This is rather a pinch-hit job for me. Last Friday I got a letter from Mr. Kershaw saying that Mr. Coffelt wouldn't be here and that he would expect me to do the job.

There has been a slight increase in the reports sent in to the council, but the same old question comes up every year. We talk about more reports in the chemical sections. If you will send in the kind of reports that will give us an idea what your problems are, then we can attack those problems; that is, we can concentrate on a problem that is the most serious. Unless that is done, we don't know where to start. It is just like the benzol problem and all the other industrial problems that we have had.

These reports come in, I have been told by the statistician of the National Safety Council, and they do not give the proper information; that is, they don't use the right figures. A man sends in a report and instead of using the penalty for loss of a finger he will use seven days lost. Now, that is not permissible. If you are going to send in your report you will have to use the full penalty regardless of the length of time that a man loses. He may not lose over seven days or he may not lose over two days, but it is necessary to use the penalty in making up the final report.

Another thing, the classification is wrong in a good many cases and the company name isn't on it or the kind of chemical industry; that is, they will send in anything that they want to put on. The clerk apparently fills it in and it is necessary to write back and get all the information before the final classification can be made.

Of course, that refers to what I said at the start. Unless the problem or the kind of accidents are properly classified under the proper head, it is absolutely impossible to tell where the first work should be done and where it is needed most in the industry.

When these reports are made out, for a death claim, for instance, under "death" they will put down maybe 600 instead of 6,000. Up here, the total number of hours worked by all employees in a plant where they have 100 maybe they will have 2,500 or 25,000 or maybe 25,000,000. In other words, they use all the ciphers that they can. They have no regard for the number that they put on.

In order for any plant to know how it stands with regard to other plants, it is necessary to keep a very accurate frequency record of all accidents. That is, if you want to know which way you are going it is necessary for you to keep these reports. This sort of thing has been talked of time and again and has been brought up in other sessions, but apparently no one wants to take the time to do

this work as seriously as it ought to be done. The council and the Chemical Section want to be of all the help that is possible and will give you all the time necessary to solve your problems, if you will just tell them what those problems are.

CHAIRMAN GREENBURG: We haven't discussed this problem of the keeping of accident statistics in the Chemical Section very fully, it seems to me, and I am going to make an effort during the coming year to see that all of the chemical companies are receiving statistics forms and filling them out and sending them back to headquarters office.

The point is simply this, as Mr. Armstrong pointed out: In order to know how good or how poor your plant is standing up with respect to accidents, we have to have accurate statistics on the number of men employed and the number of working days they are employed in order to be able to compute the man-hours employed; and then if you have a certain number of accidents carrying a certain penalty, we can figure that out in terms of man-hours. Having a figure like that, we can compare two or three or more companies manufacturing explosives, for example. In that way we can see if a plant has a high rate and another a low rate, and we can see that the high rate plant immediately needs attention concentrated on its accident problems.

That is the aim with which we attempt to get these accident statistics together. If they are imperfectly done, if they are filled out poorly, they are valueless. They are worth less than the time it takes to fill them out. All the figures called for must be carefully tabulated and put in proper places in order that we may get something out of it. It seems so obvious, if one plant can carry on the manufacture (we will say) of nitric acid and have an accident rate of 100 per 1,000 man-hours, that most every plant in the industry should in a general way be able to equal that record; and if a plant has a record of two or three times that the plant needs careful attention.

I don't mean to be dogmatic about this. There are certain peculiar conditions tied up with manufacturing methods which may not make it possible for the second plant to duplicate the first. But at least the record is good to shoot for; and if we don't get the statistics we can't do even that much. The Chemical Section desires and asks your earnest cooperation in this matter so that we may be able to be of more service to all of the manufacturers in the chemical industry.

I. V. KEPNER (Pennsylvania Salt Mfg. Co., Philadelphia): We have been using these accident statistics now for about five years. We use at all four of our plants the form that is sent out by the National Safety Council, and it is really of great interest when we compare our own plants with others. It comes back to you in code and each plant is given a code number that is assigned to no one but yourself. However, it is interesting to have some friends of yours who are sending in statistics tell you their code numbers. I have two or three that are manufacturing acids the same as our company does, and it is really interesting, especially when you know what company it is.

When you are figuring up these statistics per man hours, why, you have it pretty accurate, whether it is a small plant or a large plant. Of course, the smaller the plant, as a rule, the worse your record is going to show if you have an accident. But, just as Mr. Armstrong says, there are quite a number who don't use care when they send in their accident statistics. For instance the man who loses a finger probably rehabilitates himself in about seven days instead of taking the full penalty which he should. He simply says seven days time lost.

I was interested yesterday morning in listening to a paper given in one of the other sections where a man had a sprained leg and he was only off one day. I can hardly see the need of bringing a man back to a plant who is hardly fit to work. I don't think that is fair to your accident record and I don't think it is true statistics.

I merely want to bring this thought to your mind. It is a great help, and I

would like to see everybody in the Chemical Section, the larger chemical industries and also the small ones, send in the statistics. It is really interesting and you will be more interested when you see your own company there and see how you stand in reference to the others, no matter how large they are.

CHAIRMAN GREENBURG: Does anyone else have a word to add or a question to ask?

L. A. SPERRY (Hercules Powder Co., Kenil, N. J.): In regard to the question just raised, I appreciate fully the importance, from a statistical standpoint, of having each accident reported fully and completely on the basis sent out. At the same time there is one factor about this phase of the matter that I think really should have more emphasis than we have put on it.

During the late war when a casualty occurred, it was the earnest endeavor of everybody concerned to remove this man as soon as possible from the contact of other injured men in order that their morale should not suffer. But our problem is absolutely otherwise. We want to get as much comment and as much discussion of accidents as we can. It is really an advantage to us to have Jim go around with a sprained ankle, if he is able to get around at all, in this way: A man immediately next to him in the work will know how this accident occurred, but if we take him away at once from the plant nobody knows.

But suppose the man does go around among one hundred men in the plant and they see him. They naturally say, "What happened? What is the matter? How did you get hurt?" "Oh, I was doing so-and-so, and I admit I was a darned fool about it but nevertheless I got hurt." Everybody concerned then in the plant has a chance to be warned by the trouble that has occurred to Jim. The result is that we get people to think more about it. The matter of the danger on that particular situation is called to their attention, and we think that has a very great moral effect toward preventing accidents from this cause.

I am not arguing that our statistics should be based on something that is not comparable, but I think there is a great advantage for safety in doing that.

MR. ARMSTRONG: I don't want to give the impression that we shouldn't have men back to work. I think that is a problem that must be decided in the company. The point I would like to get over is that if you are going to report your accidents and use these blanks, in order to make the accident record comparable with other plants, it is necessary to use the full penalty, and not put down seven or eight days lost.

I might also add that there has been some criticism in regard to this form. It is to be revised very shortly, and the council would welcome any constructive criticism immediately after this Congress. So if there is anyone who would like any changes made or can suggest anything that would be better than we now have, they would be very, very glad to get it.

J. S. SHAW (Hercules Powder Co., Wilmington, Del.): I think there is a chance of misunderstanding on the part of some who are reporting. I will give you an illustration.

Jesse Shows, at Hattiesburg, Mississippi, lost a finger. He was off duty three hours. After the finger was dressed, with the physician's consent, he was put back to work—three hours, mind you, after losing a finger. The kind of work that he was doing could be done with one hand. We reported it in accordance with the penalty table, although Jesse Shows lost no time. It wasn't a long-time accident. However, the penalty should be reported properly.

So if you do put your man back to work right away with the doctor's consent, and there is a permanent disability we should not overlook it for that is the thing we want in order to make our results comparable.

CHAIRMAN GREENBURG: Is there any other discussion?

If not, I am going to call on Mr. Miller, of the duPont Company, who has kindly consented to come here this morning and speak to you for a few minutes about safety posters. During the past year the safety poster work of the Chemical Section was not on a very high plane. Many of the plants failed to cooperate in helping us get dramatic pictures for safety posters. Now, what I say isn't supposed to be said in the spirit of criticism, but we are very anxious to get this material for safety posters and a great many plants do put out their own posters and have photographs of accident happenings. If you will try to cooperate by letting us know, we can send a photographer down to take pictures.

The duPont Company has recently staged a very interesting contest, and Mr. Minor and Mr. Miller of the duPont Company have had this under their charge. They have kindly consented to come here this morning and give us some two hundred of these posters and explain the nature of the contest to us.

Posters in Accident Prevention Work

By G. H. MILLER

E. I. du Pont de Nemours & Co., Wilmington, Del.

I want to correct an impression, first. While Mr. Minor and I have done work on the poster contest, nevertheless there are probably about five or six men in the safety division of the company in Wilmington, and they have all, of course, helped. In addition to that the plants have cooperated with us, and to them, too, is due a lot of the credit for any success the contest has had.

My part in this thing is impromptu, but since Dr. Greenburg told me I might be informal and brief, I am going to take the advantage of both.

First, I would like to give you a little of the background of the poster contest, and to do that I am going to make two or three statements. I am not going to lay myself open to any questioning about them, and I am going to protect myself by saying that this is the experience of the duPont Company. Yours may be different.

Accidents are largely due to common hazards rather than to process hazards as is sometimes thought. (As I explained a minute ago, that is our experience and you can't question it.)

Furthermore, the responsibility for the majority of accidents is largely with the employee himself. In other words, due to his ignorance of the hazards or a lack of knowledge of them—his carelessness, lack of information, negligence, whatever you call it. That, again, is our experience. But in any case, these two points that I have just brought out, the fact that the common hazards are those largely responsible for injuries, and the responsibility, tell us definitely that some of the work, at least, and probably the major portion of safety work, should be such as will tend to educate the average workman.

Now, the job largely is this: To create general interest, point out specific hazards, teach them how they should be corrected. One of the means that we use frequently for that is the safety poster.

I don't know whether you have found the same minor fault with the general posters that we have found, or not, but I rather think you have. They don't seem to get down to the point, and we were worried about that. We were trying to find some means of increasing the value of our safety poster activity. At about the time we were trying to find the means of doing that, it was rather forcefully brought to our attention by an employee of one of the plants who voluntarily drew a safety poster.

In this particular plant a switchboard was located over the sink and the soap was kept in the switchbox. The poster created a lot of interest—so much so that we decided to have it distributed to all the plants. Incidentally, we cleaned up two or three things.

But we noticed that the author had shown things in the background and that something was the matter with them. For instance, he had tripping gears around and some were not guarded. In going over that, the men of the safety and fire protection division suddenly came to the thought that here would be an excellent way of bringing the common hazards to the attention of our men and teaching them how they should be corrected. That, of course, required some means of interesting the men further in the posters; but in any case, the problem was studied thoroughly and was discussed with the plant managers, and the approval of the plan was secured.

The thought was this: We would somehow find out the hazards that we had generally in our plants, and show those, or project them into these pictures; and we would then send the pictures out to the employees and let them study the pictures; and then a little later on send out another poster showing those things corrected. But we realized we couldn't get the maximum interest unless we had some kind of scheme to encourage the men to study the posters, so this contest scheme was devised.

You probably wonder where we got the items that we put in the posters. First, we went over the accident records of the duPont Company for a period of about five years. We picked out the common hazards and those largely the responsibility of the employee. Then we went through the inspection reports of the plants and picked out the things there which were generally found to be unsatisfactory. We called them undesirable items, undesirable from the standpoint of accident prevention and fire prevention and good housekeeping. Out of that we secured one hundred undesirable items and by grouping them, in a sense, we discovered we could put them into six scenes: a change house scene, a typical house scene, a construction scene, power and electric, warehouse, and a shop scene. That covers the plant pretty well.

To make the contest eligible to all employees we had to give the man some easy means of responding. We had two posters, one called the negative poster, which was the incorrect poster; and then the positive poster, which showed those things corrected.

The contest ran six months. We ran one poster each month and at the close of the month we sent out the corrected poster so that the men could tell what they should have found. In addition, we made smaller posters of the same one that was sent out each month and the men replied on the back of it and told the reason why they thought each item unsatisfactory.

I want to tell you some of the little problems we had. First of all, we got our artist. The man who had drawn the first poster that we had passed around, we felt could do the work. Unfortunately, he hadn't been on the plant much and didn't know much about the work. It was necessary for us to describe certain conditions about the problem. The problem, of course, was very large. It was more or less on this order: If I told you to draw a cat and you had never seen one, the results probably wouldn't look very much like a cat. That was Mr. Whitacre's problem in drawing these posters, nevertheless he did the best he could and we put them out. But there were a great number of items on there that we didn't intend to be there even though we did give the thing supervision. We had some criticisms and I might give you some of those.

First, the contest lasted six months, as I explained, and some thought it was too long (and it may have been), but the majority of the plants (and there were forty taking part) carried the contest successfully through the six months. In a few cases it was necessary to divide the contest into two parts, three months each; and in some, monthly contests, but that was only where they didn't get a good start.

As I explained before, we had lots of things in the posters that we didn't intend (I mean little undesirable items that the men picked out). Sometimes the men

found two or three times the items that we had intended them to find. We also thought that was favorable. The men got a lot of good out of discussing the technical points about the posters that they thought were incorrect.

One of the first criticisms was that the first poster was too easy, but that was, as you may readily see, intentional for we wanted them to get started off with the easy poster and afterwards progress to more difficult ones.

CHAIRMAN GREENBURG: The idea has a peculiar, unique, psychological appeal which certainly, it seems, must strike home. Of course, the trouble with all this poster work of the council and every other organization that exists, including commercial advertising, is that the appeal is a very difficult thing to get and to maintain. Drawing a contest out for six months, I should think, would have a tendency to have every one take an interest in it, particularly when monetary reward is given for working it out.

The next paper on our program is Dr. Vandell Henderson, Professor of Applied Physiology, of Yale University, and we are fortunate in having him here to present his important subject. In many plants, I suppose, gases and fumes and dust play a very minor role, but these sources of illness and death are borne home to every one of us at some time or other. I have in mind a case that happened at Niagara Falls in which several men were asphyxiated while painting the inside of a tank car with a rubber compound. I am certain that there is no subject, in the chemical section which is more misunderstood than gas masks and respirators. There are so many prevalent fallacious ideas about the efficiency of these various devices that we are most fortunate in having Dr. Henderson here to clear them up for us.

It is indeed a great pleasure and privilege to present Dr. Henderson.

Gas Masks and Respirators

By DR. VANDELL HENDERSON

Professor of Applied Physiology, Yale University, New Haven, Conn.

The gas mask is a really extraordinary invention and has been brought to a high degree of efficiency in the protection which it affords. Although it is now manufactured quite cheaply it has been produced at a tremendous initial cost.

In Europe it is sometimes charged that we Americans value everything according to what it costs. This charge is not true, but if it were true, we ought to value the gas mask above every other human invention, for the gas mask has cost more than the steamship, or the steam engine, or the automobile, or electricity. It has perhaps cost more than all these other inventions put together. It cost the entire expense of the great war, for the reason that (so far as I can discover) no good thing whatever came out of the war, excepting only the gas mask. The civilized nations spent ten million lives or more and hundreds of billions of dollars, and yet (as I have seen Europe lately) neither is "the world safe for democracy" nor is "war ended." But one thing civilization did get out of it all, and that is an excellent gas mask. So I recommend this article to you as being worthy of use wherever needed, both because it can save lives, and because of the stupendous price we have paid for it.

The first point which I wish to emphasize is this: There are many different kinds of gases, and these various gases have widely differing chemical characteristics. They are alike only in this one respect that they are all volatile. They differ also in their physiological effects; they have widely differing poisonous actions. They are alike only in this respect that they can all kill. For these reasons when you place a mask upon a man who is going into a poisonous atmosphere, that mask must be adjusted to the kind of gas to which the wearer is to be exposed. I wish to support the point which the chairman made in introducing me, when he warned

against the dangerous fallacies widely believed in regard to gas masks. A mask to be effective must be in good order, and it must be suitable for the particular gas in which it is to be used. Often a factory buys a mask and hangs it on the wall. In the course of a year or two the rubber dries and cracks. Often the mask purchased is unsuited to the use to which it is some day put. Often it contains an absorbent for ammonia when it is to be worn in sulphur dioxide; or possibly it is a mask that would afford protection in carbon monoxide, but when it is worn in "black damp," to which it is unsuited, it costs the wearer his life.

Valuable as are suitable gas masks, unsuitable masks do far more harm than good for they give a false feeling of safety. It is important to reinforce the good and counteract the harm and danger of gas masks. To this end, even in the short time available, I am going to run over the characteristics of the four principal types of poisonous gases. I do this because the protection which the various types of gas mask afford against the different gases, and against particular groups of gases is quite specific. A mask provided with an absorbent which makes it effective against one gas may be wholly ineffective, and therefore dangerous, in other gases.

The gas that was oftenest heard of a generation ago was what miners now call "black damp." It is simply a lack of oxygen in any atmosphere of other gases. There is really no single gas that can be separated in pure form and put in a bottle and labeled "black damp." As it is merely the absence of oxygen, the chemical test for "black damp" is that a flame will not burn in it. Its physiological effect is that a man who breathes it is asphyxiated by the lack of oxygen.

"Black damp" can be produced in several different ways. All of them involve a nearly complete withdrawal of oxygen from the air or the replacement of air by a gas or gas mixture containing no oxygen. The test for "black damp" which has been used for 1,000 years or more is made by means of a lighted candle; if the flame is extinguished, the atmosphere is dangerous; if the candle continues to burn, the atmosphere contains enough oxygen to support life also. This test is effectually applied to wells, sewers, grain elevators, and to silos where fodder is stored. In a silo the material undergoes a fermentation which is essentially like breathing. It thus consumes oxygen and produces carbon dioxide. Because carbon dioxide extinguishes a candle it is sometimes identified with "black damp." But the essential characteristic is not the carbon dioxide, but the lack of oxygen.

"Black damp" frequently occurs in the holds of ships; and many lives are lost every year because of it in the ports of all maritime nations. When the cargo consists of materials like rubber or other organic and oxidizable substances, or of living things such as bananas which breathe in much the same manner as do men and animals, the oxygen in a closed space may be consumed. Carbon dioxide may or may not be produced, it does not make much difference; the essential point is that oxygen has been withdrawn. Consequently when a man goes down into the hold, he falls unconscious and, unless rescued quickly, he dies of acute asphyxia due simply to lack of oxygen.

Many other conditions which cause the absorption of oxygen from air produce "black damp." During the building of a bridge across a river a janitor may be asphyxiated in the basement of a building near the bank of the river. In such cases the series of events is as follows: The bridge builders sink a caisson as a preliminary to erecting a pier. In the caisson air is compressed, so as to prevent the mud of the river bottom from rising and drowning the men at work there. The compressed air diffuses into the mud around the caisson, and thus through the river bottom to the basements of buildings near the shore. As it diffuses oxygen is absorbed by the organic material in the soil. It does not occur to the janitor in a building near the shore to carry a candle when he goes down into the basement where he is accustomed to work. He merely switches on the electric

light, and collapses because an atmosphere which consists chiefly of nitrogen will not support life.

Physiologically "black damp" gives no warning; it produces no sensations. The victim often has no suspicion that anything is wrong until his legs fail and he falls helpless. No pain or even discomfort is involved in being thus overcome. The only discomfort is during a recovery unassisted by proper treatment; for unassisted recovery is prolonged, excessively painful, and sometimes incomplete. This in brief outline is simple asphyxia.

Related to this condition is carbon monoxide poisoning. This also is a form of asphyxia and acts, therefore, in much the same way physiologically as asphyxia by "black damp." But chemically it is entirely different. Carbon monoxide asphyxia has been talked of so much in recent years that I need not say much on the subject. Everyone knows now that he must not go into a small garage and start his car unless he has opened the door first; that is, he must not do this unless he wants to die. Everyone knows now that carbon monoxide is the poisonous factor of illuminating gas, and that it is the constituent of smoke which overcomes firemen. Carbon monoxide results from incomplete combustion. It produces an asphyxiation which as far as the victim is concerned is very similar to "black damp." He feels no sensations in going under and dreadful sensations in coming back. He may suffer permanent injury, particularly to the heart, unless he is resuscitated properly.

On the other hand, from the chemical standpoint, an atmosphere which is dangerously contaminated with carbon monoxide is entirely different from an atmosphere of "black damp;" for a candle may burn well in it and give no warning at all. There is usually plenty of oxygen not only for a candle but for a man also, if it were not for the peculiar toxic effect of carbon monoxide. Even in a very poisonous atmosphere there is not enough carbon monoxide to explode; yet even a small amount is quickly paralyzing and fatal for a man, for it combines with the blood and thus deprives the body of its supply of oxygen. It thus acts as an asphyxiant even in the presence of ample oxygen. And because a man who has absorbed carbon monoxide continues to be asphyxiated even after he is brought into fresh air, it is especially important to apply measures of resuscitation which will eliminate carbon monoxide from the blood as rapidly as possible and thus abbreviate the period of asphyxia.

Much the same description applies to cyanide, or hydrocyanic acid gas, which is used now to kill rats and fleas in the fumigation of ships. Cyanide is a tissue asphyxiant even in minute amount. It differs from carbon monoxide in the fact that, if the victim does not die immediately, he generally recovers quickly and completely. So much for the three principal asphyxiants: "black damp," carbon monoxide and cyanide. We shall see later that each requires a different absorbent in the mask.

Next we will consider the irritants. Practically all the war gases are irritants. They do not asphyxiate directly; they attack the lungs, but in such subtle fashion that it may be hours before the victim drowns in the fluid which the injured lungs exude. Among the irritant gases are the acid fumes, the alkali fumes, and related substances occurring in industry. Chief among them are chlorine, phosgene, sulphur dioxide, the red fumes, or oxides, of nitrogen, and ammonia. Hydrogen sulphide in certain concentrations comes under this class also; indeed at one strength or another it comes under nearly all classes of noxious gases. Mention must be made also of carbon tetrachloride when used for the purpose of extinguishing fire. Carbon tetrachloride itself is practically harmless. It can be swallowed; and it is so used, as a means of getting rid of hookworm. But if it is sprayed on hot iron it undergoes a partial oxidation and produces phosgene which is one of the most deadly of lung irritants.

There is not time to dwell on the individual peculiarities of the irritant gases. Some act in the nose and throat, some well down in the windpipe, and some particularly in the lungs. The deeper the point at which they act to produce irritation, the less the immediate effects, and the worse the ultimate effects. Those which act in the nose and throat produce at once extreme discomfort; and the man who has inhaled them is driven out into the fresh air. On the other hand, the most dangerous lung irritants produce so little irritation immediately in the nose and throat that a man inhaling them is not warned of his danger. Thus a man who has inhaled nitrous fumes from burning dynamite, or from nitric acid spilt on a wooden floor, may go home feeling fairly well at the end of his day's work; but before daybreak the next morning his lungs have filled with fluid and he is drowned by pulmonary edema. With the irritant gases, as my colleague Dr. H. W. Haggard has shown, the point at which they act in the respiratory tract, and therefore the severity of their action depend on their solubility. If they are very soluble they are caught in the fluids of the nose and throat. Of course the nose and throat, and the eyes also, are thus intensely irritated; but the gases are absorbed in this action and do not reach the lungs. On the other hand phosgene and nitrous fumes are not very soluble and do not irritate the nose and throat to an unbearable degree. As they are not absorbed in the fluids of the upper respiratory tract, they pass into the lungs and initiate the inflammatory process of pulmonary edema. Thus the irritants differ markedly from the asphyxiants in their physiological effects; and, as we shall see, they demand different types of protective masks for the men exposed to them.

A third group of gases, particularly important in the chemical industries, contains most of the volatile organic substances such as chloroform, ether, benzol, methyl and other alcohols, and the petroleum distillates. The primary action on the body of most of these vapors is like that of the anesthetics used in surgery. A surgeon could, in fact, anesthetize a patient with gasoline; the disadvantage would be that the patient would probably have convulsions before the surgeon had time to operate. Gasoline is a fairly strong, but poisonous, anesthetic. Benzol is also, but has other marked toxic actions. In fact this statement applies to most of the volatile organic substances included in this group. So much for their physiological characteristics.

Turning now to the chemical characteristics of the organic gases and vapors, we find that while they differ in some respects among themselves they are all, fortunately, easily absorbed by a special form of charcoal which is placed in masks for protection against them. But this absorbent for organic substances does not absorb many of the other groups of gases.

Finally there is a fourth group of gases. Most of those which have been mentioned thus far are not what toxicologists would classify as protoplasmic poisons; but this fourth class includes a variety of substances which are true poisons of the most active type. It includes tetraethyl lead, which killed a number of workmen a few years ago in a plant at Bayway. It includes also mercury vapor and arsenurated hydrogen and other metallic and organo-metallic substances. In any shop where mercury is used carelessly it may be spilled and trodden into the floor, or rubbed into the work benches. After a time there is thus enough surface of this volatile metal exposed to contaminate the air of the work room, and mercury poisoning may result. That mercury is volatile is demonstrated by the fact that, in nearly every chemical laboratory or industrial plant in which mercury is used, a good deal more mercury goes in than appears to come out. It comes out largely in the exhaust air; but unless the ventilation is good it comes out partly also in the bodies of the chemists and workmen.

With these four types of gases in mind let us consider the types of gas mask that are available for protection against them. There are three chief types.

First there is the hose mask. It is simply a facepiece, or hood, or helmet connected by means of a piece of hose to an air pump. The hose is light but wrapped

with wire so that it cannot be kinked and shut off; and it is long enough to reach out of the poisonous atmosphere to an air pump. This pump is worked by an assistant and blows fresh air to the man wearing the facepiece or helmet in the poisonous atmosphere. For all purposes where a hose mask can be used it is by far the safest and best form of mask. Under all such conditions it should be used in preference to any other type of mask. (This remark was applauded by Dr. Ethelbert Stewart.) I wish everybody would applaud that standpoint. (General applause.) The reason the hose mask is the best of all masks is that as pure, fresh, outside air is blown to the man wearing it, it makes no difference what the character of the atmosphere in which he is working may be. That atmosphere may be dangerously contaminated with dust, or asphyxiant gas, or volatile organic poisonous vapors, or volatile inorganic poisons; but the wearer of the mask breathes only pure air.

Unfortunately the hose mask has one unavoidable disadvantage in that it is limited by the length of the hose. In a mine, for instance, the wearer of a mask cannot drag a quarter of a mile or more of hose through whatever obstructions he may meet in the irrespirable atmosphere. For this reason, when the place where the man is to go is too far from fresh air for the hose to reach to it, then the true gas mask comes into use. The true gas mask is the instrument which was developed out of the war and for which we have paid ten million lives and billions of money. It has become a wonderfully fine instrument. It consists of a facepiece of heavy rubber with non-shatterable glass goggles. After an immense amount of experimentation it has proved possible to make facepieces which fit gas-tight on every shape of face, providing the size is right and providing the rubber is new enough to be soft and not cracked. This facepiece is connected by a short piece of non-collapsible rubber tubing to a tin canister containing the absorbent or catalytic materials which remove the poisonous gases from the air drawn through them. Two points must be attended to if the canister is to be used effectively and safely. The first is that there are four more different kinds of absorbent materials that may be put into the canister, and that each of these materials is effective only against certain gases and not against others. The type of catalyst or absorbent in the canister used must, therefore, be adjusted to the kind of gas in which it is to be carried.

The second point is that there is no possible adjustment of a canister gas mask which will make it effective for protection in "black damp," for it cannot produce oxygen. Against all other poisonous atmospheres, however, canisters filled with the correct material are now very efficient. For ammonia there is an absorbent or catalyst, and the canisters to be used at an ammonia plant should therefore be filled chiefly with this material. There is an entirely different catalyst for carbon monoxide, a catalyst which is extremely effective in decomposing this most common noxious gas of modern life. But this catalyst does not act upon ammonia. Ordinarily in an atmosphere containing carbon monoxide there is plenty of oxygen; and the air is, therefore, respirable providing the carbon monoxide is removed. For miners and, as a rule, for city firemen the canister should therefore contain chiefly the catalyst for carbon monoxide. But such a canister is not effective against the irritant acid gases. For them—but for them only—the absorbent which is effective is soda lime.

The fourth type of absorbent is activated charcoal upon which vapors like benzol and gasoline and methyl alcohol will condense. This form of charcoal is extremely effective against volatile organic substances. It is, however, quite ineffective against carbon monoxide.

In addition to the masks with specialized canisters there is the so-called "all service" mask. It contains a little of every kind of absorbent and is thus effective for a short time in any atmosphere, except "black damp." It is particularly useful when the nature of the atmosphere is unknown, as for instance in the smoke

and fumes from a burning factory or warehouse containing many different chemicals. But as the "all service" mask can contain only a little of each absorbent its life, that is the period during which it can afford protection, is short.

The most important rules to be followed in using gas masks are therefore as follows: If you are going into a poisonous atmosphere where a hose will reach, use a hose mask. If you are going into a place where the hose will not reach and you do not know the character of the gases, use the "all service" mask. But be sure to carry a candle or a miner's lamp with you. If the flame of the candle or lamp goes out because of lack of oxygen, come out into fresh air quickly. The candle and the miner's lamp are extinguished in atmospheres containing 17 per cent of oxygen, while a man is in no serious danger of being overcome until the atmosphere is down to about 14 per cent of oxygen. If you are going into an atmosphere contaminated chiefly by smoke, use the mask with a canister containing the carbon monoxide catalyst and a smoke filter; but carry a candle or lamp. In case the candle or lamp is extinguished, then, but only then, it is advisable and necessary to use the third type of mask, which I have next to describe. In other words, use this third type only under conditions in which neither the hose mask nor the canister mask is practicable or safe, that is in atmospheres which do not contain enough oxygen to support life and in places which cannot be reached by a hose.

This third type of mask is the so-called "self-contained oxygen apparatus." While there are a number of different types of such apparatus, they all consist in principle of a breathing bag, a canister of soda lime, and a cylinder of oxygen. The wearer breathes back and forth into the bag; the carbon dioxide which he exhales is absorbed by the soda lime; and oxygen is fed into the bag as the wearer consumes it. A minor disadvantage of such apparatus is its weight and clumsiness. The great disadvantages are that its use requires training and experience, and that it is largely composed of rubber which deteriorates rapidly. Unless the rubber is very well taken care of, it cracks in little more than a year. The crack may not be noticed; gas may enter through it; and the wearer may be thus overcome and killed. The last time I investigated the matter, some years ago, I found that this type of apparatus had cost as many lives as it had saved. Rescue crews wearing oxygen apparatus may go into wrecked coal mines and bring out injured men; but unless the utmost care is exercised, and sometimes even then, a little crack in the mouthpiece of the apparatus, or some other defect, may cost the life of one of the rescuers. Oxygen rebreathing apparatus is an exceedingly valuable instrument; there are conditions in which nothing else can be used. But it should be used only by men especially trained to wear it, and only under the most carefully controlled conditions. It should never be used if either of the other forms of gas mask will serve the purpose.

There are one or two other matters, which are related to this general topic, that I think I should touch upon. One of them is the treatment of edema of the lungs from inhaling an irritant gas such as the oxides of nitrogen. The difficulty is that in many cases there is no way to be sure that the patient is going to have lung edema until matters have gone too far to do much to help him. Yet unless precautions are taken, and even in spite of all precautions, twelve hours later the lungs may fill with water exuded from the blood, and the man dies. On this account it ought to be the rule that whenever a man has inhaled chlorine, or phosgene, or the red fumes of nitrogen, or any other irritant gas, he should be carried on a stretcher and put to bed, and kept in bed. Even if he feels quite well and protests against this treatment, he should be kept perfectly still. After the edema has developed, a doctor should under no conditions be allowed to ask the patient to sit up, so that he can listen to his lungs. Although the doctor finds out about the lungs by listening to the râles, he can do little to relieve the edema; and the patient who is required to sit up is likely to demonstrate his own condition by

suddenly falling back dead. It is wise, therefore, to limit the methods of diagnosis and leave the patient alone. He has little chance at best.

In the treatment of carbon monoxide asphyxia and of intoxication by any of the organic substances, such as bootleg liquor (however taken into the body), or by gasoline, or benzol, or any similar gas, vapor or liquid, the most important object is to eliminate the substance from the blood and tissues as soon as possible. For such a substance as methyl alcohol to be completely excreted through the kidneys may take weeks; and this alcohol is burned in the body only slightly and slowly. That is one reason methyl alcohol is so dangerous and cumulative a poison. If it has been inhaled as vapor or drunk as liquid, it takes a long time for removal from the body, and the elimination occurs chiefly through the lungs. The elimination of carbon monoxide is wholly through the lungs.

In treating men poisoned with such substances, it is of the first importance therefore to stimulate respiration and thus to cause such vigorous breathing that the volatile poison may be rapidly ventilated out of the body. For this purpose my associate, Dr. H. W. Haggard, and I have developed the treatment by inhalation of oxygen and carbon dioxide. Carbon dioxide is nature's own stimulant of breathing. It is the stimulant which we all experience every time we make a physical exertion and breathe more vigorously because of it. This inhalational treatment is now widely used here in America and is being adopted in Europe also. We have introduced essentially the same treatment into surgery; it is used at the end of anesthesia to hasten the elimination of the anesthetic and to prevent post-operative lung complications. This treatment is now being used also to resuscitate newborn babies, if they do not start breathing of themselves. Even in Germany, where the pulmator was invented, that apparatus is being discarded and inhalators for oxygen and carbon dioxide are being introduced. In fact, all over the civilized world this treatment is being adopted. So far as I know the only two agencies which do not fully accept its advantages are the U. S. Bureau of Mines and the U. S. Public Health Service. They will ultimately.

This has been a rambling talk touching only on salient points. If you really wish to know about this subject, I recommend a book called "Noxious Gases" by Henderson and Haggard. In recommending it I have no mercenary motive, for the total royalties on a really useful book rarely pay more than the stenographer's bill. I recommend this book merely because it is the only one that attempts to describe systematically all the poisonous gases of industry, their effects, their treatment, and the different types of gas masks.

If, however, you do not care to get this book and inform yourself about a rather appalling subject, I will give you an even simpler and more practical piece of advice. The manufacturers who now produce gas masks are of high character,—especially that concern which has done more than any other agency to bring the gas mask to its present perfection—I mean the Mine Safety Appliances Company. If, therefore, you need a mask for certain particular conditions, never mind about my book; just write to the Mine Safety Appliances Company, or any other reliable company, and tell them of the gaseous conditions you have to meet. You can depend upon them to give you the type of mask that will afford protection. But do not fail to get their advice or the advice of someone who is competent in this field.

The sum and substance of the whole matter is this: A mask which affords perfect protection against one gas may be wholly ineffective against other gases. Be careful to get the right mask.

I. V. KEPNER (Pennsylvania Salt Mfg. Co., Philadelphia): I was very much interested in Dr. Henderson's paper. There was one thing I was in hopes he might bring out and that is the care and use of a gas mask. So many of us that are familiar with gas masks, but we merely purchase them and put them away and when we want to use them very often we will find that they are not

in the best of condition. I want to bring to the attention of the section the need of a Safe Practice Pamphlet on that subject. I think it is well worth while.

CHAIRMAN GREENBURG: We are again fortunate this morning, ladies and gentlemen, in having with us Mr. Yant, of the United States Bureau of Mines, who has kindly consented to speak to us on this subject. The United States Bureau of Mines is a governmental agency and has had more experience with the design and testing of gas masks than any other federal agency.

W. P. YANT: I feel somewhat honored to be asked to attempt to add to the remarks of Dr. Henderson because we consider Dr. Henderson the dean of investigators in respiratory equipment. He started out early in the war and has followed it through, and is still keeping in touch with it. He has so adequately covered the subject that I don't have a great deal to add except this:

We have strongly considered this subject of the care and maintenance of apparatus, for even though you have good equipment, if you don't keep it in shape it will deteriorate or it won't be in the proper condition when you are ready to use it. It is not like other equipment that you use daily and see when it fails; but it is something you put away until you need it in an emergency, and then you need it and it must be ready. So there is only one way to take care of it and that is care in inspection, systematic inspection from time to time so that it is ready and you can see when it is in proper condition and when it begins to disintegrate.

I might add to the classes which Dr. Henderson has made, it is not really a special class of respiratory equipment, but it is something coming into use more and more, and it is one which has been considerably neglected in the field of development. I might say that there is really some good work being done now and very good devices coming out, but it lagged behind in other equipment, and that is a small type of what is known as a respirator. All these devices have names. To some people a gas mask means anything from oxygen breathing apparatus or anything else. But each one of them has a special name. Well, the industry has more or less attributed the name respirator to a small device that fits over the nose and face, but the canister is much smaller.

This respirator is used in such industries and for such uses as spray painting and to keep out silica dust, and for such general use as that. It is not as large as a mask. It does not cover the face and it is not cumbersome.

Again, some people take a respirator as a panacea for all troubles. They may have benzol vapor and buy one with a wet sponge or a flannel in front and think it is doing good. But there again you must choose the respirator for the job you have to do. For jobs like spray painting you must have an appliance that has an absorbent or a charcoal to take up the vapors. It is the same type of material you use in canisters, only it is a smaller canister. For example, if you are interested in dust, charcoal won't stop it. You must have one with an adequate filter—whether it is cotton, felt, or filter paper—something that is specific for that particular thing.

So the point I want to make is if you buy a respirator, be sure you buy one that meets your needs.

You might say that the people of this country, the men who have developed face masks and respirators can be quite proud of their work, for there is made in this country now a respiratory protection for practically every need that comes about.

I remember when they first started drilling in the Texas Panhandle oil fields, they encountered high sulphur gas and when closing the wells it rendered many men unconscious. It was due entirely to hydrogen sulphide. While there were many chemists on the job, yet of all those chemists there was not a single one that recognized that the hydrogen sulphide would be the offending agent.

They said it couldn't be, that they had smelled it in the laboratory and had no ill effects. By merely using a hose mask, or a gas mask where the hose mask didn't give the freedom of operation desired, they could close the same wells in an hour or two without any trouble.

Another instance where I might say the operation or process depends entirely on gas masks, was in the use of a mixture of benzol and acetone. The process was developed and the plan went into effect. The process in this particular plant consisted of pressing a wax cake that had been extracted by benzol and acetone in the filter press at a temperature of fifteen below zero. After it was all ready they had so much acetone vapor they couldn't go in and open up the filter press. By merely getting some gas masks they carried the process right through and they are conducting it in that manner at this time. Whether they will finally get rid of it by ventilation or making a more enclosed system, I don't know, but the present plans of the company are to open up the filter presses using gas masks. There is an example of a process which would entirely fail if it weren't for this gas mask which Dr. Henderson says cost millions of lives and billions of dollars, and I am glad to say we are getting some dividend back.

I want to add a comment to Dr. Henderson's manner of testing for oxygen. I highly approve of it, but I don't approve of the candle for in many cases you come out sooner than you expected. It is very good in most cases where you just have low oxygen, but in a considerable number of cases I wouldn't advocate its use. It is very good in a metal mine. You seldom find any gas. In most tunnels it would be dangerous, and also in sewers. I highly approve of the part where he said he uses a flame safety lamp, but not the candle. I think he didn't stress that; he was merely bringing out the point of the flame going out, so I will grant that.

CHAIRMAN GREENBURG: This whole question of masks and respirators is a very live one. I am certain that if we started an open discussion we could run right along until four o'clock. Unfortunately, we can't do that. We have a little of the Society's business to bring up this morning and we have other papers. However, it seems unfair to close discussion on this important subject, and if anybody has anything important to contribute I think we ought to hear it.

J. S. SHAW (Hercules Powder Co., Wilmington, Del.): Two years ago in Detroit we were recommended to use ammonium carbonate in the case of a workman being fumed with acid gas. Does Dr. Henderson recommend that?

CHAIRMAN GREENBURG: Dr. Stewart?

DR. ETHELBERT STEWART (U. S. Bureau of Labor Statistics, Washington, D. C.): The Bureau of Labor Statistics in making an investigation of spray coat painting found that the mask was an abstract question and in many instances it is worse than nothing at all. When Dr. Henderson said that the best thing was the hose mask, I certainly hope that that will be in the record. I want to quote it and I want to quote it often and hard.

The whole question of spray coating is getting to be something terrific. You have no idea how many thousands and tens of thousands of little concerns rent a little shed and start refinishing furniture and that sort of work, using a spray coating machine, with absolutely no protection whatsoever. Now, because their victims don't die in fifteen minutes, why, it is perfectly safe.

Again, the benzol question: I am told by perhaps as good authority as any, the du Pont people, that benzol is unnecessary; that there are substitutes that will take its place in every case, so far as thinners for spray coating work is concerned.

I think we have gotten them on the run so far as the kind of mask, the kind of protection that they need. The only question is the rate of air per lineal foot that is necessary in these cases. We get all sorts of arguments. I am

told sixty-five feet is enough. I have recommended two hundred feet and I am told that is too low. I would like to know—of course, I recognize that it is something which is dependent upon the constituents being sprayed—but I would like to ask Dr. Henderson if he can give me some information as to the lineal feet of air current that these hose masks should carry in order to be absolutely safe. We have no trouble with the big concerns. It is the little concern that gives us the trouble, and I want some light on that subject if I can get it.

CHAIRMAN GREENBURG: Any further questions?

DR. W. H. HINKEL (Atlas Powder Co., Wilmington, Del.): I just heard mentioned acetone poisoning in connection with benzol. I have tried for some time to get some information about acetone poisoning—whether there is such a thing or whether there isn't. I would like to know, if I can, if there is such a thing.

CHAIRMAN GREENBURG: Are there any other questions relating to gas masks and respirators?

MR. KESSEY (Virginia Chemical Corporation): We have had some unfortunate experience in acids-breaking down. We have lost several men. I would like to ask what we should use to protect our men in doing that work.

MR. SLATER (Eastman Kodak Co., Rochester): Dr. Henderson told of some of the things which the doctor ought not to do, namely, not to raise the patient, not to examine him, but to keep the patient quiet. Would he be able to indicate what other things the doctor might do in treating pulmonary edema due to acid?

W. A. COOK (Travelers Insurance Co., Hartford): I am wondering if any effort is being made along the line of establishing standards for respirators. Perhaps Dr. Yant might help us out along that line.

CHAIRMAN GREENBURG: I am afraid we will just have to stop. Dr. Henderson is about overwhelmed and we may have to carry him out.

Final Discussion by Dr. Henderson

DR. HENDERSON: I heartily agree with Mr. Kepner regarding the inspection of gas masks. In fact I think I would go even further; for I would require training under service conditions. If the mask was intended for use against ammonia I would occasionally send a man into dilute ammonia vapor with the mask on. Then I would bring him out, take the mask off, and send him in again without it. He would thus learn how to use the mask when the need comes, and to appreciate its protection.

I agree also with everything that Mr. Yant has said. I concede him the candle. I remember once, when Dr. Haldane of England, the great authority on this subject, was here in America, we went through a mine in Cripple Creek. Dr. Haldane is an enthusiast in regard to atmospheres low in oxygen. He said to the engineer who was taking us through the mine: "What I want is some bad air." So the engineer took us down a disused and unventilated passage. He went on ahead with an acetylene lamp, while the rest of us followed with candles. He went on and on; and first one candle went out and then another, until finally there was nothing left but the acetylene torch. At that point even Dr. Haldane was satisfied, and we turned back toward more oxygen. I think I should always like to come out before the acetylene torch is extinguished, and I expect even Dr. Haldane and Mr. Yant would be willing to come with me.

In regard to hydrogen sulphide: when its escape into the required air cannot be controlled in any other way, it may be decomposed and then limited as a health hazard by releasing small amounts of chlorine into the air also. Hydrogen sulphide and chlorine react and eliminate each other. This is also the simplest and most effective way of deodorizing many industrial processes. A very little

chlorine gas added to the effluent vapors of a garbage plant, for instance, is effective in freeing the neighborhood from its stench.

As regards the use of ammonium carbonate and smelling salts in resuscitation or in neutralizing the effects of acid fumes, the best that can be said is that it is innocuous bunkum (laughter). It does no good and probably no harm either. It is just nonsense.

With regard to the question that Dr. Stewart asked concerning spraying methods of painting and the proper velocity in linear feet of the air flow through a hose mask to a man directing the spray, I would suggest that the requirement should be expressed not in linear feet, but in cubic feet of air per minute. A man working hard may breathe twenty liters of air per minute or more. Half of the time he is inspiring and half the time expiring. Thus as a minimum the air supply should be at least fifty liters a minute, that is 2 cubic feet of air per minute should be blown through the hose into the helmet. This figure may be turned into linear feet by dividing it by cross-section of the hose.

As to Dr. Hinkle's question of the possibility of acetone poisoning, I must admit that I do not know of any cases. But I should think such poisoning would be quite possible. I have drunk acetone myself to determine the effect; and I found it an unappetizing drink. From the pathological standpoint it is noteworthy that diabetic coma is associated with acetone and in the blood and breath. In this disorder acetone is produced in the patient's own body, although the coma is not believed to be due to any great extent to acetone. While acetone is, therefore, not extremely poisonous, its inhalation should certainly be avoided, just as the inhalation of any industrial vapor should be avoided even in the absence of seriously harmful experience.

For the protection of an acid plant hose masks should be used, if possible. If canister masks have been used and the men wearing them have been overcome, it is probable that all the alkali in the canisters has been exhausted by combination with the acid. If this is correct the canisters, or at least the soda lime in them, need merely be renewed in order to afford protection. There is, however, another possibility. Sulphuric acid may form not only a vapor but also a spray of very finely divided droplets. Such a fog will pass through alkali and charcoal and in fact through anything except a filter. I should suggest, therefore, that if the trouble at the sulphuric acid plant is not overcome by new canisters of soda lime, filters to take out the fog or spray should also be inserted in the canisters.

So far as I know, no cases of mercury poisoning have yet resulted from mercury engines, but it certainly seems that sooner or later some mercury vapor must escape; and if this happened the results would be serious.

In the treatment of edema the patient should be kept absolutely quiet. The physician should be allowed to listen to his lungs, but not to move him or to ask him to move. If anything is to be done oxygen should be administered; not oxygen mixed with carbon monoxide, but pure oxygen mixed with air; and this inhalation should be begun as soon as the patient is at all cyanosed, that is blue around the mouth. The amount of oxygen should be adjusted to keep the patient's color normal. It should not be used to excess, for prolonged inhalation of oxygen is slightly irritant to the lungs. It is best also to conserve oxygen in case there is more than one patient to be treated. In an industrial plant where the physician may be called upon to treat pulmonary edema resulting from irritant gas poisoning, it would be well for him to be provided with an apparatus for administering oxygen diluted in air. The same inhalator as that used for treating carbon monoxide poison can be used also for treating lung edema; but for lung edema the cylinders of oxygen and carbon dioxide are replaced by pure oxygen.

Finally let me express my high appreciation of the kind things that have been said here regarding my work and particularly my appreciation of what Mr. Yant has said. Mr. Yant and his associates at the Bureau of Mines do such splendid work that there is a very keen competition, a friendly sort of race between their laboratory and mine. Several times lately I have found them ahead of us. But that only stimulates us to work the harder. I judge that our competition has the same effect upon them. It is a fine kind of competition, and a race in which everyone wins.

CHAIRMAN GREENBURG: Now we will have the report of the Nominating Committee by Mr. Kepner.

Report of the Nominating Committee

We, the Nominating Committee, appointed to select a suitable personnel of officers, to serve the Chemical Section for the ensuing year, have attended to that duty, and after careful study and due consideration, the following names are placed in nomination:

Chairman: Dr. Leonard Greenburg, U. S. Public Health Service, Yale Medical School, New Haven, Conn.

Vice-Chairman: C. F. Whittemore, Western Electric Co., Chicago, Ill.

Vice-Chairman: E. C. Rogers, The Grasselli Chemical Co., Cleveland, O.

Secretary: George E. Minshull, DuPont Rayon Co., Inc., Buffalo, N. Y.

Chairman, Engineering Committee: A. L. Armstrong, Eastman Kodak Co., Rochester, N. Y.

Chairman, Industrial Poisons Committee: S. E. Whiting, Liberty Mutual Ins. Co., Boston, Mass.

Chairman, Publicity Committee: John Roach, Deputy Commissioner of Labor, State of New Jersey, Trenton, N. J.

Chairman, Program Committee: C. F. Whittemore, Western Electric Co., Chicago, Ill.

Chairman, Membership Committee: E. C. Rogers, The Grasselli Chemical Co., Cleveland, O.

Chairman, Poster, Slide and Safety Kink Committee: George H. Miller, E. I. DuPont, deNemours & Co., Wilmington, Delaware.

Chairman, Statistics Committee: Carl F. Coffelt, Victor Chemical Works, Chicago Heights, Ill.

Executive Committee, The Officers, and: S. H. Kershaw, National Safety Council, Chicago, Ill.

Ira V. Kepner, Pennsylvania Salt Manufacturing Co., Widener Building, Philadelphia, Penna.

John S. Shaw, Hercules Powder Company, Wilmington, Del.

H. L. Miner, E. I. duPont deNemours & Co., Wilmington, Del.

L. A. DeBlois, National Bureau of Casualty & Surety Underwriters, New York City.

Dr. H. C. Parmelee, "Chemical and Metallurgical Engineering," New York City.

Prof. C. E. A. Winslow, School of Medicine, Yale University, New Haven, Conn.

Dr. H. E. Howe, "American Chemical Society," Washington, D. C.

C. E. Rice, The Dow Chemical Co., Midland, Mich.

Wm. A. Baxter, The Newport Co., Milwaukee, Wis.

Ralph O. Keeper, Aluminum Co. of Am., Massena, N. Y.

Maurice Schwarz, Consulting Chemists, New York City.

Respectfully submitted,

John Roach,
John S. Shaw,
J. H. Barnholt,
Ira V. Kepner, Chairman.

(Upon motion regularly made and seconded it was voted that the report be accepted.)

CHAIRMAN GREENBURG: The next subject on the program consists of three brief contributions on "The Safe Handling of Compressed Gases." The first speaker is Mr. J. I. Banash, Consulting Engineer, of Chicago.

MR. BANASH: With the Chairman's permission I would suggest that, since our time is short, we have two guests who are not members and I would like to defer to them so that you will be sure to hear them. I will remain in the hall and tell you then what I have to say, if that meets with the Chairman's approval.

CHAIRMAN GREENBURG: In that case, let's call on Mr. H. M. Mabey, of the Mathieson Alkali Works, New York City.

MR. MABEY: It is a great pleasure to be here, gentlemen, but my duties involve largely transportation, and the only thoughts I could express along these lines have to do more with dangerous articles regulation.

As I visualize your work, the safety to persons is involved and the safety to the public; but beyond that, as I look at it, there is a question involving the welfare of the industry itself, and after all, if we once succeed in safeguarding that we won't have these other problems.

Nearly all the compressed gases, as you know, are transported under the regulations of the Interstate Commerce Commission, known as the dangerous articles regulation. I think everyone here is familiar with that.

As I see it, there is no industry where cooperation between those engaged in industry is of more importance than this branch of the chemical industry, when we are producing compressed gases.

We have all seen within the past few years a great increase in the production of various gases, not only by the older companies but the entry of newer people into the field. Following my line of thought, I think it should be impressed upon every one of us here, that we have a common interest in the prevention of any accident within the industry. It is not that an accident will cost us money individually, but we each are dependent upon the other. One accident within the industry reacts against the entire industry, and that is almost equally true whether that accident be within an individual plant or whether it be within the field of transportation.

These regulations are not in the interest primarily of the carriers, the railroads; they are in the interest of the public; but more than anything they are in our interest, as producers. We have made these regulations, we, the industry. They are broad in their scope. They intentionally in many cases do not go into extreme detail very specifically. In my opinion, therefore, it is not to the interest of anyone within the industry to see how near to those specifications they can walk, but to try to go beyond that point and live up to the spirit of the specifications, realizing that the specifications for the handling of dangerous articles are broad. The Interstate Commerce Commission, having authority from Congress, is limited somewhat in its powers in this matter, and naturally does not want to and cannot go beyond those powers. It cannot go beyond the field of interstate commerce. That field naturally begins when a product is offered to an interstate carrier in transportation. It ends when the interstate carrier ceases its job of transporting the product. Before and after those times the regulations technically do not prevail.

The greatest thing that can be done, in my opinion, is to foster an exchange of all the experiences of those who have been engaged in the handling of these commodities for years, freely, one among the other, with the aim of arriving at standards of practice and the standardization of plant practice.

This, I know, is a bit afield from the ordinary safety work that you are engaged in, as I visualize it, but nevertheless it is of the greatest importance. The

accidents—they are not really accidents—they are casualties. There has been very little physical damage so far. There has been practically no damage to human life, but a study of those accidents has almost invariably shown that they were probably the result of a departure from standardized methods, the results which have been arrived at as a result of the common experience of those who have been engaged in the industry for many years.

That, I think, is the only message that I thought it worth while to convey to you. Summed up, as I see it, these dangerous articles regulations of the Interstate Commerce Commission are the life-blood of the industry. They protect us more than anything else. They have made it possible for the industry to ship in interstate commerce, and that is what we are in business for—to sell products, uniformly, throughout the United States. They have replaced conditions whereby an individual railroad of its own volition could say whether or not and how it would handle these products.

This, therefore, is a plea that each one of you in your safety work go beyond the letter of the specifications, into the spirit of the specifications, and honestly leave nothing undone which will tend to lean towards safety in the detail operations within your own plant.

CHAIRMAN GREENBURG: The next speaker is Major John C. Minor, of New York City.

MAJOR MINOR: I realize fully that the time left is very short, and I know that I can put everything I have to say in a few words. The fact that I think I occupy the lone position of a man who has been both a gas manufacturer and a manufacturer of cylinders to contain compressed gases has just led me to the thought that I would speak of this question from the viewpoint of the gas container.

Mr. Banash, whose paper you haven't heard, has probably covered the field very completely.

There are, as you know, a great many ways to do a thing wrongly and generally one way to do it rightly, and I just want to touch on a few of the high spots regarding wrong ways to do the thing because it is in that direction that we find the basis for safety protection.

You have heard some words with reference to the Bureau of Explosives. I think it is generally known to everybody what the function is as the operating arm of the Commission. Before they entered the picture, sixteen years ago, when a man wanted to buy cylinders for compressed gases he simply went to the manufacturer and asked the price, and that was all there was to it. There was a tremendous responsibility, therefore, placed on the cylinder manufacturers at that time, and it is tremendously to their credit that they lived up to that responsibility. That is, given a tremendous hand in that way without any control outside, either by the Bureau or by any other authority. They turned out the best that the art permitted in those days.

After the entry of the Bureau of Explosives there came the formation of the Compressed Gas Manufacturers Association, and they have worked hand in hand with the Bureau of Explosives. As Mr. Mabey has suggested, they have striven not merely to adhere to the letter of the specification, but they have been active frequently in initiating steps toward the developing of the spirit back of the specifications; and today, the compressed gas cylinders that you see floating around the city (maybe you instinctively walk away from) are one of the safest things in the world. But they are safe when they are used for the purposes they are made for, and unfortunately, they aren't always used only for those purposes.

I think, perhaps, you may not all have a clear understanding of what it means to manufacture a cylinder today. We start, either with a sheet of steel that is formed up into a cup or we start with a billet from which a cup is formed by piercing it. Therefore, those short, heavy-walled containers, open at one end,

are passed through draw benches, and being supported on a mandrel of the proper size to take the desired inside diameter, they go through rings and are brought down to the proper wall thickness for the purposes desired. It takes two or three passes to do that. After each pass the cylinder has to be heated again, and at the end the neck is formed and then it is annealed and slowly cooled, and you have the final cylinder. But all sorts of requirements are necessary to do that. Disinterested inspectors test the steel. Tests are made on the stress at a suitable test pressure; giving a high stress to the cylinder requires that the cylinder can't show more than a certain expansion. Representative cylinders are crushed to show that the metal is sound. Of course the usual physical tests and all those things have produced a cylinder that we have reason to take pride in.

This association of ours which I spoke of, the Compressed Gas Manufacturers Association, is rather unique in that it isn't concerned in any trade practices except those involved in questions of safety, and we are constantly working through committees in an effort to develop further protection of the cylinder after it has passed out of the manufacturer's hands and into the customer's hands so that the customer will be able at all times to satisfy himself of the safety of the cylinder. I don't suppose that work will ever be completed but we have achieved great results and we look forward to more; and that phase of the work, I feel, is emphasized right here by this large attendance at a meeting like this. It is through cooperation, the cooperation of the big fellows who have the laboratory facilities, and they have turned them over so that even the smallest man gets the benefit of the work.

This association of ours has prepared a list of regulations that should govern the safe handling of compressed gases. Of course, in so far as it isn't state work it is out of the state Bureau. It is up to us, ourselves. There is a long list of things that should be done. I don't want to go into those except to touch on a very few of the things and show you what they mean. Some are obvious, some may seem trivial, but they are all based on experience. The proof of this is that last week I read in a Philadelphia paper about a truck carrying four or five oxygen cylinders. It was upset and they rolled to the bottom of an incline. There was nothing left of the truck, but the cylinders were perfectly all right and were delivered to the customers.

Of course, it is perfectly obvious that you don't want to drop a cylinder. I don't think that you stand much chance if you do. But it is just as well to caution you, because I don't suppose any man feeling that he has a lot of cylinders around with a stress inside amounting to perhaps 30,000 pounds, would care to take the chance on (we will say) the exceptional cylinder. Even the exceptional cylinder, I believe, is eliminated before it gets to him. But what he may do, or some customer of his may do, is the cause of the exceptional cylinder that crops up from time to time.

It is obvious that you shouldn't use a lifting magnet or rose slings on a bunch of cylinders. I have seen a cylinder hoisted fifteen stories with just a rope sling around it. It is unnecessary to say what that might mean to this assemblage.

Don't attempt to mix gas in a cylinder. You simply can't get away from the human element, and we sometimes associate the human element with people of feeble understanding in so far as the cause of accidents is concerned.

At Harvard, I think it was, two years ago, a research work was being carried on in their low temperature place. There was a hydrogen and an oxygen cylinder standing there, and the operator who had been working there for several years (he was of the Bureau of Standards and a very valuable man with high standing), in order to save the oxygen from his liquid air so he wouldn't have to go out and buy two dollars worth of it, used a hydrogen cylinder to put it in. He knew perfectly well that was a vitally wrong thing to do, or should have known it. I can't conceive that he didn't. He must have had to strip his valve threads and

force it on, nevertheless he did it. Of course there was a frightful explosion and there just simply wasn't anything left of that laboratory or the operator, and most of the people who were around there were injured.

Cylinders are used for rollers. We have seen it. I have seen a house moved with empty gas cylinders. They are not built for that kind of a strain.

Of course, you want to keep any compressed gas cylinders away from heat. You may have a safety device on there that can't operate. In a bottling shop where they were making carbonated water with carbonated gas I saw a pipe which contained water at 212 degrees and that water was running off all the time so that they could get the gas over and not freeze.

We have accidents in gauges. You can't afford to take the chance of taking your oily hands and working around an oxygen valve. It is not going to explode every time—nobody knows why it doesn't, but you are taking a chance when you do it.

Going back to that question of mixing gases, only last week our association took occasion to write to a paper, a trade paper in the petroleum industry which had described an experiment in which an empty oxygen cylinder was used as a storage reservoir for oil products.

Sometimes water is put in a cylinder. Carbonic people selling to bottling shops frequently have cylinders returned to them with water in them. The result is that in cold weather it may freeze and you get a strain that will start an initial crack.

All of these things have doubtless been commented on, but I do feel that, speaking for the gas industry and speaking for the cylinder manufacturers, we find that it pays to be safe. It costs money—it costs a good deal more to make the modern cylinder today with all the precautions surrounding it than it did the old one, but every one involved in the question agrees that it pays to be good.

CHAIRMAN GREENBURG: We certainly owe these gentlemen a debt for coming here and speaking to us, and I apologize for having to urge that the talks be brief. We might have a word from Mr. Banash by way of summary.

Industrial Gases

By J. I. BANASH

Chemical Section, National Safety Council,
Consulting Engineer, Chicago

As safety man engaged in chemical work, the field covered by gases and their industrial application is vitally interesting to us and your observations not only in your own plants but of industrial conditions in general have no doubt indicated to you a continually increasing use of materials in gaseous form so that the whole subject is of particular interest at present, and likely to become even more important in the future. For this reason we are having this little symposium, and as other speakers will treat of certain specific gases, I will try, with your permission, to analyze the general gas hazards and attempt to indicate how safety men should look at it.

Regarding any individual problem, information is available to cover practically all conditions, I think, and if you do not have the necessary data about any specific gas readily accessible, an inquiry will undoubtedly bring the information or a helpful reference from the main office of the National Safety Council. Also, there have been published in the *National Safety News* and elsewhere, articles on the subject. In the June, 1926, issue there was a very valuable article entitled "Common Gases and Their Hazards," by that very able chemist, A. C. Fieldner of the Bureau of Mines, who, in addition to being chief chemist of the Bureau, also has

the safety viewpoint. Valuable suggestions for the safe handling and use of compressed gas cylinders will be found in the rules of the Compressed Gas Manufacturers' Association which were published in the *National Safety News* and reports of which are available. The manufacturers of compressed gases are fully aware of the necessity of safe handling of their products and these rules are a valuable contribution to safety work.

Both of these specifications and Safe Practices No. 71, itemize the details relative to safe handling of gases in general and also itemize recommendations regarding a number of individual gases.

Solids and liquids are more familiar to us than gases because for one thing they stay put better than gases since they need not usually be stored under pressure whereas practically all gases are under more or less pressure at some time in an industrial establishment. For example, liquids lend themselves much more readily to specific classification according to their hazards, than gases. Underwriters Laboratories has succeeded in classifying the more common liquids according to their fire hazard by a group of numbers based on ether as 100 so that you can readily be informed as to the comparative hazard of almost any commonly used liquid by simply being told the number of the group into which it falls. It is hoped that some time this work can be extended into the field of gases but it is questionable as to whether or not a single classification can be made to take care of both fire and accident hazards. Also, even if we had such a classification of gases, although it would be very valuable from an actuarial point of view, the safety man would still want to know how to handle safely the particular gases which come into his plant.

Dr. Fieldner classifies gases into two principal groups: first those which burn, and therefore, when mixed with air may explode, and secondly those which have some pathological effect such as asphyxiation by the exclusion of the oxygen of the air or poisoning by their effect on the human system. Of course, we must also consider gases which have combinations of these properties and which may also have an anesthetic effect without being really poisonous.

Safety men have to look at very intimate details to cover all angles of the problem. Since all gases are held under some pressure, which if released at any point such as a leak, will cause the gas to escape into the atmosphere, the first thought which occurs to the average person is protection against accidental escape. This is a natural thought but from a safety viewpoint we have to consider much more than this. We must cover the safe use and application of gases in industry which includes shipping, receiving, transferring and storing such materials and eventually bringing them to the point of utilization without hazard to life and property.

As far as the shipment of gases is concerned, we are fortunate indeed that the Inter-State Commerce Commission has remarkably successful standards for containers which have been worked out by the Bureau of Explosives of the American Railway Association over a period of years so that they are now commonly accepted as part of the industrial fabric of the country. All cylinders used for the storage and transportation of compressed gases should be manufactured in accordance with I.C.C. specifications and marked in accordance with I.C.C. requirements effective at the date of their manufacture. Containers manufactured under these specifications for individual gases and so marked and used for no other purpose, may be classified as safe and the plant safety man need not go into details of construction if the supplier is a reliable concern and uses containers specified for the particular product.

Where gases are used as a regular part of the production schedule, your chemists have undoubtedly worked out the reactions which they want, and with their cooperation it should not be difficult to get complete protection which can be worked out with the establishment of the process. It is up to the safety man to get protection built into the process and see that it is maintained. When a process

is first worked out on a laboratory scale, the chemical department may not have considered all the safety angles, which subject should be brought up by the safety man before the process is put into production. It is not always easy, as you know, to induce your chemists to work as safely on a laboratory scale as will later have to be done in production, but if the safety man can keep in touch with the laboratory his cooperation from the beginning will be of value.

On the other hand where gases are incidental and only used at times, the burden of checking up on the receipt, storage and use of such material should be at least in part a function of the safety department.

Some gases are more or less on the border line between liquid and gaseous phases. They may be received as liquids and can be handled as liquids under comparatively low pressures up to the point where it is necessary to use them as gases. Certain classes of compressed hydro-carbon gases come in this classification and their use is increasing rapidly. The hazards of such gases are mostly from ignition and precaution should be taken to limit as far as consistent and practical, the amount which may accidentally escape. When such materials are received as liquids and utilized in the gaseous phase, it is considered safer to expand the liquid into a gas outside the main buildings when practical, and pipe the gas instead of the liquid into the building with the installation suitably designed in compliance with safe operating practice. Constant inspection is necessary, especially with gases which do not have an odor which is readily detectable. Usually only a comparatively small percentage of gas in the air is required to make an explosive mixture, and every precaution must be taken in the first place to prevent leakage, and secondly, to have the areas and ventilation as great as possible and keep sources of ignition away from places where gases may leak so that the possibility of getting the combination of a leak, an explosive mixture with air, and a source of ignition at the same time and at the same place will be remote.

Piping should be laid out so that the pipes used for various gases may be easily distinguished. Welded joints give great satisfaction in industrial piping because when they are well made, there is little likelihood of leakage. Never interchange gases from one shipping container to another and do not mix gases in the shipping containers. Combustible gases are shipped in cylinders which have left hand threads on the valves, and no adaptor should be used or other change made to defeat the purpose of these left hand threads. Also, keep in mind that no cylinder should ever be used for gases under pressure in a plant or in Intra-State Commerce which does not meet with the requirements of the Inter-State Commerce Commission as previously noted.

A gas which is irritable when breathed, is, of course, easily detectable and gives warning of leakage so that those in the room can leave until the hazard has been overcome. Piping, fittings, etc., should obviously be of materials which are chemically effected by the gas itself to the slightest possible degree. Easily accessible shut-offs must be provided so that in case of a leak or a break, only a minimum amount of gas will escape.

Special detecting apparatus is available for locations where leakage of flammable gases may be anticipated and such apparatus can be arranged to give ample warnings. Medical specialists have already on record treatments for poisonous and irritating gases and the development of gas masks, (as a result of the war) has been, as you know, of tremendous value industrially. Gas masks form a large subject by themselves, and we have available masks of various types from the emergency mask (good for about one-half hour), up to the specialized mask where men have to be exposed for longer periods. In any consideration of gas masks it must always be remembered that, with the exception of the oxygen helmet, and the hose mask in which air is pumped to the user, they do not supply oxygen and cannot be used where there is not enough oxygen to support life.

The Safety Engineer should accumulate and have readily accessible, all available information regarding the gases used in his plant which will include the specific antidotes and methods of protection for each gas, which cannot be gone into thoroughly in one short paper such as this. It is hoped that the record of this meeting, particularly the discussion, will show the main items of interest which possibly may form the basis for further Safe Practices Pamphlets wherein almost any amount of useful data may be compiled, and that after the next two speakers have finished their comments, the discussion will be general and will form a record which will indicate the proper trend for further work on the subject.

CHAIRMAN GREENBURG: Our time is about up. On the other hand, if there are one or two important questions to be raised, I think we should not stunt the discussion. Does anyone have a really important problem?

MR. AMRAM (Hamlin & Co., New York City): I happened to think that the greatest catastrophe which has occurred since the last Congress in Chicago, occurred in connection with the storage of natural gas. I don't know whether that comes under this heading or not. I am referring to the great catastrophe in Pittsburgh. The reason it is so vivid in my memory is that I happened to arrive in Pittsburgh fifteen minutes after it had happened. I think there were 15 instantly killed, 15 others died, and 100 were injured.

CHAIRMAN GREENBURG: As I recall, that wasn't a case of the storage of gas. That was a case of using a blow torch on a gas tank while there was still gas there. It wasn't purely a question of the storage of gas.

MR. BANASH: You mean that explosion of gas in Pittsburgh? That was a question in all probability of not having entirely cleaned out the holder of all flammable liquids. There should be proper procedure control.

MEMBER: I happen to know another detail there. I am interested in flame welding and I would like to say that it was due to electric welding.

CHAIRMAN GREENBURG: We will have to close. This is just a milepost in safety work, but the fight goes on continuously. During the past year we have had our ups and downs, as might be expected. Our *News Letter* has been a decided failure, for which I take the discredit. I hope next year you get a better man for this task. Unfortunately, it has to be written by a man in intimate contact with the work and so often he doesn't have the time.

I wish to add a word of thanks to those who have been associated with me and to all the men on the Executive Committee; and I would like to say that the success of the Chemical Section during the past year depended on their wholehearted cooperation and interest, and that the failure largely belonged to the chairman.

ADJOURNMENT.

***The Industrial Poisons Committee
in Co-operation with the
Health Division and the Rubber Section***

October 2, 1928

S. E. WHITING, Chairman

Assistant Chief Engineer, Liberty Mutual Insurance Company
Boston, Mass.

The luncheon meeting of the Industrial Poisons Committee of the Chemical Section, in cooperation with the Health Division and the Rubber Section at the Seventeenth Annual Safety Congress was called to order at one twenty-five o'clock by the chairman, S. E. Whiting, Assistant Chief Engineer, Liberty Mutual Insurance Company, Boston, Massachusetts.

CHAIRMAN WHITING: The meeting will come to order.

DR. LEONARD GREENBURG (Chairman, Chemical Section, U. S. Public Health Service, New Haven, Conn.): The Rubber and Chemical Sections of the National Safety Council have been interested in the subject of benzol poisoning for some time. The result, after some three years of research and study, was the publication of the final report of the Committee on Benzol Poisoning.

We had at that time about buried the ghost of benzol, but apparently we didn't finish the job, as several people have since thought it good to have an open discussion of the subject once again. This meeting falls into the hands of Mr. Whiting, who is the chairman of the Industrial Poisons Committee of the Chemical Section. I am now going to turn the meeting over to Mr. Whiting.

CHAIRMAN WHITING: The question is whether we should do anything more on benzol poisoning and if so, why we should do it, and then, what we should do? Unfortunately, we have only a half-hour left and the speakers will have to pardon me, if I begin to click my glass when they are going beyond their allotted time.

Mr. Armstrong, of the Eastman Kodak Co., will speak first, and he may have two minutes.

MR. ARMSTRONG (Eastman Kodak Company, Rochester, N. Y.): I am not going to speak, I am going to ask a question. When the Benzol Committee made their report, I believe the findings were that we should reduce concentration below 100 parts per million. We reduced ours to 35 parts per million but I feel we still have some evidence of benzol poisoning.

CHAIRMAN WHITING: We hope to get an answer to that question of Mr. Armstrong's. Dr. Shirley, of the Hood Rubber Company, has had very considerable experience in benzol, as you all know.

DR. SHIRLEY (Hood Rubber Co., Watertown, Mass.): Mr. Chairman, I think our benzol is of the same consistency we always used, perhaps a little less, but there still, in my opinion, is a hazard. However, on three different occasions during the last year where I have been asked for an opinion on certain cases, there was only one which I believed to be benzol poisoning. In our own plant we still use it, and I have three jobs in which I am pretty fussy in checking the physical condition of the men. I believe the hazard still exists, but perhaps to a less extent than it did before the study was made. That is all there is to say at present.

CHAIRMAN WHITING: Although Mr. Cook of the Traveler's Insurance is really the one who started this luncheon meeting, we have so little time that Mr. Cook has agreed that we call on Mr. Paine, of another large insurance company, which has had wide practical experience with benzol. Mr. Paine will have five minutes.

WALTER S. PAINE (Aetna Life Insurance Co., New York): I did not know I was going to be drafted into this, but I would like to say just a few words. I think that the Benzol Committee report we made went rampant through the country. I think there are cases where the interpretation of that report has been taken so literally that it has really hampered some of the industrial processes.

Mr. Gumaer knows one case which we had, where this report went to the manufacturer and he took it literally. He was supported in that literal interpretation by an inspector. A thorough investigation convinced me that there is very little hazard in that particular industry.

I said all I want to suggest on this subject in my report this morning in the Chemical Section. I have in mind (and this is actual experience) a certain plant making a specific product. I have watched that plant using benzol over a period of five years, and I have not had the semblance of a case in that plant. There is another plant making the same product, maybe by a different process, but I have had in that plant a number of benzol cases, some of a minor degree and some of a major degree. I believe that our committee could well afford to go further to answer some of the questions which have been brought up by Mr. Gumaer and others. Relative to how far you should go in controlling the use of benzol, I believe that no more thorough investigation could be made for a basis than has been made already by Dr. Winslow in his work at Yale University.

Before this investigation starts as a stampede, I would like to see five or six individuals selected to review the field very thoroughly to see if there is need of further investigation or if there is need of further interpretation of the code or findings as sent out by Dr. Winslow's committee.

CHAIRMAN WHITING: There is a question from the floor, Mr. Paine: what was the relative concentration in the two plants you mentioned?

MR. PAINE: If the man who is interested will see me at a later time, I think I can give him that.

CHAIRMAN WHITING: Roughly the same?

MR. PAINE: No, I think there is a difference. I am positive there is a difference. I think that, before I would make any statement, I would investigate further the cases I named this morning as a hint in my paper. My inclination is to be somewhat conservative in such matters as this is a relatively new form of poisoning.

CHAIRMAN WHITING: One of the large manufacturers of benzol is the Barrett Company, and Mr. Gumaer has for some months, or possibly a year, been studying this problem from the standpoint of the manufacturer and, of course, from the standpoint of the user. Mr. Gumaer may have five minutes, please.

P. W. GUMAER (The Barrett Company, New York): I asked a physician once what white blood corpuscles were made up of. From the look I got, it seemed as though I had asked foolish question number ninety-nine. I found later that nobody knows. I have been asking foolish questions for six months on benzol. I learned a lot about it and I have also learned there are a great many things no one knows about it.

Some time ago I was retained by the Barrett Company to devote full time to the health hazard of benzol. I visited about fifty plants using benzol in that time. I want to say this before I continue: I do not want anything I say to be an inference in any way that the Barrett Company is urging or encouraging the poisoning of any individuals. If benzol is used in industry, we want it to be used safely. I could elaborate on that, but I haven't the time.

When I started on this work I decided, as in any engineering work, in order to get anywhere, you have to have a quantitative method of measuring what you are doing. My first work was to get an instrument by which I could measure the amount of benzol in the air and do it immediately. I could not wait three days to know the results. We recently calibrated an instrument for this work, which is

about three feet long and five inches in diameter. We can measure with an accuracy of plus or minus 25 parts per million.

I made a few preliminary tests in factories and found a great variation in different parts of the plant. We can detect where the benzol concentration is greatest and determine the best means of ventilation. It will, I think, eventually be of great help in improving the ventilating systems.

I have been surprised, in going around factories, to observe the obvious mistakes made in ventilation. A very large manufacturing concern has a very capable engineering staff, one of the largest in the country, but in a small room where they were using benzol and naphtha, they had a large fan near the ceiling and absolutely none near the floor. Everybody who has had experience with those solvents knows that the fumes when at room temperature sink to the floor and stay there. In another case, they actually pulled the vapors past the workmen. In trying to get the vapors out of the room, they were drawn past the men's faces, unintentionally aggravating the conditions. Such conditions I have corrected in a number of cases.

The really important condition you find in getting around to different plants is that there is no uniformity at all in the medical supervision they give. Of course, the very small plant has no medical department. A large plant like the Eastman Kodak has very careful blood counts made. There is another firm I have in mind that made periodic blood counts for three years. They discontinued them in 1924. This firm has been using benzol for twelve years. A neighboring firm has been using it thirteen years. They claim no benzol cases. One has had three suspected cases—very mild and only suspected.

In my mind, the way they apparently prevent serious benzol cases is by their elaborate medical department. A man must report to the medical department if at all ill before he goes home. In that way, they detect the case in the preliminary stages.

The small firms without medical departments that I go to often ask me what they can do to make benzol safe. I am not a physician and I find that there is such a wide difference of opinion, particularly between the investigators and the practical users of benzol, that there is no recommendation that I can give them.

Here is something where I think the National Safety Council, insurance companies, or some other organization could be of assistance in doing—something I can not do myself. That is to get together the best medical minds on the supervision of benzol employees. I do not mean the treatment. If you have proper supervision, you do not have many cases and do not need much treatment. If you can decide on proper supervision of employees, then I can have a practical code of instructions to give to the factories that ask me about benzol poisoning prevention.

There are a great many things we do not know about benzol. For example, what is the action in the body? There is really nothing known about it, how it is absorbed or in what form it exists. Why are white blood corpuscles attacked by benzol? Then, it is generally conceded that there is a tremendous variation in susceptibility of individuals. If we could get a test for susceptibility in order to test a new man, it would be of tremendous value. There is doubt as to whether it can be done, but it would help a lot. Apparently from what I have been able to pick up, alcohol increases susceptibility. A strong drinker is apparently more susceptible than others. Mr. Paine brought up this morning the question of diet. That is also apparent in a number of cases.

I visited a factory where they use tremendous amounts of benzol. The conditions were very, very poor there. I had to judge by smell as I had no instrument at that time to measure with. The plant was located out in the country, where the men apparently had plenty of good food and fresh air. They claimed to have had no benzol cases in spite of the high vapor concentration.

At the present time, if a man is exposed to benzol vapors and he has a low white blood cell count, that is legal proof that he has benzol poisoning. Doctors I think will agree that there are a number of other substances that will give a low white blood cell count as well as benzol. That places a hardship on the compensation insurance people because they feel they have to pay benzol claims where benzol may not be responsible.

There is also the question of impurities in benzol. Benzol is not an absolutely chemically pure substance. It is separated by fractional distillation so that the best commercially pure benzol you can get on the market has a 1° to 2°c boiling range. There is apparently (as far as I can find in the literature) no research work on this phase of the subject. Absolutely chemically pure benzol is a very difficult thing to get.

I believe it is desirable to do some research along the lines that I have mentioned. I do not think it is up to the National Safety Council to attack these problems. However, I think that the possibilities are good that some of these questions will be definitely answered in the next few years. I cannot make any further statement at the present time. In the meanwhile, we must use precautions in the use of benzol by medical supervision, ventilation, and so forth.

I have the facilities to make a very thorough study of ventilation and benzol concentration in all parts of a factory as I can take several hundred readings a day on benzol. Any factory that wishes to know the concentration of benzol vapors to which their employees are exposed or desires to improve the ventilation where benzol is used may have a thorough test made by writing The Barrett Co., 40 Rector St., New York City.

As has been suggested by Mr. Paine this morning, if we could get a continuing picture of the history of benzol poisoning in different cases, it would be of value. I think the work of the National Safety Council was very admirable. It was primarily a field study. The National Safety Council, due to limited funds, was able only to make sort of snap shots in different factories. If we could get a sort of moving picture, that is, a continuing history of a large number of employees using benzol, it would be of value. Cooperation along that line of studying the health of benzol employees in connection with ventilation is something I think could be worked out and would be of value.

CHAIRMAN WHITING: Thank you. The chairman of our Health Session, Dr. Wade Wright, of the Metropolitan Insurance Company has made suggestions in this connection.

DR. WRIGHT: I have nothing whatever to contribute. I have never made any study of the benzol problem. What I have to contribute is wholly speculative. Those impressions are, I imagine, very similar to those of all persons who have ever studied benzol, that is, consternation that it strikes as it does, and equal consternation that it does not strike in the presence of appalling exposures. I do not know of any data whatever regarding the amount of benzol in use at the present time. I do not know whether information is to be had accurately, but I certainly feel from my general contacts that benzol is used about as plentifully as it was some years ago.

There are so many blank spots in our knowledge of the problem that it is hard to get anything definite. Benzol creeps in and out of industrial processes in a great many industries. The whole picture is such that I feel we are perfectly sure in saying we do not know the whole answer to the problem of benzol. We do not have the thing within our grasp. I should eagerly welcome further basic laboratory research to determine the action of toxic substances as well as the determination of impurities in their toxic effects, and coupled with that, sound clinical observation in various centers under a more or less standardized procedure.

CHAIRMAN WHITING: The man who made the last field study of benzol in connection with spray coating is here. We would like to hear from Dr. Smyth.

DR. SMYTH (University of Pennsylvania, Philadelphia, Pa.): I agree that we have not anywhere nearly solved all the problems in connection with benzol poisoning. The more we get into it, the more difficulties we still see ahead of us. I am very much interested indeed in the apparatus that Mr. Gumaer speaks of. It will be of very great advantage in field studies such as those we have conducted. It would have simplified our labor tremendously if we had had such an apparatus available.

When I looked over this program for discussion, I was first struck by this first consideration: "The compilation of the continuing histories of all available cases." In our studies in Pennsylvania as well as in the National Safety Council, I was particularly anxious to do something which I was not permitted to do in either case. I couldn't do it simply because finances would not permit me. I wanted to go back again after a year or two and examine all of those who were still working at the same job and presumably still exposed to benzol, to find out whether the changed picture we have observed was a continuing progressive change of the white cell count, or whether possibly these men had been helped by their first exposure to low concentration of benzol and they would show improvement in time; or whether it was simply a steady picture below the normal or different from the normal picture.

I tried to express that thought in our reports, but unfortunately in either case, the funds did not permit of such follow-up work, and unfortunately in both instances also, those back of the researches were anxious to get results quickly. With our National Safety Council survey, we concentrated all our field work into two months. In Pennsylvania, we spread it more. Neither of these surveys was long enough to get those continuing pictures or continuing studies. As to whether the impurities of benzol were responsible for the blood picture, I have heard that question raised before. I have discussed that question with representatives of one of the larger producers of benzol in this country, the Carnegie Steel people. They felt that undoubtedly the benzol product was not pure. Some impurity, I can not recall just what it was, they had isolated and shipped great quantities of it at a former time for some special work. In all events, they felt this impurity was far more toxic than benzol, and in the same direction. The removal of that material adds a great deal of expense to it, and if the best benzol usable in the market is that with the 2° boiling range, then industrially the picture is not satisfactory.

In such cases as Mr. Armstrong reports, where there is very low concentration, we do not say (I do not think Mr. Paine meant to imply) that no one exposed to less than 100 parts per million would get benzol poisoning, but that was the limit which would protect the average person.

Both in the National Safety Council report on benzol and in the Pennsylvania report and in National Safety Council report on Spray Painting, we endeavored to emphasize the importance of periodic medical examination to protect the susceptible individual and weed him out before he was dangerously injured. No matter what precautions we take, there will be occasional individuals that will be poisoned. We can not eliminate all hazards from any operation, but if we present reasonable regulations that will protect the average worker and then protect the susceptible worker by periodic medical examination, we will have tremendously lessened the hazard in industry. I think there is no toxic substance that may be used in industry that cannot be used with a fair degree of safety by the average worker if we are willing to pay the price of adequate supervision.

CHAIRMAN WHITING: Dr. Hamilton, we should like to hear from you.

DR. ALICE HAMILTON (Harvard University, Cambridge, Mass.): I think it will take me only a minute to say what I have to say. In talking about benzol poisoning we really do not know just what substance we are dealing with, and that is one problem that should be settled as soon as it can be.

We may have two individuals exposed to the same hazard. One succumbs and the other does not. It is a matter of individual susceptibility, but all who have had experience with benzol in industry know there are cases of apparent group susceptibility, so we can not accept that explanation. There will be a plant in which the benzol hazard is comparatively low. I have in mind, for instance, a patent leather shoe plant in Massachusetts, in which there were two fatal cases recently, and a plant out in Cincinnati where hides are doped with benzol dope, a plant which, for the two years previous to my visit, had had no cases of poisoning, although the men had slight supervision. There can be no question in anyone's mind which group had the more serious benzol hazard to face.

I cannot see how we can explain that discrepancy except that the two plants were not using just the same substance. I think that subject should somehow be dealt with, and is one of the first to be solved.

CHAIRMAN WHITING: You all know upon whom I shall call to close the discussion, but if there is anyone here who, in one minute, would like to add some point that has not been raised already, I would like to hear from him.

W. A. COOK (Travelers Insurance Co., Hartford, Conn.): Just this one thought; the first investigation was the basis upon which a great deal of activity has been based since 1926. It does seem to me that the results of all activity in the various circles in getting blood counts and in getting concentrations of benzol in various plants might possibly be gathered together to advantage at this time.

MR. DOWN (Sloan Company, Birmingham, Ala.): We manufacture benzol, and we are down in the South, but I would like to get on the mailing list of this discussion and if possible, make some tests when I get back of men that we have had in our employ for ten years in the manufacture of benzol.

CHAIRMAN WHITING: That would be very useful. We shall see that you get a copy of this discussion. The National Safety Council's Vice-President for Health, as you all know, has led us in our entire benzol investigation from the very beginning. I will call upon Dr. Winslow to close the discussion, if you please.

DR. C.-E. A. WINSLOW (Yale Medical School, New Haven, Conn.): No one appreciates more fully than I the need for more light, and the imperfections in the work that we did. I am a little gratified to find, however, that the criticism, dreadful as it is, comes from two opposite sides, inferring apparently that Mr. Armstrong thinks the standard is not high enough, and Mr. Paine thinks it is a little too high. That is a wholesome thing.

I do think in the main that the points brought out are valuable. No one questions that the use of benzol in industry is a substantial and important hazard. No one, I think, doubts that in such processes where benzol can be replaced by other substances, it should be done. Where it cannot be replaced, I think most of us are agreed that exhaust ventilation of a high degree, respirators and so on, will help materially.

I think perhaps one of the most valuable by-products of the whole study on spray coating has been the growing recognition that the positive pressure respirator is the only kind of value for more or less continuous use. In addition to these things, just one word as to the ventilation. Mr. Gumaer brought up the question of upward and downward ventilation. Some of you will recall that this entire problem arose for action at one of the meetings of the National Safety Council as a result of the argument as to upward or downward ventilation between Mr. Horan and Mr. Paine.

I think we feel now that that is a thing that depends on circumstances. They were both right. Whether you use upward or downward ventilation depends on the temperature at which the process is conducted and other local conditions.

Whatever you do, you must have adequate medical supervision. The standards we suggested for that are available. They may be too high for practical use, but they are the standards which I think are necessary for safety. As to the new

problem, there are several ways in which, it seems to me, this subject can be approached. In the first place, I am entirely convinced that it would be sound to have the practical side of this subject reviewed to make use, as Mr. Cook suggested, of the records that have been accumulated from the increased number of examinations; to study with great care in the field such conflicting plants with conflicting results as those of which Professor Hamilton spoke. Such a field study I think would be of the greatest value, and it might help to explain a great many things we do not know.

In the second place, as Mr. Gumaer said, it would be very desirable to conduct more extensive animal experimentation—along three major lines. The question of impurities I am not sure of, myself. As Dr. Smyth suggested, it is a rather academic question, but that could be quite completely solved by animal experimentation within a reasonable period of time. Also, in the question of individual susceptibility, much light could be thrown on it by animal experimentation. The effect of diet, alcohol and other conditions upon benzol poisoning should be worked out. Finally, as the third of these rather obvious laboratory problems, there is the question as to what happens in recovery, what happens after? We do not know anything like enough as to the process of recovery in animals or human beings.

Besides those studies, field surveys might be undertaken. If they are, I think it would be of great advantage, in the first place, if the National Safety Council should undertake a field study of what is developing in plant experience. It would be of great advantage to have any laboratory study carried on in intimate connection with that. It would be far more effective if correlated with it and if placed under the direction of the same body. I think that funds are likely to be provided for this laboratory research.

Again I mention, that would be invaluable if tied up with a field study which I think this Council is so well equipped to make. If either of those investigations—field study or laboratory study—is to be made, funds will be needed. We were over-optimistic in estimating our funds in the other study, and did not allow enough to do it as thoroughly as we wish it could have been done. These things cannot be done without money.

One other point in closing. I do not think the Council will undertake these things unless the funds are available, and if it does undertake them, I think the studies should be set up under a committee which is constituted somewhat as the original Benzol Committee was constituted, to represent the various parties interested, with scientific experts, individual industrial experts and insurance experts on it. But the members who represent these various interests should be carefully selected so that we are quite sure they are going to face whatever facts are brought out in the investigation. I speak of that because the Council has experienced serious difficulty with other committees where they were set up on a political rather than a scientific basis.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Construction Section

New Section Officers

General Chairman—W. R. RICHARDS, The Associated General Contractors of America, Inc., Washington, D. C.

Vice-Chairman (In Charge of Publicity and Statistics)—J. WILSON ROBINSON, Everett Winters Company, Detroit, Mich.

Vice-Chairman (In Charge of Slides and Membership)—EARE F. TUCKER, United Engineers and Contractors, Philadelphia, Pa.

Vice-Chairman (In Charge of Program)—W. A. DEARBORN, Federal Mutual Liability Insurance Company, Boston, Mass.

Vice-Chairman and News-Letter Editor—GEORGE WIDUA, Woods Brothers Construction Company, Lincoln, Nebr.

Secretary—CHARLES H. BLACK, Stone and Webster Engineering Corporation, Boston, Mass.

Poster Committee Chairman—ROBERT MCKINLEY, General Accident Fire and Life Assurance Corp., Ltd., Detroit, Mich.

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Executive Committee: THE OFFICERS AND

W. F. AUSTIN, President, W. E. Wood Company, Detroit, Mich.

W. G. WHEELER, Building Trades Employers' Association, New York City.

W. F. TUBESING, W. F. Tubesing Company, Milwaukee, Wis.

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October 1, 1928**E. C. HARDING, Chairman****General Superintendent, Ferro Concrete Construction Company
Cincinnati, O.**

The joint meeting of the Construction Section at the Seventeenth Annual Safety Congress with the Building Trades Employers' Association of the City of New York was called to order at one-thirty o'clock by the chairman, E. C. Harding, General Superintendent, Ferro Concrete Construction Company, Cincinnati, Ohio.

CHAIRMAN HARDING: It is indeed very gratifying to me, and I know it is to the other officers of the Construction Section, to see this large assembly. It is, indeed, a very representative turnout and I am sure the Construction Section welcomes you to this Congress. I want to invite you all to our other sessions which will be held Tuesday morning and Wednesday morning at nine-thirty. I urge your attendance.

Our address of welcome this afternoon will be given by Mr. Walter S. Faddis, President, Building Trades Employers' Association of the City of New York.

Address of Welcome

By WALTER S. FADDIS**President, Building Trades Employers' Association of the City of New York**

As president of the Building Trades Employers' Association I bring you welcome from that organization. We are glad to see you and we invite you to use our beautiful rooms at number two Park Avenue, as if they were your own. If we can acquaint you with our beautiful, progressive city in any way, our time is yours. We congratulate you for having chosen the time and the place of your deliberations when much of beauty and joy can be had for the asking.

We heartily commend your spirit of public service in seeking to lessen the grievous physical pain and the great financial loss caused by accident. The construction industry is considered to be an extremely hazardous one, from the moment the wrecking contractor turns loose the men whose job it is to break things down, up through all the various stages of excavation and construction until the last bit of dust is swept away. Only through extreme vigilance by everyone, and the best of equipment, can accidents be prevented, with their constant loss of health and time.

Alive to this situation, the Building Trades Employers' Association has organized a safety department to conduct a campaign among the membership for the purpose of educating all concerned in proper safety measures to lessen the severity of accidents on buildings. The committee functions through a department, with men prominent in the industry in control. They devote considerable time to this work, which will be outlined by Mr. Lohmann, who is to make an address before you tomorrow.

There is a meeting in Philadelphia today of seven thousand bankers who will discuss credit requirements. There are two thousand men meeting in New York today to discuss postponement of old age. A strict adherence to the demands of the former and the advice of the latter will greatly enhance our safety. After a lifetime of very active participation in the industry, thirty-seven years of it being in the construction end in this city, no one can appreciate the most advanced means to lessen distress among my fellow workers more than I can.

As a man, I singularly regret the loss of dear friends through momentary

forgetfulness. As an employer, I see the great benefit from continued service in teaching safe methods of scaffold building, the proper placing of ladders, and so on. While fully appreciating all the work that this Council has done and is doing, I hope you will not resent a word of caution. Do not add to our present burdens by making further restrictive and mandatory laws. The old maxim says, "He is governed best who is governed least." Accident prevention can be advanced by education, cooperation, and efficient supervision, teaching men to act and think safety, until it becomes instinctive and characteristic. This will cause more progress in this direction than the passing of mandatory laws and codes.

I bid you welcome.

CHAIRMAN HARDING: Mr. Faddis, we appreciate your invitation. The next speaker will tell us "How the architect can contribute to safety"—Mr. R. H. Shreve, President of the New York Building Congress, New York City.

Architects' Cooperation in Safety

By R. H. SHREVE

President, New York Building Congress, New York City

It is my privilege on behalf of the New York Building Congress to extend to you a hearty welcome to New York and to wish you success in your activities here.

In order that the welcome which I am allowed to express may come to you with full effect, I should tell you that the Building Congress embraces in its membership representatives of all the elements of the Building Industry of this city,—architects and engineers, builders, sub-contractors, material supply men, labor, the real estate operators and the financial group. The Congress is the only organization active in the Building Industry of New York in which all the essential factors meet on common ground, and from all of these elements of the Industry I bring you greeting.

During the past few years, the Congress Committee on Safety, of which Alexander Kelso is chairman, has actively cooperated with the Safety Committee of the Building Trades Employers' Association, for whom Mr. Faddis speaks to you.

Mr. Faddis urged that no mandatory provisions be placed upon the industry. Whether specifications can be considered mandatory or not, I shall leave to Mr. Faddis. The architects are not convinced that the final truth is in either of these. We see merit in both.

At a recent Congress luncheon the Hon. James A. Hamilton, the Industrial Commissioner of the State of New York, addressed us on "Safety and Accident Prevention." Throughout all recent efforts to promote the cause of safety the Committee of the Congress has been among the leaders, but there is still much to be done, and I have been asked to state in what way the architect may contribute to this work.

Until recently, individually, in actual practice we architects have not done very much. The complexities, the dangers of building have increased faster than the provision by architects of safety precautions.

We have been participants in the discussions with which you are familiar, on the merits of codes or laws as opposed to education as means to assure safety. We are unable to agree fully with either extreme contention;—in our judgment the best results must finally be obtained by the adoption of both methods.

A great majority of the causes of accidents lie in the failure of the human element. To remedy this there must be education, training, discipline and intelligent supervision, but all of these must be based on suitable standards. Education must have its text-book, training its manual,—discipline its code,—and supervision its standards and tests; back of them all must be system, control,—coordination.

This need is fully recognized today by those who understand the tremendous financial losses occasioned by accidents in construction, losses due to death or injury of the workmen, losses due to insurance carried to cover excessive risks, losses through necessary medical care, through destruction of material and interruption of construction schedules, or through turnover and disorganization.

All of these are important, but above them rises the cause of humanity. How many of us who prepare drawings or specifications, contract for work or supervise its execution, picture ourselves in the places of the men who daily face the risks of the building, men who carry steel to giddy heights or blast the solid rock from beside our careless pathways. What if we had to do that which we set them to do? Would we then fail to provide protection to the utmost limit? And shall we now deny that protection to them? My own sympathy and understanding go out fully to Labor which, in the absence of other compulsory protection, seeks the help of the law. To do these men justice and to provide reasonable standards before we are perhaps saddled with unreasonable ones, we should seek effective action as you are to do at this session of the National Safety Council. With this purpose the Committee on Health and Safety of the American Institute of Architects, of which Mr. D. Everett Waid is chairman, is preparing through the assistance of Mr. Rudolph P. Miller, the committee's consultant, a statement or specification of safety standards.

This set of requirements will be put forward as a part of the General Clauses of the Standard Specifications of the American Institute of Architects and can be made applicable to all work on which it is intended that it shall be effective. It should supersede the less complete clauses now in use,—and afford a basis for fixing responsibility for the maintenance of proper working conditions and practice.

As architects, we believe heartily in the work you are undertaking and we pledge our cooperation in this endeavor to the workers, to the American Engineering Standards Committee, to the Association of General Contractors, and to you, the National Safety Council, in a task in which the cause of humanity works hand in hand with economy.

CHAIRMAN HARDING: The chair will make a change in the order of our program. One of our speakers has to leave to catch a train. Our next speaker is one who has devoted years in the cause of safety and I take pleasure in presenting the Hon. James A. Hamilton, Industrial Commissioner of the State Department of Labor, New York City.

The Economic Value of Safety to the Contractor

By JAMES A. HAMILTON

Industrial Commissioner of New York State

The title of this paper does not, I am sure, suggest to any one present the idea that safety is of economic value to the contractor only. All of us recognize the economic importance of safety to all employers. The achievement of safe production is a problem common to all industry. This is witnessed to by this Seventeenth Annual Session of the National Safety Council under whose auspices we are today gathered. The roll call of the more than twenty different sections, extending from "Automotive" to "Woodworking," into which the National Safety Council is divided, is evidence of the fact that there is no field of modern activity exempt from the necessity for consideration of the safety problem.

The rather elaborate subdivision, as indicated by the numerous sections of the Safety Council, of the question of accident prevention is indicative also that the problem is being analyzed in such a way as to develop it to a degree that would

be impossible without such subdivision. "Divide and conquer" was a maxim of Napoleon, and it holds true in this matter of accident prevention just as it was proven true in military affairs by the great Corsican. Although the general objective is much the same, namely, safe production for all industries, yet the methods of attack are far from being the same. The specific hazards of each industry, the materials handled, the composition of the working personnel, and other features peculiarly incident to one industry as contrasted with another must be considered if effective progress is to be made in the prevention of accidents.

Effect of Compensation Legislation

It might also be pointed out here that the enactment of workmen's compensation legislation, now well nigh universal, was designed to bring economic pressure upon employers to bring every effort to bear for the attainment of safety in industry. This legislation has, of course, an humanitarian aspect. With some employers humanitarian motives had been a sufficient inducement for safety even before workmen's compensation laws were enacted. But general recognition of the necessity for bringing a distinct economic pressure into play, which would apply with equal force to all employers, led to the enactment of compensation legislation which reenforced humanitarian motives, where such existed, and supplied the missing incentive for safety work where it did not exist. Employers who had previously been interested in safety work welcomed such effective support for their activities, and the others have, with rarely an exception, come to accept it as a necessary factor in industrial life.

Relation of the Contractor to Safety

Turning from the general aspect of the question, what specific value, if any, does safe operation have to the contractor? Is his safety problem differentiated in any way from that of other employers? Evidently, the Safety Council thinks so, as witness this luncheon session under the auspices of the Building Trades Employers' Association, and the sessions on Tuesday and Wednesday with detailed programs on safety in construction work.

Some Facts on the Accident Situation as Related to Contractors

First, let me give you a general picture of the accident situation in New York State. I quote first the figures as to compensated cases only in New York State for each of the four years ended June 30, from 1924 to 1927. This indicates an annual increase, but it should be borne in mind that the reduction in waiting period from two weeks to one week, which became effective on January 1, 1925, greatly increased the number of compensated cases for temporary disability.

TABLE I
Number of Compensated Accidents by Year of Closing

Year ending June 30—	All disabilities	Death	Perma- nent total	Perma- nent partial	Temporary
1924	72,983	1,109	22	15,526	56,326
1925	76,216	1,302	50	16,000	59,064
1926	*99,673	1,110	41	17,327	*81,195
1927	*98,984	1,042	41	18,518	*79,383

*Reduction in the waiting period from 14 to 7 days brought a large additional group of cases under the law.

The second table breaks up the total figures into industrial groups. It will be of especial interest to you to note that the "Construction" group had a greater increase in compensated accidents than any other.

TABLE II
Increase in Compensated Accidents by Industries

Industry	Number of Cases Year Ending June 30—				Increase (Decrease*)
	1924	1925	1926	1927	1927 over 1924
All Industries	72,983	76,216	99,673	98,984	26,001
Manufacturing	32,533	31,254	41,245	39,837	7,304
Construction	13,361	15,632	20,464	21,606	8,245
Transportation and public utilities.....	13,654	13,561	17,627	16,666	3,012
Trade	5,931	6,759	9,218	9,167	3,236
Service	5,589	7,030	9,091	9,559	3,970
Mining and quarrying.....	688	762	970	981	293
Agriculture	458	519	684	752	294
Other	769	699	374	416	*353

The third table furnishes information, for the years 1924 to 1927, by industries of the serious compensated disabilities. In this table, the "temporary" disabilities are omitted, while fatal cases, and permanent disabilities, whether total or partial, are included. Here, again, it will be seen that "construction" accidents had a greater increase, both in number of accidents and in amount of compensation awarded than any other group.

TABLE III
Cases Other Than Temporary Disabilities

Industry Group	Number of Cases Years Ended June 30—				Increase (Decrease*)
	1924	1925	1926	1927	1927 over 1924
Manufacturing	8,169	7,403	8,148	8,412	243
Construction	3,000	3,702	3,974	4,491	1,491
Transportation and public utilities.....	2,617	2,688	2,741	2,890	273
Service	1,298	1,562	1,745	1,880	582
Trade	1,165	1,343	1,485	1,587	422
Mining and quarrying.....	161	190	192	200	39
Agriculture	92	126	139	126	34
Other	155	138	54	15	*140

Total Compensation					
Manufacturing	\$8,127,670	\$7,709,239	\$7,550,524	\$7,953,668	*\$ 174,002
Construction	4,469,493	5,414,513	5,509,944	5,942,520	1,473,027
Transportation and public utilities.....	3,974,263	4,030,334	3,852,453	3,439,401	*534,862
Service	1,780,802	1,902,551	2,120,392	2,187,196	406,394
Trade	1,296,786	1,580,538	1,583,386	1,462,170	165,384
Mining and quarrying.....	356,977	352,455	429,881	441,207	84,230
Agriculture	109,084	153,112	167,218	132,176	23,092
Other	155,715	130,785	39,689	14,555	*141,160

I thoroughly appreciate the fact that safety in construction work presents peculiar problems. An ordinary manufacturing establishment has a fixed place of work and much greater routine in its operations than does a construction job. These conditions tend to render easier the working out of a safety program. I do not need to stress this point since the difficulties of perfecting a safety program amid the constantly changing conditions which confront you, are only too apparent. The message I would like to leave with you is that the problem of safety presents a challenge that should summon your ingenuity and sustained effort. And I also offer a word of congratulation on the efforts you are now making. You have realized as never before the seriousness of the problem and are engaged in what, I am sure, will prove the most successful effort yet made to produce safety in the construction industry.

CHAIRMAN HARDING: Thank you, Mr. Hamilton. Now we will hear from Mr. John Sullivan, the President of the New York State Federation of Labor.

Address

By JOHN SULLIVAN

President, New York State Federation of Labor, New York City

Organized Labor is a thorough believer in organized safety methods for industrial work places. It is impossible to conceive of any person having more interest in industrial safety than the employee. The entire hazard of workplace danger faces him. When the disaster comes it is the employee who receives its first and fullest impact and who is the last to recover from its evil effects.

This is an elementary fact quickly driven into the consciousness of those who must earn their bread in the sweat of their brows. It is most quickly realized in the construction trades where accident so frequently attends its processes, almost all of which are in the open air and often above ground surfaces. Within the factory and in the underground trades the frequency of accident, notwithstanding the greater opportunity for control of ways and means, usually keeps the possibility of disablement before the worker. Long contact with impending danger sometimes creates the indifference which leads to the careless act that invokes injury and death.

Thoughtful workers are keenly aware of and fully estimate all of these hazards that surround them in their employment, and seek by individual and by collective action to minimize them. They suggest and concur in shop rules that make for safety, and in their organized capacity propose legislation to make ways and means compulsorily safe by law. It will not be disputed that the interest of the organized workers in the safety of all workplaces is chiefly responsible for the laws and codes now operating to safeguard workers in all occupations affected with danger to life and limb. It has been the principal work of the organization of which I have the honor to be president to seek during the 65 years of its existence statutory law prohibiting or regulating workplace practices that were found by the workers to menace life and limb and health. Yet, notwithstanding all this desire to prevent and effort to limit, it is acknowledged that industrial accidents are still common happenings and the army of the crippled and widowed and orphaned is being added to every day.

Any continuous period of experience with workplace accidents and of genuine effort to reduce the most apparent causes teaches us that vigilance must be constant if results are to be gained and maintained. In fact, there are no absolute methods of accident prevention that, once devised and set in motion, perform their humane mission automatically. Complete suspension of workshop activities is the only absolute assurance of absence of workshop hazards. None of us want to purchase

immunity from accident at such a price. As an alternative we have created Workmen's Compensation Laws, the double purpose of which is to promote prevention of accidents and to compensate the victims of accidents whether preventable or not. Cooperative carefulness by employees and management supplemented by mechanical safety devices can and do reduce the causes and totals of factory accidents. A wider and more sustained cooperation will assuredly add to these beneficial results.

No one any longer accepts workshop accidents as inevitable. At one time they were considered as acts or omissions of a Divine Providence. Now we are coming to recognize clearly that many of them are due to human improvidence. A particular accident at its first occurrence may involve no personal fault, but its recurrence in the same workplace usually does. Where the fault is originally in the ways, works or machinery, its recurrence is plain negligence and thus becomes personal fault. Without inquiring as to whether personal fault is attributable to either an employer or to an employee in any given instance, we can all join in the conclusion that personal fault can and should be corrected and stay corrected. Such a correction is a task of cooperation, and such corrective cooperation is a mutual duty.

Much as we who are engaged in industry wish and work for that ideal and practical form of cooperation where all workplace problems can be considered and solved in conferences between employers and employees, still there is a function for government to perform in assuring workplace safety that is apparently indispensable. Our state factory laws and codes and protective statutes have been enacted almost wholly to safeguard the life, limb and health of workers against the ignorance, indifference or greed of a class of employers that is happily diminishing.

Enlightened and humane employers greet these laws as allied forces in accomplishing workshop safety. By imposing equally on all competitors in an industry workplace conditions conservative of life, limb and health, the pernicious effect of degrading competition is largely overcome by such laws. Their value as allies of workshop safety resides entirely in the quality of their enforcement. If they are poorly or partially enforced, then the employer who observes them in principle and practice is deprived of the shield of the laws against evil competition, while masses of workers are bereft of their protection. Full enforcement of such safety laws and codes is of vital importance to the aims and purposes of this gathering. Departments of Labor charged with such enforcement can only be effective when fully supplied with competent agencies.

No labor organization will absolve any worker who contributes to accident or risk by personal carelessness. We hold that every worker should not only do all he can to prevent and avoid accident, but that he should bring to the attention of those who have the power to remedy it any violation of the safety laws and codes occurring in his place of employment. We encourage the doing of this as a contribution to efficient enforcement of the Labor Laws we have secured. We hold that worker to be culpably negligent who refuses to employ the safeguards provided for the power tools he uses, and to be morally responsible if his indifference or intentional neglect causes the disablement or death of a fellow worker.

On behalf of the New York State Federation of Labor and its hundreds of thousands of employed members, it is my privilege, as its president, to pledge to you that we are anxious and willing to continue to do our full share in making all workshops as safe for the worker as human foresight and carefulness will permit.

CHAIRMAN HARDING: Thank you, Mr. Sullivan. I am sure that the Construction Section wants to convey their thanks to the Building Trades Employers' Association for this afternoon's session and especially to Mr. Wheeler, who is responsible for the program. I trust we will see you all in the morning.

ADJOURNMENT.

October 2, 1928

E. C. HARDING, Chairman

**General Superintendent, Ferro Concrete Construction Company
Cincinnati, O.**

The second session was called to order at nine-thirty by the chairman, E. C. Harding.

CHAIRMAN HARDING: We will take up the reports of the committees. Mr. Robinson, the secretary, who also has charge of the statistics will give us his combined report.

Report of the Secretary and the Statistics Committee

By J. WILSON ROBINSON

Everett Winters Company, Detroit, Mich.

As the Executive Committee did not have a meeting this year, there is no report along that order. The only thing we have is a report on your membership. From the last Congress up to the present seventeen memberships have been accepted and eighteen cancelled, so that our membership at the present time stands one less than it did a year ago, giving us a total of one hundred and twenty. The year before it jumped from ninety-six to one hundred and twenty-one, and we have contended right along that the requirements of this section were a full time paid secretary who can give his full time to the business of meeting members and seeing that they get something out of belonging to the National Safety Council.

We regret to say that this has fallen through. Last year we reported to you that the Council had appropriated the necessary funds and it was a question of finding a man for the job. It seems we were having some trouble to do this.

On statistics I have brought a summary which goes back several years so that you might make a comparison based on the hours worked and lost, per thousand hours. In 1922 the members of this Congress recorded that they had lost 49 9/10 hours; in 1923 it dropped to 47 9/10 hours; in 1924 to 46 4/10 hours; in 1925 it jumped to 57 1/10 hours; in 1926 it dropped back to 55 4/10 hours; last year, 1927, it was 49 2/10; so we have an average for the six years of 48 6/10 hours lost every thousand hours worked.

That is based on the man-power worked, as shown by the records of twenty-nine million and some over, as against one million hours worked, giving 64 6/10 for every thousand hours worked. It may seem from these records that we did not make much progress in 1927; but when you take into consideration the difficult factors with which we contended in the construction field, you will find that if the effort had not been put forth which has been put forth during the last five or six years along the line of accident prevention, it would be hard to tell what the ratio would have been for last year.

Take into consideration the great expansion of the automobile industry, which has led the field along the construction line, and has forced other industries into that same pace. This means that if an owner contracts with you today he expects a building built tomorrow, and the result is that you have your carpenters, and all others, working on night and day shifts. Taking those factors into consideration one can see the hazards have at least doubled and probably trebled, because there is no question but that men working at night are working under more hazardous conditions than in the day time. So that I may say, even though it does not appear on the surface that our records for 1927 are favorable with other years,

yet a good deal of it can be accounted for in the way I have just mentioned.

CHAIRMAN HARDING: Thank you Mr. Robinson. Would anyone like to ask Mr. Robinson any questions? If not we will call on Mr. Almstead.

C. H. ALMSTEAD (Safety Engineer, Patent Scaffolding Company, New York City): The Publicity Committee reports slight progress. I cannot give the exact amount of progress, but I want personally to compliment Mr. Wheeler of the Building Trades Employers' Association for the splendid cooperation and publicity given the meeting of yesterday, and I hope we can depend upon the Building Trades Employers' Association for the same kind of support we had yesterday.

CHAIRMAN HARDING: I hope so too, now that we have them interested. I will now call on Mr. Widua.

GEORGE WIDUA (Supt., Safety Dept., Woods Brothers Construction Company, Lincoln, Nebr.): As news letter editor of the Construction Section I would like to report that we have published seven news-letters for our members and in every one we have asked for suggestions from the members to help better the letters. I want to thank the members who have contributed to the *News-Letter* this year and hope next year our *News-Letter* will be better and bigger.

CHAIRMAN HARDING: I think you deserve a lot of credit for the issues, particularly the last one, because it was very complete. Now we will hear from Mr. Black, chairman of the Poster Committee.

Report of the Poster Committee

By CHARLES H. BLACK

Insurance Manager, Stone & Webster Engineering Corp., Boston, Mass.

My experience has been very interesting and enjoyable. In obtaining the proper personnel for the committee, I felt that it was quite necessary to select persons who would offset my inexperience in the preparation of posters applicable to construction work, and thanks to Howard L. Cates, Ralph Pendleton and S. J. Steinmann, and to their employers, the Employers' Liability Assurance Corporation, of the Massachusetts Safety Council and the Indemnity Insurance Company of North America, I was very fortunate in having them serve as co-workers on the committee.

We endeavored for a time to persuade some of the contractors in greater Boston to allow their employees to serve with us and furnish construction posters, but we finally gave up trying to secure additional members because we were losing time.

Our being unfamiliar with the system of poster preparation followed by the headquarters of the National Safety Council proved somewhat discouraging at first. We were not certain how much expense should be incurred in the preparation of posters or what would happen to the prepared posters sent to headquarters. It seemed as if everything we thought would make a good poster has been previously used in a similar manner. We hesitated to send in our ideas because we felt they lacked originality. We appealed to contractors with whom we were acquainted for poster suggestions but we obtained nothing. Very few of the contractors made use of posters to any great extent and those that did were satisfied with the posters obtained from the National Safety Council.

The situation looked dark when Howard Cates, with the assistance of his co-workers in the Employers' Liability Assurance Corporation, prepared three posters. We felt that these were very good and that they should be sent to headquarters. We understand that the General Poster Committee accepted them and that they will be used in the future. This approval by headquarters gave courage to your committee.

Shortly afterward, the Massachusetts Safety Council sponsored a contest among

Massachusetts construction jobs and distributed copies of the picture displayed on the rack in this room. Considerable enthusiasm was shown by construction men, and although this contest was not started to aid your poster committee it did aid considerably and paved the way for us to approach the bosses of the jobs for permission to take pictures. A great deal of credit is due Ralph Pendleton, of the Massachusetts Safety Council, a member of our committee, for the preparation of this contest. Through Mr. Pendleton's efforts material was sent to the National Safety Council for display, and, at his suggestion, General Series Bulletin No. 2151-B, showing National Safety "17 Things Wrong In This Picture" was recently published in the *News*. Mr. Steinmann solicited material from many in his territory and drafted letters to members of the Construction Section, requesting new ideas. Just how much material reached headquarters we don't know—only the display at this Congress will tell.

Many of the old "standbys" of our section gave valuable suggestions. Once again Howard Cates, our good friend, and the Employers' Liability Assurance Corporation, came to our assistance. Mr. Cates shortened his vacation, and with the assistance of Mr. MacNeil, also of the Employers', spent a number of days in securing photographs, twenty-three in all, of the safe and unsafe practices on construction jobs. Their labor did not end then; they prepared ten fine posters which are displayed there in original print to be later made up for distribution.

As an inexperienced committee we feel that we were not altogether dormant, but we should like to have done more. We feel that we accomplished something at very little expense to our employers and to the National Safety Council. The securing of poster material applicable to construction activities is a problem. It is serious enough to warrant some action at this meeting which will bring about more assistance to your next year's Poster Committee.

The area over which the construction industry extends is, without doubt, one of the greatest of any section meeting here this week. Its operation is not staple as a mill, a public utility, railroad, etc. Its activities are changing from day to day. The members of a Poster Committee cannot always find the particular example suitable for safety poster material in its neighborhood and the average contractor does not wish to be annoyed by having posing photographs taken on his job.

Because of my experience this past year I wish to give our next year's Poster Committee the benefit of my observations and I feel that it is necessary to recommend the following:

First; the responsibilities of the Poster Committee would be greatly lightened if all of the members of the Construction Section would cooperate.

Secondly; through the results obtained from circular letters it does not seem that they are worth while; the personal contact is necessary.

Third; a large committee is more preferable and its personnel should be selected from various sections of the country.

Fourth; the individual members of the Poster Committee should act as sub-chairmen with a committee of their own and they should exert every effort to obtain poster material from the contractors in their immediate neighborhood.

Fifth; the sub-committees should operate through their chairman and this chairman in turn should operate through the chairman of the Poster Committee, of which he is a member.

I believe that better results would be obtained if some of the members attending this meeting would volunteer to serve on the Poster Committee and act as chairman of a sub-committee for his section of the country.

It is practically impossible for a poster committee to efficiently carry on without cooperation from all our members and it is the duty of each one who is not engaged in other duties in our section to volunteer his services as a committeeman.

or a sub-chairman. With such assistance I feel that your next year's Poster Committee will have the finest record ever and will set an example for the other sections of the National Safety Council to attain.

In closing I wish to thank all those who sent us material, particularly the Employers' Liability Assurance Corporation, the Indemnity Insurance Company of North America and the Massachusetts Safety Council, for permitting Messrs. Cates, Pendleton, Steinmann and their other employees to come to our aid.

CHAIRMAN HARDING: I think you are to be congratulated on the fine work that you and the Poster Committee have done during the past year. Since there are no more reports we will hear our first speaker of the morning, Mr. H. W. Lohmann, of the Building Trades Employers' Association.

Safety by New York Contractors

By H. W. LOHMANN

Chairman, Committee on Accident Prevention, Building Trades Employers' Association, New York City

I have been requested by the Building Trades Employers' Association of New York to address the National Safety Council on "Safety in building construction by New York contractors." No one familiar with modern building construction can overlook the growing importance of this factor in the protection of human life.

We hear a great deal these days of the increased number of building construction accidents in this state over a period of years, but we hear little as to the principal contributing causes for that increase. Statistics are apparently not available to show that the main reasons may not be for such causes, for instance, increased production or the haste in which a modern structure is oftentimes erected, so for present purposes, at least, we must be content with the bare facts as published in the reports of the Department of Labor, which certainly do show an upward trend.

We also hear much of the great dangers connected with the work, and incidental thereto and the necessary methods to be applied to eliminate them, about which I will direct my talk today. We all know that building construction is hazardous and will continue to be so. The first steps in any of the various jobs in the erection of a building are usually dangerous but, I believe, that dangers in the ordinary progress of the work have been overestimated, especially as far as the immediate future is concerned, and I say this advisedly.

The cardinal principle of American business men has been to reduce waste, and as they, either individually or through their association activity, gradually eliminated the main source of it, they directed their attention to the less conspicuous ones. Many large industries, influenced by legal, humanitarian and financial reasons, adopted organized safety methods with astonishing results in the reduction of accidents and accident costs, and proved that accident prevention eliminates human and economic waste. These definite results are sufficient in themselves to justify concentrated safety activities in the building industry, which has and still is suffering a real but unnecessary economic loss due to the establishment of its unfavorable accident record.

It has been said that the test of any big business is in honest competition, integrity, usefulness of purpose, elimination of waste and freedom from unnecessary encroachments, rather than the size of the business. Building contractors, representing an industry which is the backbone of the nation's progress, would not be measuring up to that standard of business men, which they are, if they

did not profit from the experience of other industries and seek to do all that can be done to combat this increasing business disadvantage.

Waste from building construction accidents in the past was passively accepted by the contractor as inevitable. "A worker killed for every floor" which was a current saying a short time ago, is now considered as plain bunk. Preventable accidents on buildings is a challenge to the brains and courage of contractors and any endeavor by them in safety work is bound to pay good profits in dollars and large profits to the industry as a whole in the saving of man power and the relief of human suffering.

The Building Trades Employers' Association of New York, spurred to action by the increasing number of accidents with resultant loss of life, suffering and misery following in the wake of these casualties, and because of the remarkable success of other industries which blazed the trail along this line, decided that it should extend its activities to include accident prevention among its membership for their mutual welfare and the good of the industry. Frankly, our members do not retain their membership for philanthropic purposes, but rather for business reasons with the expectation of a return in some form, which we hope to give them. In the past they have concerned themselves more with the harmonious conduct of their business and business relations rather than with safety. It is true, that some of the more progressive ones realized the advantages of safety years ago, and have practiced it each through individual effort with some very remarkable results. Reduction of accidents by members of the Building Trades Employers' Association, through their own efforts, has been substantial but, regardless of it, accidents in the industry have increased, as is evidenced by statistical reports and the increase of insurance rates. The need for an organization movement became apparent—team work was necessary for effective results through a well directed campaign to reach all classes of contractors.

The association organized a committee known as the committee on accident prevention and provided for an annual appropriation to defray its expenses. It is composed of seven members, four representing general contractors and three sub-contractors. Sub-committees were appointed for each of the twenty-six affiliated trade associations, whose duties are to bring all matters on safety requiring attention to the notice of the general committee and to advise on matters pertaining to their trades. The committee serves gratuitously but has employed an executive secretary to direct the detailed management. It has been functioning since October 1st, 1927, and holds its meetings twice a month. A study has been made of local conditions and the requirements for conducting a continuous safety campaign, which will follow prescribed safety methods.

An appeal has been made to our members for safety, both from the humanitarian and economic side, and the contractor who does not believe that safety is his paramount moral duty readily appreciates it as an economic necessity. New York contractors, through our efforts, are now more or less sold on this matter of safety, and, it is believed that when they have all been instructed in the approved methods for building up their organization for carrying on accident prevention, it is an assured fact that they will make an honest endeavor to eliminate this class of waste as unworthy of the industry, and place building construction into the sphere where it belongs.

In my humble opinion safety measures have not kept pace with the stupendous increase in the size and height of buildings wherein all possible hazards are encountered and which requires the formulation of entirely new methods of protection. Formerly, safety measures were left entirely to the discretion of the superintendent on each job and if this man was careless or indifferent, nothing was accomplished. In recent years, however, many of the large construction firms have given considerable study to this problem and their executives have planned and have personally gone into this matter, made detailed scientific studies

of methods by which the greatest degree of safety can be obtained for each branch of the industry and prescribed safety measures that must be followed by their administrative force, inside superintendents and their superintendents and foremen on the building.

Realizing that "first things come first" our pamphlet No. 1 was "Accident Records—How to Compile Them and How to Use Them," and was based on the standards of the National Safety Council. Provision has been made for members reporting their accidents annually directly to the committee for the purpose of compiling statistics, which will be published in a report similar to that of the council.

Safety work in building construction, to be effective, must be directed toward its two main elements, namely, safeguarding and education. The burden of responsibility for accidents to workers is placed upon the employer of labor by the compensation law, while the erection and maintenance of safeguards are mandatory on contractors, each for his own employees, under the labor law and industrial code of this state. It has been estimated that the lack of physical safeguards and the improper maintenance of them accounts for twenty-five per cent of the major accidents on buildings. Most of these accidents are preventable and can be eliminated provided that all contractors comply with the requirements of the code. Accidents occurring through a violation of these rules are, in most instances, inexcusable and directly chargeable against the industry.

The contractor who is honest and careful, in the business to stay, and who erects and maintains safeguards on all his jobs, and has an active accident prevention organization can be relied upon to continue that work regardless of assistance because he knows that it pays. But there are two other classes which require real attention if accidents are to be substantially reduced. They are as follows:

1. The so-called speculative or owner-builder, not in the business to stay, and who knows little or nothing of accident prevention or the requirements for safeguarding.
2. The contractor, who may term himself a general contractor, but who either does not know how to erect safeguards or will not do so on account of their cost.

The committee is interested in reaching both of these classes, but when it is realized that over fifty per cent of the building in the metropolitan district is done by the former class, who belong to no association, the problem of how to effectively reach him is readily appreciated.

Building construction work with its constantly changing conditions is hazardous employment. New hazards quickly appear and alertness must be ever present to prevent accidents. In manufacturing plants, due to the more or less stable conditions, an accident may be practically eliminated by the installation of permanent safeguarding equipment. A similar safeguard in a building under construction may shortly have to be removed on account of progress. Again, workmen may remove guards, either in the course of their regular employment or to use elsewhere for a similar purpose and they are not immediately replaced. An improper safeguard, or one not maintained, creates a new hazard. Accidents are rare where a man falls down a wholly unguarded floor opening during working hours, but falls do occur where the workman depends on a safeguard which proves either to be weak or insufficient.

It is axiomatic that faulty protection is worse than no protection at all. To explain further—where a protective measure has been installed workmen and others are depending on its being in a proper and safe condition, whereas if there is no protection such dangerous places are avoided. Take for instance, a temporary walk over areaways. The public does not examine the walk before using

it and has every reason to assume that same was built for that specific purpose, namely, for pedestrian traffic and if any knotty plank is used or the walk is poorly constructed and is unsafe, and it gives way, the accident happens, whereas if there is no walkway at all, pedestrians will avoid such places. The same thing applies in building in the covering of hatchways, ladders and the like.

The construction of a modern building, due to the many different trades on the job, is a complicated undertaking, and in order to be safely and economically carried out requires a carefully organized machine. As a matter of economy, in view of the many different contractors on the work, proper safety provisions cannot be fully expected unless the architect upon whom the primary responsibility for the operation rests, carefully specifies the safeguards to be made and by whom. Our purpose, however, is to build up a human machine rather than a purely economic system and thus increase the efficiency and productivity of the industry, and with the final and even stronger urgency on the grounds of humanity.

Upon contractors rests the secondary responsibility for faithful execution of the work and without the promulgation of sound basic safety rules for the guidance of all of them, maximum results in accident prevention will not attain. Our committee felt that the accident movement should start with the architect who really is the fountainhead, and with this in mind, prepared a safety specification composed of fifteen articles entitled "Protection and Safety Work." It was sent to contractors and architects in this district with the recommendation that the entire specification be embodied in the general specifications in all building construction, and cooperation was requested in its application and use. The adoption of this plan would definitely fix the responsibility for safeguarding on the contractors, each for his own employees, by virtue of his contract. It would not be inequitable for the reason that it would definitely place the responsibility for safeguarding upon each contractor only in so far as the protection was applicable to his work, avoiding confusion as to who should safeguard a particular piece of work, and tending to eliminate duplication in bids for the cost of such safeguarding. Contractors including this cost in their bids would not rely (as is sometimes practiced) upon the safeguarding equipment of others, thereby cutting down a prolific source of accidents caused through the removal of a board, etc., which renders a safeguard inoperative. Due to its far-reaching effects, hundreds of contractors and architects are in accord with this plan and have voluntarily signified, not only their willingness to cooperate, but their intention to use this specification in all of their work.

The committee on accident prevention came to the conclusion that if it was to do a real job the educational campaign on safety being conducted among its membership should be extended to all of the elements engaged in the work regardless of affiliation and it is continuing its work along that line. The general plan adopted is to awaken the general public, the owner, architect, engineer, contractor and the mechanic to the accident conditions that prevail and to obtain their support in the movement. A newspaper and trade journal publicity campaign has been under way for the past fourteen weeks, with the result that our entire line of activity has reached millions of readers. Fourteen of the largest metropolitan newspapers have printed stories on our work and fourteen trade journals have done likewise.

Our Bulletin No. 3 was a broadside with appropriate illustrations on the gruesome type designed primarily to awaken contractors and others to the seriousness of the present accident conditions. It was sent to members, contractors who are not members, architects, engineers and insurance companies, and the supply of 10,000 copies originally printed has been practically exhausted.

Heretofore we have sought to create an interest on the part of the employer,

but in accordance with our plans, we are now directing our attention to the employee. Our Bulletin No. 4, which is now being prepared for distribution to workmen, is our first attempt toward their education. It will graphically depict some fifteen admonitions, with an urgent plea for their cooperation in the movement. Plans are also under way to conduct a poster contest, similar to the one used in Massachusetts and Pennsylvania, to further stimulate their interest. It will be open to competition for all workmen engaged in the building trades and large cash prizes will be awarded to the winners.

We plan to hold safety meetings for superintendents and foremen of our members regularly during the fall and winter months, and we will, from time to time, issue safe practice bulletins on various subjects, such as the installation and operation of material platform hoists, arrangement of ladders, guards, etc. We will be guided by the suggestions of our members and the committees representing the trade groups, together with such other information and advice obtained through our own study including conferences with cooperating bodies whose activities are centered in building construction. We intend to continue selling cooperation in accident prevention to the employer and his superintendents and foremen and through them to the workers. We believe that we have a problem, but that the best factors in facing that problem will prove to be proper supervision and inspection, complete observance of safety requirements, installation of protective devices, exercise of care, eternal vigilance and determination on the part of both employers and employees and all associated with them that preventable deaths and accidents can and must be reduced.

The New York Building Congress, among its other activities, has a committee on craftsmanship awards, by which craftsmen are given recognition by award of certificates for high class workmanship. This has been a wonderful stimulus to the workmen in putting forth their best to do splendid work in their craft and it is my belief that superintendents should be given similar recognition on the basis of a low average of casualty which could be calculated on a man-hour basis. This would stimulate those superintendents in furthering the cause of safety.

CHAIRMAN HARDING: I think we all enjoyed that paper. We will now hear from the next speaker on our program, Mr. F. H. Westmeyer, the Insurance Manager for A. Bentley & Sons Company, Toledo, Ohio.

Minimizing the Damage of Accidental Injuries

By F. H. WESTMEYER

Insurance Manager, The A. Bentley & Sons Company, Toledo, O.

Much has been said about the prevention of accidents in industry, a large amount of thought and effort has been given to the subject and a considerable measure of success has been achieved. Why all this thought and effort? Why this great meeting here today? The answer is, to immediately reduce and, if possible, to eventually eliminate the loss to society and the losses to individuals which result from personal injuries.

The subject needs no apology, but these introductory remarks have been made for the purpose of bringing to your minds quickly the fact that there is a very close relation between the prevention of accidents and the minimizing of losses resulting from accidents, because efforts in either direction have a common purpose. If accident prevention was wholly successful, there would, of course, be no need of discussing the means of caring for the injured. Unfortunately, however, the position of sincere and active accident preventionists is very much like the position of a certain enthusiastic golfer.

One of his friends said to him, "Bill, do you play golf?" and Bill answered "No, and I can't quit it."

Accidents still occur and a great many men are still being injured. In the state of Ohio alone, the number of injured for the first half of this year exceeded *one hundred thousand*. In the construction industry, particularly, the frequency rate is high. It is not especially difficult to understand why this is so. The reason lies largely in the fact that there are more hazards in the construction industry than in other industries. You can get some idea of the relation of hazards in construction to industrial hazards generally from this—the workmen's compensation rate manual of the Ohio Industrial Commission, which does not vary greatly in its classification list from the rate manual used by private insurance carriers, lists 590 occupations or classes of hazards. Of this number 78, which is more than one eighth of the total, are distinctly contracting operations, and 51 more are allied classes of work which are, in some few instances at least, carried on by contractors.

All these hazards; a large labor turnover; seasonal occupation; continually changing physical conditions at work that is under way; and various other conditions peculiar to the construction industry are all obstacles to successful prevention work. These obstacles, serious and discouraging as they are, should not deter us from prevention efforts; rather they should spur us on to greater efforts; but as long as men are injured, it will be necessary to care for them and to limit as far as possible the extent of the damage resulting from their injuries.

Now, what is the damage, what is the loss which results from personal injuries? Disregarding here the pain, suffering and anguish caused, because these are items which cannot be considered economically, although they should always be kept in mind, there are quite a number of items which go to make up this loss. The most important of these are the immediate loss of productive capacity of the individual injured, through loss of time immediately following the injury, and the lessening of that productive capacity, through any impairment of bodily function which may result from injury. In addition, the cost of supervising the care of injured, fees for medical and various other kinds of service, hospital and nursing costs and various lesser items must be considered. The various workmen's compensation laws provide what portion of this loss shall be borne by the employers, and that portion is borne either directly by self insurance, or by a great many employers, collectively, through the medium of insurance with privately or publicly conducted workmen's compensation insurance companies or funds. Keep in mind, always, the cold, hard fact that insurance companies or funds bear no portion of this loss; that they merely act as administrators in the distribution of it, always collecting, or at least endeavoring to collect, a respectable fee for their service.

To attempt to set forth specific rules for the care of injured and to expect such rules to fit all cases would be a useless effort. Above all other things, it is necessary to adopt the mental attitude of putting yourself in the place of the injured man and, prompted by that attitude to do for him, as far as possible, the things you would like to have done if you were in his place. This advice loses nothing either in value or practicability because it happens to be the oft repeated general advice given some nineteen hundred years ago by the greatest philosopher of all times. Amplifying this, there are certain sound, fundamental practices which may be applied, with sundry changes in detail, to all cases, and these practices will be discussed here, not in the order of their importance, but in the order of their need or occurrence.

FIRST—The acceptance of the idea that accidents will occur. This item is probably the most important of all, because if it is not a part of your scheme of management, it quite naturally follows that no plan for the care of injured will be made until an injury is actually sustained. Caring for injured, like any other human activity, proceeds more smoothly and with less error if this work is planned in advance of its execution.

SECOND—The centering of responsibility for the care of all injured in some one person and the making of some provision, as nearly perfect as possible, for the prompt reporting of all accidents to this person. A reasonable measure of authority must, of course, go with this responsibility.

THIRD—The selection of certain definite agencies for the repair of the damage wrought by accidents. This should include the selection of a doctor or doctors, X-ray man, ambulance and hospital. Having made a selection, your field force should be kept fully informed as to just what agencies are used. Arrangements should be perfected for the making of quick contacts with these agencies, and these arrangements should provide for substitutions when for any reason such contacts cannot be quickly made when needed. An injured man does not feel any better in mind or body, if he is compelled to wait, without proper attention, while those around him are wondering what to do next.

FOURTH—The presentation to your field force and the acceptance by that force of the idea that when an accident has caused a disabling personal injury, the most important piece of business at hand is the care of the injured person. Common decency suggests this, but quite aside from any humanitarian reason for promptly and properly caring for disabled persons, there is the fact that all serious accidents cause disorganization; and reorganization will not take place until the injured is removed from the scene of the accident if he is disabled.

FIFTH—Maintaining a genuine interest in the physical welfare of the injured employee, allowing him to know that you have this interest.

SIXTH—The exercise of great care in the selection of the agencies used for the care and treatment of injured. Only thoroughly competent physicians and surgeons, preferably those specializing in industrial work, should be used. If you were injured and were unwilling to have your own case handled by the doctor whom you select for the treatment of your injured employee he is, by that token, not good enough to treat an injured employee.

SEVENTH—Close cooperation between doctors and employers. This applies as well to agencies of repair other than doctors. You should be advised at frequent intervals as to the physical condition of any injured employee whose injury is at all serious, and the doctor should receive the support and influence of the employer in any measure intended for the good of the injured employee. There is an idea, prevalent in the minds of a great many people that, once a man is injured, the whole responsibility for him until his return to work should be passed on to his doctor, and that any attention to him on the part of anyone else is an almost sacrilegious infringement on the rights of the injured person or the prerogatives of the medical profession. This idea, which does a great deal of harm is, fortunately, not held by any great portion of the medical fraternity.

EIGHTH—An understanding, in a broad sense, of the purpose of workmen's compensation laws in general and a specific, detailed knowledge of the workmen's compensation law which is applicable to the particular work being carried on by you. Where the liability imposed by the workmen's compensation law is passed on to an insurance company, this does not relieve the employer of all moral obligation. It is essential that all injuries be promptly reported to the insurance carrier and it is equally important that the injured person receive, without any undue annoyance or delay, any workmen's compensation benefit due

him and no more. Keeping compensation payments within the legal limitations applies only to compensation for wage losses, for there are a great many instances where it is economical to disregard entirely the legal limitations for medical and hospital service and to go far beyond those limitations. It is unfortunate, indeed, that the present practice of insurance carriers generally, including state funds, is such that losses which might be curtailed by certain early attentions, possible only through close contacts with injured persons and the agencies of repair, are permitted to get out of bounds because of the inevitable delays always incident to remote control.

All of the practices outlined, are viewed from the standpoint of the employer and it is entirely proper that they should be, because under the modern concept of responsibility for industrial accidents, the employer is held wholly responsible and he should, therefore, not be barred from using any available means for reducing the losses from accidents, so long as the means employed do not definitely work to the harm or ultimate damage of the injured employee.

It is very difficult, if not impossible, to point out in minute detail just how the damage is minimized in any particular case or to show just where some saving is effected. There is a way of knowing, however, whether or not reductions are being effected. Records can and should be kept showing the direct cost of accidental injuries. These records should show not only the cost in money expended for supervision, medical, hospital and other service and workmen's compensation benefits to injured employees, but the time loss as well. The loss in money, considered apart from the loss in time, and the loss in time, considered apart from the loss in money, should be set against the total number of hours worked during any given period. In this way, *relative* costs may be established and comparisons made. Another method is to keep a cumulative record of the employer's whole cost of accidental injuries and a cumulative record of all payroll expenditures and compare the cost figure with the payroll figure. This method is faulty, as will be explained in a moment, but it is the only method by which workmen's compensation loss costs can be compared with workmen's compensation insurance costs. The method used by insurance carriers for measuring workmen's compensation loss experience and for fixing premium rates is to take the payroll of the employer as a basis, using each one hundred dollars of payroll as a unit of measurement. This method is wholly unreliable, because of changes in wage levels between one period and another or between one locality and another, and it should not be used if loss experience records are desired in such form that the record for one locality or for one period of time may be compared with the record for another locality or for another period of time.

So many petty details enter into the proper handling of accidents and employees' workmen's compensation claims, that a great deal more of a detailed nature might be said, but time is not available for that purpose. It is, moreover, easier to form a good mental picture from the description of some specific case, than from general rules or suggestions, so we will now follow such a case from the time of the injury.

The particular job on which this injury is to occur is a new factory building, located at the edge of the city, some six or seven miles from your main office. The site of the job is visited before a spadeful of earth is turned, and you learn while going there just which will be the smoothest route for an ambulance to take if one needs to be called. Charlie Stelker, the superintendent who will have charge of this job, is on the ground and, the job being quite remote from the center of the city, you arrange with him for the early erection of a small but clean shanty for the keeping of first aid supplies and for the reception of men in the treatment of minor injuries. This is done because it is less costly than to suffer the loss of time occasioned by men with minor injuries going down town for treatment or to take the inevitable loss following failure of men to get

proper attention to nail wounds and other lesser injuries.

You explain to Charlie that the doctor will call on him at the site of the job, at any reasonable time, to arrange with him the details for attending to minor injuries, and you ask him to make his own appointment with the doctor. Again you tell this superintendent that no injury may be regarded as trivial, although you have told him this same thing some twenty or thirty times before. He already knows what doctor will attend the injured, what ambulance will be used and to what hospital disabled men are to be sent. You remind him that as soon as his first aid shanty is up it should contain, in addition to ordinary first aid supplies, one or two stretchers or cots, and that the doctor may recommend some additional equipment. If you have not already talked with Doctors Post and Crane about this particular job, you do so without further delay and ask them to make such arrangements with Charlie Stelker, for the treatment of minor injuries, as will be mutually satisfactory. Possibly, you will make some special fee arrangement for service at this particular job.

Two or three months later your telephone rings and Jim Gridley, the time-keeper at this job, tells you that an employee, named Dave Bendel, has just fallen and appears to be quite seriously hurt. You ask whether Bendel is bleeding and, being assured that he is not, you learn that he has been picked up and placed in a fairly comfortable position. You may ask whether Bendel is conscious and whether the nature of his more serious injuries is quite evident, but you spend no time now asking about the accident. You already know that the accident has just occurred and you learn that no ambulance has been ordered. You tell Gridley that you will order the ambulance, that a man should be stationed at the entrance to the plant premises to direct the ambulance driver when he arrives, and that the ambulance driver should be directed to take Bendel to St. Vincent's Hospital.

You then order the ambulance by telephone, being careful to learn that one is actually available immediately and, when giving your order, state that Bendel should be taken to St. Vincent's Hospital. You may make some suggestion as to the most direct route to the job and the smoothest route from the job. Then you try to get into communication with one of your doctors at the office of Doctors Post and Crane. If the accident occurs in the forenoon, you will probably not locate either doctor there, but as they do much industrial work they are accustomed to receiving emergency calls and have their affairs so arranged that their office attendant can probably locate one of them with almost no delay and, after telling her that a patient, Bendel, seriously injured, is on his way to St. Vincent's Hospital, you enlist her services in locating either Dr. Post or Dr. Crane, requesting her to advise you definitely within a few minutes whether or not she has been successful. You then call St. Vincent's Hospital and arrange for the reception of the patient, learning at the same time whether or not either Dr. Post or Dr. Crane is there. If either is at the hospital, you ask to have him immediately located and sent to the emergency dressing room where the patient will be received. After doing these things, you will probably not have to wait more than two or three minutes before you hear from the doctors' office attendant. If she has not been able to locate one of them, you ask her to continue her efforts and tell her that you will call her again from the hospital in a few minutes. You then leave for the hospital and, if your plans have been well ordered, you will arrive there at about the same time that the patient does. On arriving there, if neither of your doctors is at hand, you arrange either with the hospital interne or with some more experienced doctor, as the obvious condition of the injured suggests, for Bendel's immediate medical or surgical needs.

Unless Bendel is unconscious or is suffering pain of almost unbearable intensity, you learn, without much talk, just where he lives, and what you can do for him in the way of small attentions, such as having his tools on the job picked

up and put away for him, taking care of his automobile if he has one at the job, and at the same time assuring him that you will promptly notify his wife or family of his misfortune. Right now is a good time to learn what kind of reactions you may expect from his people when taking this piece of bad news to his home. In the case of a serious injury like this, it is usually impossible to learn immediately the complete extent of the injuries. However, it is usually possible to learn in what way the man is most seriously injured, and in most cases you can learn whether or not the injuries will probably terminate fatally. It is well to have this information in advance of carrying to Bendel's home the news of the accident, because any gross understatement or overstatement of the extent of the injuries destroys confidence, and this confidence may be much needed in a short time. Moreover, bad news travels fast and, if Bendel is not dangerously hurt, you will find a great measure of relief in being able to so advise his family, in case some exaggerated story of the accident has preceded you.

After notifying Bendel's family and attending to such minor matters as need immediate attention, you investigate the accident fully, preferably by an early visit and inquiry made at the job, report the whole matter to your insurance carrier and then feel that your responsibility has ended. Is this really so?

If, instead of having passed your liability over to an insurance company for a premium, you were facing the cost of this accident directly by self-insurance, your interest certainly would not stop here. You would know that only one course was open to you. You would know that your actions would be finally approved or disapproved by a board or commission with autocratic powers, interested in very little that you might have to say, but quite interested in what you might be able to show in the way of results. After some contacts with injured men, that spirit of neighborliness, that all humans have in some degree, would probably assert itself and impel you to further interest and action; but if it did not—if you were possessed of about half as much warm blood as an oyster—that sense which enables you to carry on in one of the most highly competitive and hazardous businesses that exist, would urge you to see to it that every available agency was used to repair, as fully as possible, the damage done. You would not be satisfied if Bendel had to suffer some permanent disability, if by any means at your command that prospect could be avoided. You would want to know from your doctor whether any special knowledge not possessed by him or any agency not at his immediate disposal was needed for the better care of Bendel, having always in mind the final result, and your doctor would not take umbrage at your action, for he would know that the medical and surgical field is large and that no one man surveys it all. And if some special knowledge, some further agency was needed for the better repair of the damage, you would, through proper channels, set that knowledge, that agency to work; because you would know that you were a partner with Bendel in his loss; in a partnership that could not be dissolved until your portion of the loss had been fully paid. And, if you are a partner in this serious loss, you are also a partner with each injured man in every other loss caused by personal injury and, therefore interested in the result in each instance.

Without considering at all the humanitarian aspects of the situation, a very close attention to detail and a willingness to go beyond the legal limitations in the expenditure of money, time and effort for the repair of damage wrought by personal injury is economical. If this last statement is correct, if these methods, these practices are economical for those who bear the employers' portion of the financial burden of this loss directly, would it be advisable to use such methods, such practices where the loss is borne indirectly through insurance? And, if these practices, these methods are advisable where the loss is indirectly borne, and the agencies used for the distribution of this loss are not now using these or similar methods or practices, is it worth while for you who furnish collectively,

the money to pay these losses, to give some thought to the subject, with a view to bettering the situation? These are questions which you must answer for yourself.

There is much more to this subject than what has been mentioned. Have you ever considered the *meaning* of workmen's compensation laws? Have you ever thought of them as other than bothersome rules that have been injected into your business? Have you ever thought of the laws, collectively, or of workmen's compensation as an idea? Well, this idea is society's notice, brought forcibly to your attention by laws on the statute books of nearly every state in this country, that the forces of industry, *employers and employees alike*, have failed to make, without interference, sensible, practical, workable provisions for a reasonably equitable distribution of the economic loss resulting from accidents in industry. More than that: where compensation laws have been once enacted there has been no repeal, no change to some other system or method; and this is the open confession of the forces of industry, employers and employees alike, that their failure to handle this question has been complete. *Shall we fail too in the reduction of this great loss as we have failed in its distribution?*

CHAIRMAN HARDING: Thank you Mr. Westmeyer. Now, our next speaker will be Dr. S. W. Grafflin, the Religious Work Secretary of the West Side Y. M. C. A., of New York City.

First Things First

By DR. SAMUEL W. GRAFFLIN

Religious Work Secretary, West Side Y. M. C. A., New York City

I was asked to speak on "First Things First" and I have a paper here on that, but someone wanted me to repeat what I said yesterday on "First Principles" and it does not matter a particle to me. But before I do that let me explain how I came to be a Y. M. C. A. secretary.

For sixteen years I had a very wonderful job in the sash door and building game, with open machinery in which we killed a man a day and the whole thing was just a nice happy proposition. We encountered very drastic opposition when we wanted to put guards on some of the machines. There were more reasons why that should not be done than anything else on earth. But after a while the organization drafted me to take charge of the Y. M. C. A. work and have given me a roving commission to go where I please and I happen to be here this morning to talk to you about "First Things First."

Before I talk about that I will talk about the "First Principles" because while there are certain first things (I will name them in a moment) the text would be; "He who knows and understands his customers will have trade." I might add; "He who knows and understands his competitors will have safety, he who knows and understands his business will have riches, but he who knows and understands his workmen will have peace."

The first thing would be the ability to think straight and after that to look out for the most dangerous man in the world, the conscientious ignorant man. He is the one who makes all the trouble.

When the historian comes to speak of this day and age I think he is going to say four things about it. First, that it was the age of the political opportunist. There are no statesmen in this age. It is the age of industrial readjustment, and it is also the age of the decadent home. The great American tragedy is the non-praying woman.

I had to speak to about fifteen leading highbrows the other night. One thousand were men and they had five hundred wives along with them—only half brought their wives. I asked how many of them had children between two and ten and quite a large showing of hands went up. I asked how many had had a child by their knee to hear a Bible story and I got eleven weak hands. I had my doubts about some of them, but anyway that is typical of the generation that has lost the one thing that helped the last generation.

This is the age of the conservation of the bodies of men. There are two sides to that question. The race never would have been as far, and as fit, and as fine as it is if the primitive peoples had cared for their unfit.

The boy or girl who could not march with the crowd was left behind. If he could not run with the pack he was simply left to die. Society has gotten as far as it has because of the elimination of the unfit. That sounds hard but it is a grand thing. Nothing in the modern trend is more dangerous than the fact that we are doing everything to save our unfit and get them up to a point where they can get married and raise another crop of unfit.

Now between the first great business enterprise, the building of the Tower of Babel, and the next great business enterprise of the world, the building of a bridge across the Firth of Forth, in Scotland, there was no accident insurance or preventive measure. In the latter job they put in an estimate to give two hundred pounds to the family of every man who was killed on the job, so that shows how recent this whole proposition is.

If you should sit along the banks of the Euphrates and see the old brick-yard that was used seven thousand years ago, you would notice how up-to-date everything looks, and you might learn how the workers refused to work facing the sun and how they did not want to walk home in the evening facing the sun; and I haven't a doubt in the world that at the building of the Tower of Babel they had their first aid staff and their litters to carry away the injured and all the rest. But from that date no further progress was made until this bunch of Scotchmen built their bridge. But in order to put over any great universal project there are certain underlying principles that I want to talk to you about, and the first is the courage to pioneer.

Gentlemen, may I say that there is not anything that calls for greater courage than the ability to pioneer? The world has been made by its pilgrims and its prophets, and its immigrants and its inventors, the men who dared to do something new. When Mr. Howe walked into the office of a Yankee that day and said: "Gentlemen, I am going to take the eye out of the stern of the needle," do you know where he spent the night? In the hoosegow. They said: "After ten thousand years this nut is going to place the eye in the point of the needle. Lock him up!" When Mr. Morse, America's greatest scenic artist, walked into a Baltimore office and astounded them by saying he was going to send a message around to the City Hall on a wire, they sent him to the City Hospital. Was the Mayflower launched by courage?

"Oh, launch your Mayflower boldly,
And steer o'er the wintery sea."

It takes courage to pioneer and the men who did anything in the past where the men who had the daring to do something along new lines. That calls for all the courage you have got, as I can testify after having attempted to have two or three safety devices installed in the old shop. You would think I was trying to commit murder when I wanted to have a guard put on the bandsaw. It takes courage to pioneer.

Now the second thing is the will to investigate.

I know of a son of a friend of mine who was offered a little chance to take over a factory in the country, that was under the guidance of Edison. He didn't

even take the time to go out and look it over. Now he is in the hands of the sheriff.

When God got ready to bring industry into the world he brought six thousand brick-layers up out of serfdom and welded them into a religious commonwealth. He took that man who was to pool those forty years of education and forty years of mature reflection and sent him a Regent's examination. I hate to think what the State of New York would have done with him at the end of that time. For when Moses saw the bush burning and turned aside to investigate it, he was the first scientific investigator. No matter how many sheep he had, he still had time to see why that bush burned and was not consumed. Let us come down to the great American tragedy.

George Washington decided to go scouting in the valley of the Ohio and he found a stream that ran pure grease and he took notes about it and decided that it would burn. But he turned his back on the stream of running petroleum. Petroleum was not drilled for until nearly one hundred years later; and at the very hour when Washington turned his back on this, Benjamin Franklin said: "If these sparks would jump off the cat's back they would jump off the clouds if I had a big enough pussy." At the very hour George Washington turned his back on the petroleum Benjamin Franklin was being decorated by an English society for the discovery of the electric spark. If Washington had brought one drop of that petroleum back to see if it would burn we would have had the internal combustion engine, the industrial revolution, and the tragedy of coal would have centered in petroleum. Nothing that makes smoke should ever be taken away from the mouth of the mine, it should be reduced right there to power. But one man did not have the will to investigate. We have got to have the capacity for new truths.

That is one reason I sympathize with the preacher. Every Sunday he has to get up and make the same talk. He thinks, "What did I preach about last Sunday morning?" No wonder the world is making such slow progress spiritually. They have not got the degree of understanding sufficient to recognize old truths, let alone the capacity for new truth. We become conservatives.

Once about nine or ten years ago when I was lecturing in Chicago, after I had completed my talk, a young Jewish lad, who might have passed for Joseph or Jesus, came up to me and said: "Mister, you sound honest." I said, "Thank you; and what can I do for you?" He said, "I am a widow's son and I am in high school, but I have a little laboratory and I have made a great chemical discovery." Well, I tightened up and said, "What is it?" He answered, "I have discovered how to eliminate a certain chemical from a certain process." I said, "Your fortune is made;" and he answered again, "I have learned how to eliminate that chemical." I asked him to tell me about it and I would see what I could do for him. Then he indicted me as I have never been indicted before and he indicted all of big business in a way that ought to make every man here ashamed of himself. He said: "There's not a big business man who wouldn't wring me dry."

I told this story at a meeting once where the poorest man was worth a million, and one of the biggest men there said: "Sure, that's the game. I have wrung a dozen of them dry." Shame on them that that boy was able to indict them!

I asked this boy to tell me what he could and he told me that the headquarters where this was used was in New York and he asked me if I could get them to send out a man to look over his process. So since I had been reading the two page national advertisements of this concern I walked right up and sent in my card and got the great American lie, "that Mr. A. was in conference."

When you go to an office now you have to see everybody from the office boy up and they all tell you this great American lie. Some years ago Richard Hobson Pierson said to me: "If you want to learn something keep your door wide open,

you can save more time this way." In all the years since then I have never closed my door except to change my shirt. Yes, you will save time, because the people in the other office can see you and will hurry on.

Well, anyhow, I got the lie that he was in conference, but since I have devilish persistence, as Mrs. Grafflin says, I sat down in the outer office and pretty soon Mr. A walked out. I went right up to him and he growled that he had sent word that he was in conference and what did I want with him anyway? I told him that I knew of a little lad who had made a great discovery and that he would like to have someone look it over. Mr. A brushed past me and said, "If he wants anything let him come down here, and I'm not interested anyway. The interview is at an end."

I walked out and I was mad. I was so mad I got a Red Book—I mean a telephone Red Book. I looked down the list until I found a firm in this same line and when I found one with a star, which meant they were rich enough to have a switchboard. I went down, and in three minutes I saw the young general manager, and he said that if what the kid has said was true he would have a man in Chicago that day. Five years later they asked me what I wanted as my fee, but that would have ruined the game. I took one cent. I have more fun doing things for nothing than I ever would by getting paid. So when this large firm, about that time, was bought out by the smaller firm, this young fellow, now the general manager, asked me if I wanted to see him fire the bird that turned me down that day.

I realize that this is neither Quaker or Christian, but I said, "Oh boy! I'll be right up"! And I walked over there and when this man came in they handed him a check for three months and said that they did not want a man who did not have time to look at anything as promising as this had been. So you see you have got to have the capacity for new truths which are showing up every minute and against which we are closing our minds.

The fourth thing is to have a tolerance of radical youngsters while we hold steady. Heaven save me from a bunch of dissatisfied old men and satisfied young men! The old boy who is up in the air at fifty will never come down, and the young fellow at twenty who has not started will never go up. I don't want any conservative or settled young men around me. We have got to have these radical youngsters because the progress of the world is right in them. Mrs. Grafflin said, "If there were any settled young men calling on our daughter that she wanted me to get the axe." I want none of them around me. I wasn't a settled young man myself.

By the same token, I don't want any of these radical old ones. We have got to have this tolerance of young men while we hold steady and let them try out their stuff. In the group with which I am associated as head, we have graduated a group of twelve of America's leading men in the educational and religious world. That is due to the fact that the nominal head of the department is an old boy who is out wandering around and talking to councils and things, and just comes back to look them over and cheer them on.

I am going right from here to an Interborough shop meeting and see how it is running. I am going to stand back in the crowd and watch one of my boys run it better than I ever dared.

"New occasions make new duties,

Time makes ancient good uncouth."

You keep a tolerance for radical youngsters while you hold steady.

After this there must be a sense of responsibility to society. There must be a sense of responsibility to God. My own daughter once wrote that "Nobody is fit to serve humanity unless he loves God and desires to serve Him, loves men and desires to serve them, and has or is willing to have lived himself." She is the head of one of the greatest social movements in this country. You cannot conduct

great enterprises by a correspondence course. I want to tell you the little story about the first Christmas we weren't broke. I think it was the last, too. My wife didn't believe it.

I have always sympathized with Mr. Stanley Mitchell's famous story of the man who was dying, who sent for the minister to make final the arrangements for his funeral. "Who will you have for your pall-bearers?" inquired the dominie. "I guess the local bankers will do," was the reply, "they have been carrying me all my life. They might as well finish the job."

However, having convinced the good lady that we owed nothing and had money in the bank, we were promptly informed that she needed clothes. "That is what Eve said," was our answer. But we trimmed her out in fine style. Then we asked our eldest daughter what she would have. She asked for a little set of books. We asked our second daughter, whose request was for fruit cake, sponge cake, pound cake, apples, oranges, doughnuts, candy and something to eat. Then we asked Don. Running true to form (for he is one of the kind if he fell down a sewer, would come up with a gold watch in one hand and a diamond ring in the other), he said: "I want a little store with bins and things to sell. I want a little cash register and I want a little horse and wagon with which to deliver the goods."

Came Christmas morning, and after early church and breakfast the parlor was opened and the abundance of presents displayed and everyone was happy. Five minutes later the children were dashing back to inform me that Don was not giving them the goods. He was selling them. I knew that, so I divided my small change, all that was left, equally among them, and business began. Time and again he sold out the little stock, finally looting everyone's Christmas stocking and his mother's cookie jars. As the neighbors' children came in he sold the very cubes of sugar from the bags in the pantry.

About eight that evening there was a great quiet in the parlor—a quiet that could be felt. We rose from where we were reading, my good wife and I, and walked to the portieres and parted them. I wish you could have seen the picture. Ruth in a big Morris chair, her little shelf of books before her, head down, in the middle of Adam Bede, read out, all in. Dorothy flat on her back, sweating like an ice pitcher, full as a tick, but happy as a lord and sound asleep in the middle of the floor. Everything that she had, had perished with the using, but there was no question about her having had and having enjoyed it. And Don—the little horse in the stall, sold out, his arm around the store, his left hand literally leaking pennies, nickels and dimes.

We stood and looked at the picture for a few minutes and then I took Ruth's little set of books, set them back on one of the library shelves, carried her up stairs and her mother put her to bed. Then I carried Dorothy, eats and all, up and laid her on her bed and her mother put her to bed. Then I came back and took Don's little store and stood it in the corner, placed the horse in the stall, emptied his hand into mine, put the money in my pocket and carried him up and put him to bed.

When I returned, my good wife was seated by the student's lamp, not reading, but with moist eyes. "What is the matter, sweetheart?" "Nothing," she said. "Did you see that picture?" I replied, "Oh, yes."

But all life is just like that. God gives us books and banquets, stores, cash registers, nickels, dimes, and pennies to play out this little thing which we call "Life," and someday we are going to fall asleep and the Great Father is going to come to the parlor door and look us over; and He will come pretty nearly knowing how we play the game by the way in which He finds us.

It is a great thing to be trusted with the lives and limbs of men. It is a great thing to hold the health and happiness of humanity in the hollow of our hand. It is a great task with great responsibility. May God give us the understanding of

the thing which we are trying to do and an interest in the hearts and lives of those with whom we are trying to work that we may get a maximum of results.

If you have the courage to pioneer, the will to investigate, the tolerance of radical youngsters, you must have a set of convictions. No man ever continues persistently except from a set of convictions. No other thing but a great conviction that the thing is worth while will make a man stay with an enterprise. There must be a sacrificial persistence.

We have just begun. We have killed and maimed too many, not of the unfit but of the fit, not to realize the task that is before us; and I hope the Almighty will help us to conserve the fit as never before. If we have the courage to pioneer, the will to investigate, tolerance and convictions we can put it over.

CHAIRMAN HARDING: Thank you Dr. Grafflin. We will now hear from Hon. C. A. Waters, of the Department of Labor and Industry, Harrisburg, Pennsylvania.

Safety in the Construction Industry from the Viewpoint of the State

By HON. CHARLES A. WATERS

Secretary, Department of Labor and Industry, Harrisburg, Pa.

Education and the development and enforcement of adequate regulations are the means by which the Pennsylvania Department of Labor and Industry is undertaking to promote safety in building construction. Education is put first because of what experience has shown the Department to be its relative importance.

Regulations are peculiarly inadequate in themselves to produce any considerable degree of safety in construction. A machine may sometimes be well enough guarded to make accident to the operator next to impossible. The same certainly cannot be said of a construction operation. So construction comes under a new general plan of the Department for advancement of safety through education, the most important feature of which is a study of the individual working force and the individual operation.

Up to this time the Department has largely endeavored to promote safety in construction and in all other lines of industry by systematic inspection under a block system whereby all industrial plants and industrial operations have been visited in the order in which they have been found in the locality. It has more and more been impressed that this system does not make the most effective use of our limited inspection personnel. Under its operation those who are doing quite effective safety work of their own get as much, or almost as much, attention as others much more in need of assistance. It was realized that some means must be found for determining just what factories and just what contractors were having bad accident records and of concentrating attention on them.

Today the Pennsylvania Department of Labor and Industry is preparing to introduce something new in the field of state-wide accident prevention work. It is preparing to utilize individual accident records to advance safety. Through its Bureau of Compensation the Department receives reports of all lost-time accidents in industry in Pennsylvania. Preparation is now being made to apply these records in inspection.

Within a few months the Bureau of Inspection of the Pennsylvania Department of Labor and Industry will be in position to know exactly what plants and what contractors are having more accidents than they should have in relation to the general average. Trained inspectors will then be prepared to sit down with these concerns and help them figure out where their weakness lies and how it can be

remedied. Much is expected from this new plan which has the hearty endorsement of all associations of employers and workers to which it has been presented.

The need of adequate safety regulations and their enforcement, and the fact that the state can alone properly apply such regulations is not overlooked. A special drive for accident reduction in building construction covering the last two years developed inadequacies in existing regulations which are now being studied with a view to their correction. The so-called "Scaffold Regulations" of the Pennsylvania Department of Labor and Industry, which are in effect building construction regulations, are to be developed into such in fact. As revised, they will include regulations for building demolition which has been shown to be badly in need of safety restrictions. Recently the need of some other treatment of builders' hoists than the existing sweeping restriction against workers riding on them was shown to be essential, particularly when hoists afforded the only means, other than ladders or stairs, for workers to reach the upper floors of tall buildings under construction. Today workers in Pennsylvania are permitted to ride on builders' hoists when they are equipped with certain safety devices.

The Department is at this time engaged in the development of regulations to govern construction of trenches and excavations of all sorts. These regulations, as all others developed by the Department, are presented to both employers and employed in tentative form at public hearings for criticism before they are adopted, so that as finally applied they represent the best thought of those whom they will most affect, rather than a lot of closet-developed theories.

In teaching safety and in applying regulations in construction the first aim of the Department is to develop each contracting unit into a self-sustaining safety factor. It is recognized that safety organization is particularly difficult to apply to such contracting operations as building construction. On large operations there may be many sub-contractors working with their individual forces under a general contractor. The Pennsylvania Department of Labor and Industry has applied with considerable success on these operations a type of safety organization in which the general contractor appoints a safety committee chairman and each sub-contractor appoints a representative on the committee. This committee holds a meeting at least once a week during the course of operation and discusses its safety problems with Department inspectors. Each sub-contractor fixes responsibility for the safety of his working force on one or more individuals, usually superintendent or foreman. This plan has been applied in the construction of the new \$3,000,000 North Office building at the State Capitol in Harrisburg. While too early yet to state the final result, this operation to date has been remarkably free from lost-time accidents. The fixing of responsibility on supervisory workers has been found in Pennsylvania to be the best means of attaining safety in construction operations, taken along with the state's aid through education and application of regulations. The transitory type of worker engaged to so large an extent in construction does not lend himself readily to development of the highly efficient sorts of safety organizations we find in many industrial plants.

An important feature of Pennsylvania's new plan for dealing with the accident problem in construction work is the development of a staff of building inspectors who are specialists. The desirability of safety inspection by specialists in any line of industry need not be stressed. Up to this time it has not been found practical to extend such inspection to all types of industry. Building construction, because of its very considerable hazard and its very special problems, has seemed to warrant this sort of treatment and after a year's application the Department already feels justified, through the extent of cooperation it is receiving from the industry, in feeling that no mistake has been made in extending to it this special safety service.

October 3, 1928

E. C. HARDING, Chairman

General Superintendent, Ferro Concrete Construction Company
Cincinnati, O.

The third session was called to order at nine-thirty o'clock, Chairman E. C. Harding presiding.

CHAIRMAN HARDING: Our first matter on the program this morning is the election of officers. We will have the report of the Nominating Committee. They submit the following for your consideration:

Chairman, W. R. Richards of the Associated General Contractors.

Vice Chairman in Charge of Publicity, J. Wilson Robinson of the Everett Winters Company.

Vice Chairman in charge of program, J. W. Dalzell of the Ferro Concrete Construction Company.

Vice Chairman and News Letter Editor, George Widua of the Woods Brothers Construction Company.

Vice Chairman in charge of the Poster Committee, Robert McKinley, General Accident Insurance Company.

Secretary, C. H. Black of the Stone and Webster Engineering Corporation.

If there are no objections or further nominations the officers for the next year will stand as read.

Will someone conduct the new Chairman to the platform? Before retiring as Chairman I would like to thank the officers who have served with me for all the good work that they have done and it has been a pleasure to have worked with them.

(Mr. W. R. Richards took the chair and presided as Chairman.)

CHAIRMAN RICHARDS: Gentlemen: I do not know how I came to get this position, but I am certainly going to do the best that I can to fulfill it and I hope I will be as successful as Mr. Harding has been. I want to ask every one of you to give me all the cooperation that you can. It is not a one-man job. We have got to have cooperation to increase this section. It has been growing pretty rapidly and I would like to see it doubled up in the next year. If Mr. Black, the new secretary, is here I would like to have him come to the platform.

(Mr. C. H. Black came to platform and took the chair as Secretary of the Construction Section.)

CHAIRMAN RICHARDS: The next item on the program is a talk by Mr. Frank E. Cudworth, Resident Engineer of the New Hudson River Bridge.

(At this point Mr. Cudworth showed a number of interesting lantern slides illustrating the methods employed to prevent accidents in the work he is engaged in.)

CHAIRMAN RICHARDS: I want to thank you, in behalf of the Association, for your talk. Are there any questions anyone would like to ask Mr. Cudworth?

MR. STEWART: It may be a little bit off the line, but we are making an investigation at this time to determine the relation of labor companies to material companies. Of course, we are not taking into consideration jobs where there are such an amount of materials and labor, so that it is taken away like your scaffolding; but I would like to know where it would be possible to get the ratio of labor cost to material cost on a building like that.

MR. CUDWORTH: Well, in the general contracting work I would say that the ratio was about fifty-fifty.

MR. CHAPIN (Independents Bureau): I would like to ask about those work-ways along the chutes. What kind of screens do they use?

MR. CUDWORTH: They use half-inch mesh.

CHAIRMAN RICHARDS: If there is no further discussion we will proceed with the next speaker, Mr. R. B. Thomas, of the Structural Steel Board of Trade, New York City.

Safety in Steel Erection

By R. B. THOMAS

Counsel, Structural Steel Board of Trade, Inc., New York City

The safety engineer who has the job of cutting down the accident record of a large construction project is indeed in an unfortunate position, for he not only has plenty of hard work but at times it would seem that every man's hand is against him. By its very nature construction work is dangerous and economy of cost demands speed in building. The owner wants the building completed before the next renting season. The contractor wants to keep the cost at a minimum and also wishes to satisfy the owner. The men resent interference and what seem to them unnecessary precautions. The constant labor turnover makes safety education difficult.

Again, the contractor is not selling a staple commodity at a definite market price. If, because of expensive safety measures peculiar to his own organization, and not general in the trade, his costs rise, he is placed in a bad competitive position. His instincts are all on the saving side, particularly after losing a few jobs to a lower bidder. The more obvious and important safety requirements must be a matter of law with adequate inspection, but the better way for the construction industry would be for the architects and engineers to write into the specifications, the precautions that must be taken on the particular operation. In that event all the bidders are on the same basis and the cost element disappears.

We, of the steel erection fraternity, are popularly supposed to be the bad boys of the building industry. We take unnecessary risks and have little regard for the safety of other trades. The lay public has the idea, fostered somewhat by the press, that a New York skyscraper "costs a man a floor." No doubt too many men are killed in this work, but the actual facts make the popular idea ridiculous. During the calendar year of 1926, 27 structural steel workers met their deaths from accidents in the course of their employment, in the state of New York. In that year considerably more than 500,000 tons of structural steel went into buildings in this state. Roughly, that means that one man was killed for every 20 apartment houses, say 15 stories in height and 100x100 feet in ground area. During the same year 15 were killed in New Jersey. There the tonnage erected was somewhat less, but the proportion was probably not much different. This information is from the respective State Departments of Labor and is surely authentic.

However, steel erection is not the safest work on the building, because of its very nature, and the industry itself is most anxious to reduce accidents. Our insurance costs are very high and we would welcome the saving, aside from the humanitarian view. The members of the New York Structural Steel Board of Trade, with which I am connected, believe and hope that they can reduce the number and severity of their accidents. But we are making haste slowly until we can find out just what needs to be done. The first of this year we started to receive duplicate reports of all accidents from our members. We hope that at the end of this year we may have sufficient data as to the causes of our accidents, that we may dope out ways and means of preventing a large percentage. It is possible, from the reports already received, to draw some conclusions which may be helpful.

Our most bothersome types of cases are those which are constantly with us, not the ones which are almost in the nature of catastrophes, in which more than one are hurt. In this latter type the causes can nearly always be traced to the carelessness or neglect of some man, or more frequently, the foreman or pusher.

For instance, in one case, in order to put a strain on the line, the men had passed a hoisting cable that was being wound onto the drum of a hoisting engine, around the wooden foot block of the derrick, on top of which two men were rigging up. The line became entangled, the engine kept the drums moving and the foot block was pulled loose, with the consequent fall of the derrick. Again, one erection gang was racing another, they had just raised their derrick to another floor and were lifting the first load. Someone had neglected to see that there was no slack in the lashing holding the derrick footblock to the structure. The foot of the derrick moved, snapped the lashing and the whole thing fell into the building. The handling of heavy erection equipment requires meticulous care on the part of those in charge.

However, such cases as have been presented are few and far between and their number, as compared with the increasing tonnage of steel erected, is on the decrease. The other classes of case, minor in severity but major in cost and suffering, are always present. While it is necessary to prevent the serious wrecks, if possible, if active steps are taken to cut down the other risks these infrequent serious accidents will decrease in consequence.

A few simple and necessary rules to be followed in steel erection on buildings are:

1. Forbid riding on loads and cables on the outside of buildings.

There is no necessity for this practice and it is only undertaken by the men in a spirit of bravado and to save a tiresome ladder climb. A sudden change in the speed of the hoist or the swaying of the load against the building may loosen the man's hold and he nearly always falls to his death.

2. Keep up a constant inspection of hoisting equipment.
3. Check carefully the possibility of overloading the derrick.

Erection gangs often save time by taking up more steel in one load than can safely be lifted by the equipment provided. The margin of safety should be large, for a jerk on the cable when "booming up" or through lack of smooth operation on the part of the engine, multiplies the strain on the cable many times. This is particularly to be avoided when the angle between the mast and the boom of the derrick becomes a large one.

4. If at all possible, do not permit the throwing of rivets toward the outside of the building.

It is usually not necessary to throw toward the outside and if passed inward, a missed rivet has some chance of being stopped by a floor. On the outside it is almost sure to carom down into the street, where if it injures no one, it may do damage to property or cause a fire.

5. Provide cone-shaped cans for catching rivets.

These are not expensive and are easy to handle. Rivets often bounce out of flat bottomed pails, which are not strong enough for the purpose in any event. After some use the rivet is liable to go clean through and injure the catcher.

6. Insist that burners wear goggles.
7. Provide tote boxes for the bolters up and see that they use them.

Many injuries are caused by loose bolts and rivets lying around the building and which fall down below.

8. Be sure that the erection floor is clear of any loose objects before the planks are raised to the next level.

It is easy to clean a plank by turning it up on edge but that doesn't protect those below.

We find that about one-third of all our accidents come from "falling objects," not heavy pieces of material but rivets, bolts and tools. About one-half of those or one-sixth of the total are injuries to men of other trades on the same building who are working below the ironworker. Directly below, on the usual operation, are the carpenters building forms and the concrete laborers putting in the concrete floor arches. If these men were afforded some protection the risk would most certainly be lessened.

The erection gang raises the beams and columns, sets them and bolts them in place. Then along comes the riveter, who takes out the bolts and replaces them with rivets. The floor on which the erection is going on is always planked over, but the riveters are usually at work on the two floors directly below this and immediately above the concrete men. It would seem that if an extra floor of plank, or some other protection, was interposed just below the riveters, a number of these distressing head and back injuries would be eliminated. Unfortunately we cannot do this in New York because of statutory requirements that compel the concrete arches to follow closely the steel erection. This particular law should be changed so that the proper protection could be afforded, but even in that event it would be necessary to have the requirement written into the job specifications so that the careless and unscrupulous contractor would not reap the benefit of the lower cost. The erection floor plank are comparatively easy to handle, as they are lifted to new levels through open space, but to provide an extra floor of planking below would prove somewhat more expensive. Perhaps if the arch requirements were not so stringent it would be possible to leave this extra floor in place for some time, and that it would only have to be handled a few times during the whole building operation. In that event the concrete men would not be on the job so soon. Falling bolts cannot injure men who are not there.

The heavy character of our material makes it difficult to handle and we have a number of cases in which men suffer contusions and bruises to their hands and feet. A beam rolls over or a connector pinches his fingers between a beam and a column. These account for one-fifth of all our accidents. Strains from lifting cause another 2.8 per cent. Apparently there are no safeguards for this class of cases except the education of the worker and competent and careful supervision.

"Foreign matter in the eyes" is the cause of 13.6 per cent. The stronger breezes up high on the skyscrapers blow around a lot of dirt and dust. Some eye injuries come from steel chips and others from sparks from forges and burning torches. Obviously the burners should wear goggles during the actual burning operation, during which they are generally settled in a stable position. For the other men the cure might be worse than the disease, for the man who walks a beam at a dizzy height needs his full range of vision.

"Falls of person" cause 11.1 per cent of all the accidents, but peculiarly the ironworker seems to be careful when he is in a dangerous position. More than one-half of these falls occur on the level. I know of an authentic case in which an ironworker who had walked beams for 20 years, slipped on the Times Square curb and gave himself a bad spinal injury. Sometimes our man falls into an unauthorized opening or one that is improperly protected.

This would appear to be a frequent cause of fatal accidents. Proper protection of openings is one of the essentials of safe building construction.

Again, our heavy material is the cause of another class of accidents. It must be lifted under power and at the end of cables sometimes many stories in length. The swaying and swinging of loads and cables cause 6.3 per cent of our cases. These can only be cut down by extreme care and watchfulness on the part of the men.

In 2.9 per cent of our cases the men injured themselves with their own tools. In 1.8 per cent they were injured by tools wielded by another. Various miscellaneous causes account for another 1 per cent. Failure of equipment causes only 1.7 per cent.

In 9.5 per cent of our cases our men are injured through the fault of employees of other contractors, 2.8 per cent from "falling objects" and 6.7 per cent from stepping on nails protruding from lumber lying around the building. The latter is one of the greatest causes of injuries in building work that can readily be eliminated. If the concrete form lumber is taken care of as soon as it is torn down and either piled or nails removed, a lot of ironworkers would be happier. Many is the foot infection that prevents a man from earning his livelihood for a long period.

Perhaps the welding of structural steel will become an actuality in a few years and we will have fewer rivets to throw and drop, and no one would be more thankful than the steel contractor if the accidents that could be attributed to him would be materially reduced as a result. I am sure that the construction industry may rest assured that the steel erecting contractors are more than anxious to cooperate with the rest of the trades to the end that buildings may be put up with a maximum of safety.

General Discussion

CHAIRMAN RICHARDS: Thank you, Mr. Thomas, for your fine talk. Are there any questions, or any discussion on this subject?

MEMBER: I would like to ask Mr. Thomas if he knows of any cases where safety belts were used?

MR. THOMAS: No, I do not.

MR. LOWELL: I would like to ask Mr. Thomas about the self insurance that has been issued.

MR. THOMAS: Most of our self insurance here is in steel erection. We have one company that has been insured since the law went into effect in 1913. There are some others who have been self insurers for several years. The initial cost is very large in steel erection because a man just going up once is apt to be killed, while others may be on the job all the time in less hazardous occupations. The company realizes this and stresses it, so that the careful man will save a lot by self insurance.

MR. WHEELER (Building Trades Employers' Association): You spoke of first aid. Is it customary to have a first aid kit on your job?

MR. THOMAS: That is a matter of cooperation. On some of the larger jobs the general contractor provides a first aid room. On this job there was a very well equipped first aid room. They had a shanty fixed up and a doctor there all the time—or he could be reached by phone, and he appeared there so many times a day.

MR. CHAPIN: Some years ago, while the Delaware River Bridge was being built, I had an opportunity to see some of the work there. I also learned of some accidents that it was my duty to investigate. One of the men walked off a beam and before the day was over the coroner found that he only had one eye.

That seemed to indicate a laxity in finding out what kind of men were put on the job. In another case we sent a man for tools and he seemed to have something else on his mind and walked right off the bridge. Now that showed a mental deficiency. I am just citing these instances because they may be helpful here. Someone mentioned that it might be possible to leave the safety devices to the architects, and I was just wondering how many architects would be capable of specifying the safety measures to be used. We might hear from some of the architects on that.

MR. THOMAS: Not so long ago a company here used the new machine for the passing of rivets that they use on ship a great deal. That is used best when you have a lot of rivets to be put in close together. But this company put in the new automatic riveter. The superintendent was quite in favor of it. He had it set up and had the chief engineer of the company see it work. The chief engineer put a rivet in it to try it. It flew out and took off his hat and went out into the street and caught a girl's fur coat and they had to buy her another one.

Then in regard to the personal deficiencies of men. You have to be careful of that or they will accuse you of running a black list, but obviously there are certain men who shouldn't be on any job.

CHAIRMAN RICHARD: I think the time is only a short way off when we will have to pay a lot of attention to the physical condition of the worker, then there won't be so many accidents.

MR. WELLIN (Travelers Insurance Company): Mr. Thomas stated that a large number of accidents are due to materials falling from the erection floor. He believed this could be avoided if the floor below the erection floor were covered, but there was some objection because of the cost of the material. However, this would be low for the same material could be used on several jobs.

MR. THOMAS: I will show you where some additional cost comes in. That planking is very high, because you have to hoist it around with the derrick and move it and it all costs. Occasionally there is a job in New York where we do that. There was a job a few years ago over on Sixth Avenue where they added six or nine additional floors and they had to open the roof of the existing building. Now the specifications on that job called for a floor of plank to be left over that roof and to be moved once. I do not know what it cost to raise the planking in a building like that, but I do believe it cost about four hundred dollars to raise it once. It had to be taken down and up and spread again.

F. A. DAVIDSON (Cheesboro-Whitman Company): Apparently the matter of co-operation is one of the outstanding difficulties we have, but more often than not we only hear the contractor's side of the story. I wonder if the time has not come when we could put into effect at the places where building operations are going on, the rules of a safety organization that would function according to its own craft, that is for the particular job.

I am familiar with a scheme of organization worked a number of years ago. At first it worked very successfully. We had a foreman's committee that met and represented the different crafts. Once a week they inspected the entire job. It took an hour, and then they would meet in the superintendent's office and report anything which they had found that needed attention. No man served more than a month on this committee and that kept the foreman rotating. They were usually in a committee of three. This was a very long job and the foremen all had a chance and they were all very careful, because if they found anything wrong on any of the other operations they knew that they were liable to have some of the others discover something wrong with their portion of the job when he was on the committee.

I believe that could be done in New York City, and I don't believe there is a man in this room who does not remember when he used to call in the sub-contractors regularly just to talk. There were no such general meetings to

discuss the different phases of the work. Now if the time has arrived when we believe that safety promotion is an important enough thing, the general contractor could have a day set aside for an inspection by the safety committee, composed of the foremen on the job. Let each foreman serve three weeks. I believe that would be of great assistance to you, and I believe it would work out very effectively.

J. J. COFFEY (Department of Labor, Philadelphia, Pennsylvania): That experiment has been tried out in Philadelphia and it has been very successful. The committee is made up of the superintendent on the job and each of the sub-contractors. They meet once a week. The general superintendent makes it very easy to offer criticism and desires it. They keep written minutes of the meeting and a great deal of good help has been derived from them.

MR. WHEELER: In that connection I would like to say that James Stewart & Company have had that plan in all their jobs. In Japan they are using the same plan in many jobs, and furthermore the Building Trades Employers' Association through its Committee on the Prevention of Accidents is about to recommend that plan among all its members. I have visited a number of places where it has been tried this last year and it has been very successful.

CHAIRMAN RICHARD: I have visited a great many of the jobs where they are using that method and are getting good results.

MR. CANE (Bricklayer's Union): It is very unfortunate that everybody is not giving as much attention to this subject as you gentlemen and you should be complimented. But the trouble is, a lot of people are not cooperating. We have rules for contractors and rules for architects in New York State, but they are not adhered to by many. We had one job around on Sixty-sixth Street where they gave the bricklayers a scaffold that was an outrage. We insisted on a different type of scaffold and they gave us another that was supported by two-inch and four-inch boards. It was not safe. We called our men off the job and they put out a patent scaffolding. About three or four days after that the steel workers were hoisting their load of steel, the derrick gave way and fell on the scaffold but the scaffold did not fall. If we had not have had this type of scaffold fifteen or twenty men would have been killed. I think now a movement has been made for stricter enforcement of that rule.

I think the State should take more interest in that kind of job, because even though the masons and the builders give the men everything they want, it is those who are not connected with them who are responsible for a great many of those accidents. If we recommend a great many more safety measures then we would accomplish something.

CHAIRMAN RICHARDS: The time is getting short and we will hear from our next speaker, Mr. D. F. McMurchy, of the Industrial Commission of Ohio, Columbus, Ohio.

Wire Rope and Safety

By **D. F. McMURCHY**

Structural Engineer, Industrial Commission of Ohio, Columbus, O.

It is my pleasure, gentlemen, to give you a few observations upon the use and abuse of wire rope from the standpoint of an engineer with a state safety department. This item of equipment has done more to facilitate the construction of our larger structures than any other in that it made possible the power equipment used in excavation, erection and transmission without which our construction operations would be seriously hampered. Its ability to withstand abuse, combined with its great strength and flexibility, recommend wire rope for the severe service required of such equipment on construction work, and it has been

my experience that the majority of wire rope failures are not the fault of the rope but are due to improper care, use and connections.

Construction of Wire Rope

If we consider for a moment the construction of wire rope we immediately sense its limitations. As the name implies it is rope made of wire. The construction most familiar on building operations being 6x19, that is, 6 strands of 19 wires each twisted around a hemp center to form a rope. Three grades of wire are most commonly used in its manufacture—iron, crucible steel and plow steel. The latter two, because of their combined strength and flexibility, are generally used on construction operations as rigging for hoisting, transmission and excavating equipment. Frequently cables that have been removed from this equipment are again placed in service as guys on towers and derricks and as lashing, slings, etc. Other constructions are manufactured to serve various purposes requiring greater strength or flexibility but the 6x19 construction more nearly satisfies the contractor's requirements. Being made of wire it is not as flexible as hemp rope and cannot be bent sharply without seriously affecting its strength.

The contractor in ordering rope has to rely almost entirely upon the integrity of the supply dealer in the matter of getting the rope specified. Few workmen can tell by the appearance or feel of a rope whether it is iron, crucible or plow steel. Like Chinamen, they all look alike but their strengths vary considerably. Iron rope having about 40 per cent and crucible cast steel about 85 per cent of the strength of a plow steel rope of the same diameter. Iron rope when bent with the hands does not have the tendency to spring back that crucible or plow steel rope have and may be detected in this manner, but the difference in spring between the crucible and plow is hardly perceptible and the test is not sufficiently reliable to determine the quality of the rope.

To overcome this uncertainty the proposition of weaving into the hemp core a narrow tape containing information as to the material, strength and manufacturer has been advocated by several speakers and writers on the subject and I am informed that one manufacturer is labeling his rope in this manner. For the benefit of the manufacturer, dealer, consumer, and public such procedure should be followed by all wire rope manufacturers, thus removing the uncertainty of using a rope of less than is required.

The Three Major Factors

Three major factors govern the life and strength of wire rope, external wear, internal wear and kinking. A new rope being circular in section, presents only the surface of one or two wires of each strand at any section to external wear against the sheaves and other objects with which it comes in contact. Abrasion against the sheaves augmented by gritty substances contained in the dust and mud ever present around construction operations, tend to wear these outside wires very quickly, reducing their sectional area. As the process continues the next adjacent wires begin to wear but rarely more than three wires of any strand present a wearing surface to the sheave before one wire breaks. This failure increases the load on the other wires and with their decreased sectional area they fail rapidly.

As a means of reducing external wear on rope it is essential that the sheaves be properly aligned and that the grooves of the sheaves are kept in good condition. Sheaves with broken flanges or that have oversize bores, not only increase the wear on the cable but also the hazard of the line jumping the sheave which often produces disastrous results. Running lines should be clear and well lubricated

and should not be allowed to wear against any material which will tend to abrade them. The question of the use of hard or soft sheaves depends upon existing conditions. In some instances it is more economical to replace the sheave than the line; in others the opposite is true. A rope should be replaced according to the Bureau of Mines when the diameter of the outside wires has been worn to 65 per cent of their original diameter or if 6 broken wires appear in one twist or lay of 6x19 rope. It is recommended that rope be discarded if five wires are broken with 10 per cent wear on outside wires; four wires are broken with 20 per cent wear on outside wires and three wires are broken with 30 per cent wear on outside wires.

Another factor affecting the life of wire rope in service is internal wear. Being flexible there is considerable internal motion in the rope as it changes direction under load as when passing over sheaves. The outside wires of the rope passing over a sheave are stretched more than the ones adjacent to the sheave. This unequal stretching produces internal motion within the rope which unless thoroughly lubricated tends to wear the rope from within. Where the rope is subjected to reverse bends as in the case of the load line on a derrick passing from the hoist engine under a sheave at the bottom of the mast and over a sheave a short distance up the mast, this stretching shifts from one side of the rope to the other, increasing the internal motion and consequently the internal wear. It follows that the smaller the sheave, the greater the stretch in the outside wires. Wire rope manufacturers recommend sheaves of a diameter in feet equal to 4 times the rope diameter in inches for crucible steel or plow steel rope.

Lubrication Reduces Internal Wear

Internal wear can be materially reduced by proper lubrication and the use of larger sheaves. The latter is not always possible, being limited by the design of the equipment, but larger sheaves will pay their added cost in increased rope life where conditions permit their use. The value of lubrication cannot be stressed too strongly and the additional cost of lubricating them is negligible when compared with the increased life resulting. Proper lubrication will minimize the breaking of interior wires which weaken the rope and which cannot be detected by casual inspection.

A third major factor is kinking. To sever a wire without the services of wire cutters we kink it and it breaks easily. Kinking has the same effect upon wire rope, it being nothing more than a twisted bundle of wires. We know also by experience that the harder the steel the more brittle it becomes, having broken soft iron or copper wire in one instance and steel piano wire in the other, the latter breaking with much less kinking than the former.

Kinking is probably the most destructive of the three major causes of wire rope failure as little warning is given of the weakened condition. Great care should be exercised in taking wire rope from the reel to avoid kinks. It is a good plan either to roll the reel along the ground or floor or to mount the reel on a bar and run the rope off as needed. When wire rope is taken from a coil—roll the coil along the ground rather than to pull it from the coil laying flat. Wire lines are frequently snarled when a clam shell turns over or a load slips. Such occurrences very often produce kinks and sometimes snags. Snarled lines should be straightened very carefully and inspected for snags or cuts before subjecting them to loads.

There are other factors affecting the strength of wire rope such as unlaying of strands due to lack of sizing, corrosion from various causes, fatigue and others

but the majority of failures in wire rope are traceable to the three major causes given above providing of course that the proper kind and construction of rope was selected for the work in hand.

Different Types of Connections

At this point I would like to say a few words about connections. Of the various connections manufactured the clip is used more frequently than any other type on construction work. Its cost, ease of application, efficiency and adaptability are responsible for its extensive use in preference to other types with greater efficiency such as leaded sockets or wedge socket connections. Clip connections can develop efficiencies of better than 80 per cent when properly applied but connections of this strength are rarely found. Many riggers prefer to stagger clips on clip and thimble connections for no other reason than that they have always made such connections in that manner. The "U" bolt when drawn too tight as they frequently are, crush the wire line at the point of application—kinking the strands at that point. If the "U" bolts are placed on the free end of the line, the friction around the thimble reduces the load on the line at the clip, thus offsetting in a measure the decreased strength due to the crushing effect of the bolt. When applied in the opposite manner the full load is subjected to the weakened section directly under the bolt. Better connections are made by using more clips rather than to apply a few in such a manner that the rope is crushed. Clip connections on new lines should be watched very carefully until the line takes its stretch. As the strands adjust themselves under load and compress the hemp center, the rope decreases in diameter, thus loosening the clips. The contractor's standby, much maligned by safety men as being dangerous, is far more efficient and dependable than some clip connections commonly found on construction work. While the half hitch kinks the line and reduces its strength probably 50 per cent the connection is dependable up to this limit even when applied in a relatively careless manner and the load on the line rarely reaches 50 per cent of its ultimate strength. The wedge socket has some advantages over other connections in efficiency and ease of application but is more expensive and does not have the adaptability of the clip.

Wire Rope Accidents

Accidents in which wire rope is a factor are not limited to those caused by the failure of the line itself. Our records show that accidents due to wire rope failures are quite infrequent, there being only one in the construction industry this year. In this case a boom line on a derrick parted and two men were struck by the falling boom. There are others, however, in which wire rope is a factor but not the cause of the accident. Just recently a laborer on an operation in Cincinnati was killed when a splice in a hoist line made with one clip failed, allowing the platform of the inclined hoist to run to the bottom of the incline, crushing the workman against a pile of lumber. Two workmen were electrocuted in Akron when the lines of an excavating machine came in contact with a high tension wire. A workman received a fractured skull when a hook pulled off of a lug on a section of steel stack which was being moved along the floor by means of a winch. He was standing about 20 feet from the stack and about 3 feet from the line when the hook snapped back and struck him in the head. We receive numerous reports of lacerations and falls caused by men running into moving lines placed near the floor and not infrequently reports of mangled hands and arms which have been drawn into snatch blocks and sheaves located within reach of workmen.

Accidents of this kind are of sufficient frequency and severity to warrant the

constant attention of the safety engineer on construction operations. Some of our contractors put their sheaves up out of reach and provide barriers for all running lines near the floor or ground as a means of preventing accidents from this source. In my opinion, rules of standard practice governing the use and care of wire rope and the various types of connections should be made available to every user of wire rope as a means of increasing the life and safety of wire rope and of reducing the number of accidents in which it is a factor.

CHAIRMAN RICHARDS: I want to thank you, Mr. McMurchy, on behalf of the Association. Now Mr. Widua wishes to make an announcement about the news-letter.

GEORGE WIDUA (Woods Brothers Construction Company, Lincoln, Nebraska): We are trying to make our *News-Letter* a monthly letter. Last year we sent out seven letters. This year we want to do better than that, but we must have your help in order to do it. If any of you have anything which you think would be fitting for our *News-Letter*, won't you please send it to Lincoln, Nebraska?

CHAIRMAN RICHARDS: There can be a lot of good done by means of the *News-Letter* and I would like to see everyone cooperate with the committee.

ADJOURNMENT.

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Electric Railway Section

New Section Officers

- General Chairman*—E. K. EASTHAM, St. Louis Public Service Company, St. Louis, Mo.
Vice-Chairman—H. K. BENNETT, Providence Safety Council, Providence, R. I.
Vice-Chairman—MELVIN W. BRIDGES, Chicago Rapid Transit Company, Chicago, Ill.
Vice-Chairman—GLENN H. SHAW, Northern Ohio Power and Light Company, Akron, Ohio.
Secretary—PAUL HOBSON, East St. Louis and Suburban Railway Co., East St. Louis, Ill.
Poster and Slide Committee Chairman—L. R. BROWN, New York State Railways, Rochester, N. Y.
Membership Committee Chairman—SAMUEL H. REID, Bureau of Safety, Inc., Chicago, Ill.
Membership Committee Vice-Chairman—ARTHUR GABOURY, Province of Quebec Safety League, Montreal, Canada.
Publicity Committee Chairman and News-Letter Editor—BUELL W. NUTT, The Safety Equipment Service Company, Cleveland, Ohio.
Program Committee Chairman—T. G. BRABSTON, Birmingham Electric Company, Birmingham, Ala.
Engineering and Statistics Committee Chairman—EDWARD MALTZ, The Cleveland Railway Company, Cleveland, Ohio.
Executive Committee: THE OFFICERS AND
R. W. EMERSON, The Cleveland Railway Company, Cleveland, Ohio.
G. T. HELLMUTH, Chicago, North Shore and Milwaukee Railroad Company, Chicago, Ill.
D. L. FENNELL, Kansas City, Public Service Company, Kansas City, Mo.

Retiring Officers

Chairman, A. W. KOEHLER, The Milwaukee Electric Railway and Light Co., Milwaukee, Wis.; *Vice-Chairman*, H. K. BENNETT, United Electric Railways Company, Providence, R. I.; *Vice-Chairman*, E. K. EASTHAM, The United Railways of St. Louis, St. Louis, Mo.; *Vice-Chairman*, MELVIN W. BRIDGES, Chicago Rapid Transit Company, Chicago, Ill.; *Secretary*, J. E. STOTT, Georgia Power Company, Atlanta, Ga.; *Poster and Slide Committee Chairman*, L. R. BROWN, New York State Railways, Rochester, N. Y.; *Membership Committee Chairman*, W. H. BOYCE, Pittsburgh Railways Company, Pittsburgh, Pa.; *Publicity Committee Chairman and News Letter Editor*, BUELL W. NUTT, The Safety Equipment Service Company, Cleveland, Ohio; *Program Committee Chairman*, GLENN H. SHAW, Northern

Ohio Power & Light Co., Akron, O.; *Engineering Committee Chairman*, W. F. HANNA, United Railways and Electric Company, Baltimore, Md. *Executive Committee*: THE OFFICERS AND R. W. EMERSON, The Cleveland Railway Company, Cleveland, Ohio; G. T. HELLMUTH, Chicago North Shore and Milwaukee Railroad Company, Chicago, Ill.

October 2, 1928

A. W. KOEHLER, Chairman

The Milwaukee Electric Railway and Light Company
Milwaukee, Wis.

The first session of the Electric Railway Section at the Seventeenth Annual Safety Congress, was called to order at ten o'clock, by the chairman, A. W. Koehler.

CHAIRMAN KOEHLER: Doubtless many of you were present at the opening session yesterday, have already been officially welcomed, and have had extended to you the greeting of the President of the National Safety Council, but there are some who perhaps came in this morning, so I think it not out of place to extend to you a very warm welcome to the first of our meetings of the Electric Railway Section.

According to the custom, which was adopted a year or two ago, and one which I think is a good one, I am going to ask you to rise and very briefly state your name and connection so that we may break down any little formality that may still remain.

(Each member in turn then arose and announced his name and business connection.)

CHAIRMAN KOEHLER: Now that we are better acquainted and all know one another, we may proceed. I think it is inspiring to learn to know one another as well as the respective interests we represent and to know that there are many men here from all sections of the country. If there is any doubt in the mind of anyone, of the interest of the electric railway industry in accident prevention, I think that doubt will be dispelled by such a demonstration as we have just had.

According to the program, you might be led to expect some remarks from your chairman concerning the noteworthy accomplishments of the section during the past year. I do not want to take away from the officers of the section, the members of our committees, the leaders of those committees, the privilege of telling you personally what their respective committees accomplished during the past year. Were I to even attempt to sketch their various accomplishments, it would simply be a duplication and a repetition, so that I know you would much prefer to see these men who have done these things and hear from them the things that they have accomplished.

I am going to satisfy myself (and I think you) with a statement of a very few concepts that have come to me as a result of my observation of the trend in accident prevention in the electric railway industry. I think it is encouraging to find a growing disposition on the part of electric railways to delve more deeply into facts. I think in the past we have confused cause and effect. We have been prone to jump at conclusions. We didn't search deeply enough. We said that this man was injured because he fell. The cause of that fall perhaps wasn't clearly established. We were prone to say a man was injured because he was careless. That is an easy thing to say. Perhaps we are all guilty of being just a little bit lazy mentally. Perhaps we ourselves had a greater responsibility for accidents in the past than we cared to acknowledge or admit. Perhaps our methods

in every instance weren't in keeping with the progress that we had made in other directions. Perhaps our supervision wasn't as keen as it might have been. In any event, I am convinced that now, we are searching more deeply and we are finding enlightening facts. We are able to determine causes, and we are promoting accident prevention work in the electric railways in the country in a way that it hasn't been done before. I think it is very encouraging.

The safety engineer has an ally now in the general manager, the assistant manager, the superintendent, and in the foreman. There has been promoted a spirit of cooperation between departments that unhappily didn't exist all the time in the years past. We are going to hear a lot more about that in the papers that are going to be presented very shortly.

With these few remarks I am going to at this time call upon Mr. Allison, who will report for Mr. Boyce, who is unable to be here. Mr. Boyce is Chairman of the Membership Committee. Membership is one of our most important activities, because without membership, all of these other things would be in vain. Mr. Boyce has had a very important job and he has filled it as ably as all other jobs he has ever undertaken.

Report of the Membership Committee

By W. H. BRYCE
Chairman

As quickly as possible after October 1, 1927, I was so fortunate as to accomplish the formation of a committee composed of fifteen gentlemen all of whom are well known either for their safety activities or in the management of railway properties. I assigned to each territory comprising one or more states, the size of the territory assigned depending upon the number of street railway companies in each district classifiable as fair prospects for membership.

Each of the committeemen was furnished with a list of the prospective properties in his territory and I have kept in touch with all by correspondence supplemented by suitable literature produced by the Chicago headquarters of the Council, such as *News Letters*, etc., which have been sent to the committeemen in sufficient quantities to permit furnishing copies to each of their prospects.

I wrote letters to the ranking officials of each of approximately 110 holding or management corporations throughout the United States and Canada, outlining benefits to be derived from association with the National Safety Council. Very courteous replies were received from fourteen of these companies.

It is regrettable that the membership of the Section shows a net loss of five companies for the year, seventeen companies having withdrawn, while twelve companies have become associated with the Council. As of October 1, 1927, the Section had a membership of 245 companies. The membership now is 240.

I would make the recommendation that Chicago headquarters continue its efforts to obtain an accurate list of railways which have membership as a result of affiliation with some of the large holding companies. In several instances my committeemen have reported that roads solicited by them have replied that they held membership because of affiliation with some holding company. This condition makes it rather embarrassing to the committeeman making the solicitation.

I want to take this opportunity of thanking Mr. Koehler, and Mr. Cameron and his staff, and all the gentlemen who have so generously given of their time and efforts as committeemen and for the thorough cooperation shown. The fact that we show a loss for the year is due, I believe, not to any lack of conscientious effort on the part of your committee, or the staff officers of the National Safety Council, but rather to the unhappy situation in which the electric railway industry finds itself at the present time.

CHAIRMAN KOEHLER: You see from the report just read by Mr. Allison, the extensive organization created by Mr. Boyce and the imposing personnel of his committee. He has done a masterful job. We are certainly greatly indebted to him.

I am going to ask Mr. Shaw if he now will give us a report of the activity of the Program Committee.

G. H. SHAW (Northern Ohio Power & Light Co., Akron, Ohio): I haven't prepared any extensive report of the activity of your Program Committee. The program should speak for itself. I want to say that this was not a one-man committee or a one-man job. I had very capable assistance in preparing the program that you are about to hear. The other members of the committee were Mr. Koehler, Chairman, Mr. Hellmuth, Past Chairman, and Mr. Bush, of Boston. We have endeavored to bring out subjects which we thought would be of interest to all of you. We solicited suggestions from the membership and officers of the section, and received a large number of useful suggestions, of which a great many were used.

The Chairman mentioned the fact that in former years we have not had sufficient time for discussions. Therefore, we attempted to arrange this program so that you will have time to conclude all discussions. You will notice on the last day, or Thursday, there are about two items on the program. We would like to have you make notes of any questions or anything that you want to ask, and if you don't have the opportunity prior to that time, present them on that morning. I don't think it is necessary to say anything more about this program. You can draw your own conclusions. If you like it, we will be pleased. We only hope that you will be able to take something home with you worth while.

CHAIRMAN KOEHLER: Thank you, Mr. Shaw. Is Mr. Buell W. Nutt in the room? Mr. Nutt is chairman of the Publicity Committee. All of you have received copies of the *News Letter*. The *News Letter* speaks for itself. I needn't go into detail to tell you all of the things Mr. Nutt has done. I might say this, I believe we are the only section that has had a printed *News Letter* put out in the forms in which you have received it. That was begun in the previous administration and was continued through the year. We found too, that there was no interruption. Mr. Nutt began where the previous committee had left off. He worked untiringly and did a splendid job. He had hearty cooperation from various members of the section. The vice-chairman of the section as well as other members, contributed very largely to the material that you found in the news letter.

I will now ask Mr. L. R. Brown to report on the activity of the Poster and Slide Committee.

L. R. BROWN (New York State Rys., Rochester, N. Y.): Our committee got under way early in the season. The new committee was appointed and working by the first of November. The first thing we did was to review all the old posters which had been issued by the Council for the Electric Railway Section. There were about three or four hundred of them, I think. We selected from those old posters, subjects for new posters. It was a rather hard thing to do, as you can imagine. We had to go to work on those 400 or so, old posters, to find subjects for new ones. However, we got quite a few under way, and then we sent out circular or personal letters to 50 of the most important of the electric railway companies in the United States.

We asked those 50 companies if they wouldn't send in some suggestions for posters, and if they would be willing to cooperate in sending in photographs. We received just one reply from those personal letters. In that one reply the company stated if we would be more specific, they would send in a photograph. We immediately sent back a specific problem or specific subject, but we didn't get that photograph.

However, we had previously received from other companies, several photographs, and we also went to work on the photographs of the National Safety Council, so in a short time we had out a sufficient number of posters for this year, and probably there will be one left for next year.

Recently, during the latter part of the year, the subject of slides came up. Mr. Schrieber, from Albany, brought that to our attention. Our lantern slides were pretty well out of date. Most of you people probably know that. In fact, lantern slides themselves are out of date. Film strips are now the thing. Most everybody has a machine for film strips. We started in to revise the lantern slides and get out film strips. At the present time, we have a list of 50 subjects to go on the film strips. We followed out the idea Mr. Schrieber had, which was to approach the subject of a train man's activity from the time he left home in the morning until he got back home at night.

For instance, the first slide shows the train man leaving home in a happy frame of mind, kissing his wife goodbye, and so on. The idea is, everything must be happy in the home if he is going to have a successful day, without any accidents. It will be the work of next year's committee to get those fifty subjects in order so that the film strips can be gotten out. I think that is the entire report.

CHAIRMAN KOEHLER: Thank you, Mr. Brown. Mr. Bennett, won't you give us just a brief report of the activity in which you were particularly interested?

H. K. BENNETT (Providence Safety Council, Providence, R. I.): The only factor I had anything particularly to do with during the year was the proposition of having a permanent secretary for the section. You know, the Petroleum Section started two years ago with a permanent, paid secretary, who devotes his entire time to that industry.

It was suggested at one of the Chicago meetings that the Electric Railway Section might find itself in a similar position and desiring to have a man do full time work for the Section. The result of that was, the committee queried the membership. Whether the committee did not fully apprise the membership of just exactly what was intended, or didn't make it understandable enough for the membership, is accountable for only around fifty replies (if I remember correctly) being received, I cannot say. It was found that it was a fifty-fifty proposition as to whether or not such a thing was deemed advisable.

I am not going into the details of the replies from each one of the members, because that would entail too much time. But your committee feels, and the national officers of the Council feel, that it is a matter that should not be dropped at the present time. They feel if the membership is made more fully acquainted with the desirability of having a full time secretary, that they will give the matter more favorable consideration. I might say in passing that a number of the members thought that the American Electric Railway Association should have a paid man on their staff, who would function with the Electric Railway Section of the National Safety Council. That matter is still under consideration. I had a conference with Mr. Storrs and Mr. Welch in that connection a few months ago.

In any event, your committee recommends, owing to the desires of the National Office and the broad scope of the question itself, that the matter be not allowed to drop with the indefinite report of your committee at the present time, and that either the present committee or another committee carry on the work during another year with the assistance of the National Office, and bring again to the attention of the membership perhaps with a broader viewpoint, this matter, so that they may better understand the situation. Perhaps a year from now, the committee may have a more satisfactory report.

CHAIRMAN KOEHLER: Thank you, Mr. Bennett.

The first speaker scheduled to address you this morning, according to the program, is Mr. John J. Reynolds, Claims Attorney, Boston Elevated Ry. Co., of

Boston. Mr. Daniel Fennell, the second speaker, has requested that he be permitted to speak first. Mr. Reynolds has very kindly consented to that change, and we will now listen to the discussion.

Overcoming Transportation Hazards

By D. L. FENNELL

General Superintendent of Transportation Kansas City Public Service Company, Kansas City, Mo.

The chairman of your Program Committee in requesting that I prepare a paper for this meeting, has assigned a subject so broad in scope, as to make impossible to properly cover in any reasonable time, but I will endeavor to keep within the limit allotted.

The matter of accident hazard is one in which every transportation man, particularly those engaged in the Electric Railway industry, is vitally interested, and of major importance in efficient operation in this day of unlimited competition. The advent and popular use of the automobile and motor propelled trucks has given to the transportation operators within the past fifteen years, a problem more difficult of solving than any other that has confronted the industry since its inception.

Prior to 1912, the use of motor driven vehicles was confined to a limited number, but since that time, the production and use of such equipment has increased by leaps and bounds.

Organized accident prevention work on the part of Electric Railways was, in so far as I can ascertain, almost unknown fifteen years ago. Today, all wide awake Electric Railway managements are carrying on accident prevention campaigns.

In 1912 there were less than two million automobiles. Today, there are in this country approximately 23 million, and hundreds of thousands of trucks, with street capacity much less than fifteen years ago. Few cities have as yet awakened to the necessity for a prohibition of parking to increase street capacity, and very little has been done towards actually widening our traffic ways. In every city thousands of automobiles are parked along the side of car tracks, and an almost countless number are constantly driving on, crossing and re-crossing these tracks, making the problem of safe operation of electric cars a most difficult one.

That the safety work of the City Electric Railways has been successful, is I believe, conclusively shown by the fact that in 1912, there were approximately 3,000 fatalities in street railway operation, and only 1,661, according to National Safety Council figures, occurred during 1927. Of the 1,661 fatalities in street railway operation the past year, 500 occurred in collisions with automobiles or trucks, thus reducing to 1,161 those attributable to other causes. This decrease despite the fact that the street railway speeds have been materially increased the past fifteen years to meet popular demand and competition of motor driven vehicles.

In addition to the accident hazard, due to the increased use of automobiles and trucks, Electric Railway operators have been confronted with the matter of decreased revenues, due largely to automobile competition, which has made necessary reduction wherever possible in expenses, of which amount, that paid out for injuries and damages, is no small part. A condition such as existed fifteen years ago when there was practically no accident prevention work, if still in effect today, would, no doubt, spell bankruptcy for any street railway.

Rapid strides have been made recently towards reducing accidents in all lines of industry, particularly in the Electric Railway field, and the National Safety Council has rendered invaluable assistance to our Industry.

It is my desire to confine myself to the accident hazard only in so far as it concerns actual operation of the cars, as I feel the matter of employees' safety

can, and has been more efficiently covered in other Papers presented at this, and other meetings of the National Safety Council.

My observations lead me to believe that in general, little attention was paid fifteen years ago by Electric Railway operating officials to the accident prevention problem, and such a lack of interest, of course, existed among car operators. Today, every employee is thoroughly alert to the necessity of careful operation.

Your chairman, in extending an invitation to appear before this meeting, requested that I present for your consideration, activities in effect on the property of the Kansas City Public Service Company, with which I have been connected for many years, and with which I am familiar.

I know that there are some properties much more advanced than we in Kansas City, in accident prevention work, but the results that we have obtained, have in my opinion, been so successful, as to be worthy of your consideration.

Fifteen to eighteen years ago, neither the operating Officials nor the trainmen in Kansas City were greatly concerned with accident prevention, although men were disciplined, if, in the opinion of officials, accidents occurred due to gross carelessness on trainmen's part. Today, an entirely different situation exists, and it might be of interest to know how this change has been brought about.

It was necessary, of course, before any comprehensive plan for accident reduction was put into effect, to make a study as to where and how accidents occurred. An addition was made to the general transportation force in the way of a statistical clerk who compiled data of all accidents occurring over a long period of years, and made careful analyses and comparisons. The next step was to secure active cooperation of division operating officials, which was done through meetings of an educational nature, and explaining the need for intensive work throughout the entire transportation organization. Having information as to facts, the division and general transportation officials next carried the problem to those who actually operate the cars;—the trainmen. In a series of meetings held at the various Divisions, the men were given an outline of accident conditions, data as to number occurring, cost, etc., and their cooperation solicited towards obtaining the desired reduction and improvement.

Analyses made as to accidents, developed an excessive number of so called "Boarding and Alighting" accidents; apparently due to the fact that persons were attempting to get on or off cars while in motion. As an aid in improving conditions, the Management equipped all cars with folding doors and steps, thus doing away with open platforms.

The mechanical department cooperated by putting into effect a much more thorough system of inspection and maintenance of equipment. This has been a most important factor in reducing accidents. With this assistance from the Mechanical Department, it was found that car operators were much more interested in reporting defects in equipment, which heretofore they had been prone to neglect.

Educational work among the operating force has, of course, its limitations, without the public in general assisting in reducing accidents.

The aid of the Kansas City Safety Council was solicited, and officers and officials of our company have been taking an active part in the public safety work of the Council. Through the activities of the traffic committee of the Safety Council, much has been accomplished in the way of improving operating conditions, through reduction of traffic congestion. This committee of the Safety Council is composed of men in many lines of industry, including representatives of Taxicab companies, Steam Railroads, engineers versed in traffic studies and City planning work, as well as representation from our company. The Director of Public Works of Kansas City, is at the present time the chairman of this committee, and active in the work of the committee are the Police Commissioners, and captains of the traffic and motorcycle force. The personnel of this committee has the respect of

the general public and newspapers, and gives a contact into all branches of City Government which would otherwise be impossible to obtain.

We are also very fortunate in having had since its organization, men as directors of the Kansas City Safety Council, well fitted for the position they held. The loss of Mr. Julien Harvey to the National Safety Council was considerable of a blow to safety activities in greater Kansas City, but Mr. F. C. Lynch has proved a worthy successor.

The traffic committee of the Safety Council is called on by the City Council to make recommendations on all ordinances affecting traffic, and while there is still, of course, much unaccomplished, conditions have been materially improved. Also, traffic problems in general are handled through this division of the Safety Council. Accident prevention work among the thousands of school children is another part of the Safety Council activity. This aid has been invaluable in our efforts to overcome transportation hazards.

Automatic traffic signal lights at certain congested intersections in the outlying districts have materially improved the accident situation, and the City Council now has under consideration, a bond issue to install automatic signal lights in the business district, which will be a further aid, if installed.

Last December, on recommendation of the Safety Council's Traffic Committee, the Police Commissioners put into effect, pedestrian control at all down town intersections where traffic officers are stationed, which has materially speeded up our operation at these intersections, and reduced the possibility of collisions with persons crossing at these corners.

Some few streets used by our car operation have been made arterial or stop streets, and this has resulted in a less number of collisions with vehicles crossing the tracks.

At the present time there is pending before the City Council, a proposed ordinance recommended by the traffic committee to make certain streets stop or arterial streets, which streets include those on which practically all of our main car lines operate.

Safety zones have been installed at all car stops in the business district, and at many outlying points. With vehicles prohibited from driving on track through safety zones, a marked reduction in collisions with automobiles and trucks has been obtained, and also speeded up operation.

Yellow lines on pavement marking overhang of cars, have been placed at many locations where our studies found that accidents to vehicles and pedestrians being struck by rear end of car, had previously occurred. This class of accidents has been almost eliminated at such locations.

So much for prevention methods on the streets, and through public safety work, and through work of the traffic committee.

Within the past few years, a much more careful selection has been made in the employment of men as car operators. After filling out a preliminary application, applicant is given an inspection to determine fitness for work, by either general superintendent of transportation or assistant, and then must pass a rigid physical examination before being turned over to instruction department. Three days are spent in the instruction school, prior to actual road instruction, and where some fifteen years ago a man was considered competent to operate a car with one week's instruction, our present training period is from twenty-one days at the smaller Divisions, to thirty days at the larger ones. The first seven days of operation alone, a man is checked daily by a representative from Instruction Department, and for a period of ninety days is followed up on an average of once a week, by a travelling instructor. A careful record is kept, through a card index system in the Instruction Department, and this follow-up is not a hit or miss system.

All accidents are carefully investigated by division superintendent or assistant, and the man concerned, interviewed the day that accident occurs. Division super-

intendents send in a written statement, made out in duplicate; one copy of which is sent to the adjustment department, and the other filed in the operator's record.

Twice yearly, the division officials compile accident records of car operators, and the man is called in personally by division superintendent and commended if he has a good record, or advised as to improvement necessary.

Formerly, men involved in accidents due to carelessness on their part, were disciplined by serving days at the foot of the extra list or by suspension. Some five years ago, this feature was discontinued, as it was found that discipline of that kind did not tend to improve a man's work, and also was a hardship on his family, due to reduced pay, and had a tendency to keep his mind on personal matters, rather than on proper operation of his car. Before making this radical change in discipline, the matter was taken up with the division and general transportation committees. In meetings with the men, it was explained that a six months' trial of this would be made, and that final decision would depend on results secured. Although some of the division superintendents were somewhat skeptical as to the outcome, an immediate improvement was noted, as the men were trying hard to reduce all classes of accidents.

To keep the trainmen fully advised as to results, a daily system of bulletins was inaugurated, showing in chart form, the number of accidents, a general classification of those chargeable to each division, and explanation as to number apparently avoidable, and how same could have been prevented. These bulletins are posted at divisions not later than noon of the day following, and although this system has been in effect for many years, we find the men still greatly interested.

Early in 1919 our employees and officials worked out and adopted an Employee Representation plan for handling all matters affecting operation and working conditions. Much assistance has been received from this committee system. At each division there are elected each year from the employees, committees of three men at larger divisions, and two men at each small division. These men, with division superintendent, and assistant, constitute division committee. Equal representation of division officials and elective members of their committee, make up the general transportation committee, of which general superintendent of transportation is chairman. Similar committees function in all other departments.

We have never tried the bonus system in effect on some properties, but as an incentive towards improvement, and to create rivalry among divisions, an accident table was worked out by operating officials and general transportation committee.

Under this plan accidents are divided into five major classes and a certain number of points are allowed for the best record in each class, according to the importance of that particular type of accident. Points are also awarded for the greatest percentage of improvement over the month previous and over the same month for the year previous. All accident comparisons are made on a basis of car miles operated, or 1,000,000 passengers carried.

A prize of \$50 per month is awarded to the division making the best record, and a \$25 prize to the division next in line. A \$25 prize is also given to the motor coach division making the best record; there being only two divisions operating coaches. Division making best record for year in accordance with this schedule, is given a banquet or outing, and a trophy to display at their headquarters.

In competitions of this kind there is usually a tendency on the part of a few to avoid if possible, reporting all accidents in order to better their own, or division record. These unreported or "Blind Accidents" constitute a serious problem for the claim or adjustment department, and also cause the company to pay out large sums of money. To minimize this class of accidents, our plan provides for the awarding of prizes to those divisions making the best record in this respect. Each "Blind Accident" charged to a division carries such a high penalty that an other-

wise splendid record would be practically wiped out, and minimize the chances for division winning the monthly prize.

Prior to our intensive safety work, we were involved in many car collisions, serious in nature, and costing thousands of dollars, and resulting in serious and some fatal injuries to passengers. In 1912 there were 333 of this class of accidents, as compared with 106 in 1927, a reduction of 68.2 per cent. A comparison of 1922 with the year 1927, shows 164 in 1922, as against 106 in 1927, a reduction of 35.4 per cent. In 1912 we had 1.43 car collisions per 100,000 car miles, and last year, 0.44. Our record for 1928, based on eight months' experience, will be even better. Of the 106 car collisions occurring last year, few resulted in other than bent fenders or touching bumpers, and little or no injuries to passengers. This has resulted in a big reduction in amount paid for injuries and damages.

In the early part of 1927, with revenues constantly reducing, it was necessary to make drastic reductions in operating expenses, and decision was reached to put into effect one-man operation on all cars in greater Kansas City.

Prior to July 1st, 1927, 37 per cent of our car miles were one man operated, and between July 1 of last year, and July 16th, 1928, changeover to 100 per cent one man operation was made. To accomplish this in the short space of a year, it was necessary to instruct approximately 600 conductors, and 250 motormen in the details of one man car operation. This greatly increased the work of the instruction department, but we are able to say that changeover has been made without a single serious accident that is in any way chargeable to the change to one man operated cars. Our peak schedule calls for approximately 700 cars in service.

In making this change to one man operation, all possible safety devices were installed on cars, including rear exit treadle interlocked with brakes, as well as features to make door operation impossible when car is in motion.

All of our cars are single end, and unfortunately the majority of outlying termini are so located as to make looping impossible, so a "Y" movement must be made. Accidents have occurred to vehicles and pedestrians being struck by rear end of car during the backing at "Y," and in making changeover to one man operation, there was installed on these cars a rear end control feature which enables operators to back car from rear end. Although this safety feature added \$30,450 to the cost of remodeling cars, it was thought necessary to install, and eliminate this accident hazard. With one man cars backed from rear making "Y," there have been no accidents of this nature since changeover to one man operation.

As an aid in reducing the number of so-called "Falling in Car" accidents, sometimes caused by sudden starting, a line breaker switch was also installed on cars at the time of rehabilitation. This switch between controller and motors, opens if operator attempts to feed too rapidly which would cause surge on motors. Opening of this switch automatically prevents car jerk from improper feeding of controller. Installation of this feature was at an expense of \$81,720.

Safety meetings conducted by division superintendents and assistants, are held each week with all men at divisions on the extra board, and once each month, a general meeting for all men at the divisions is held. This really is two meetings, in that one is a day, and one a night meeting.

Our committee system provides for safety committees, meeting once a month with division officials and taking up the many details of accident prevention work.

Men at each division by popular vote, elect from their own number, team captains, who in turn select from operating personnel, their own teams; and the winners on these teams each month receive various prizes.

While we have made reductions in majority of accidents, we have not been so successful insofar as vehicle accidents are concerned. This is largely accounted for by the great increase in automobiles in Kansas City. In 1912 there were 4,519

automobiles in Kansas City; in 1927, 79,763; over sixteen times as many as were on streets in 1912. Vehicle accidents during this same period increased 104 per cent, with 2,571 in 1912, and 5,254 in 1927. A large part of this increase, however, can be attributed to conditions existing the latter part of 1918 when almost the entire transportation force left service, making necessary our hiring and training some six thousand men to obtain a force of 2,000 competent trainmen.

A comparison of 1922 with 1927 shows 4,980 vehicle accidents in 1922, and 5,254 in 1927, an increase of only 5.5 per cent. In this five-year period, automobiles in Kansas City increased 54.3 per cent; from 51,688 to 79,763. Vehicle accidents in 1912 were 1.11 per 10,000 car miles; in 1922, 1.99 per 10,000 car miles; and in 1927 there were 2.16 for each 10,000 car miles operated.

Most gratifying of all is the reduction in fatal accidents; there being only 16 chargeable to car operation in greater Kansas City, in 1927, as against 33 in 1912; a decrease of 51.5 per cent during this period. Also, the majority of such fatal accidents occurring in 1927 were ones which our operators could in no way have averted, they being due to gross carelessness on the part of automobile drivers. This total of 16 deaths in street railway operation is considerably less than the number killed by automobiles in Kansas City last year, and we can say without fear of contradiction, that the street car is today the safest means of transportation.

From January 1, 1923, up to and including the first eight months of 1928, we carried in greater Kansas City, 693,751,207 revenue passengers, and 369,317,933 transfer passengers, or a total of 1,063,069,140 passengers, without a passenger fatality.

Starting two years ago, I requested and have been receiving accident data from fifteen or twenty companies comparable with Kansas City as to size, operating conditions, etc. This information is charted and posted, along with comparison of Kansas City record, at our divisions. This has been of benefit in keeping our men interested in their endeavors to further reduce all classes of accidents, and make as good if not a better record than other companies.

We are not as yet satisfied with our accident record, and must constantly carry on if we are to improve, or even hold our own, in the battle to overcome transportation hazards.

Before concluding, I should like to make a statement with which many may disagree, and that is: It is possible to go to extremes which may react unfavorably. I sometimes wonder if we have not already gone a little too far in being overly cautious as to attempting to prevent accidents with automobiles and trucks. As it is, most of us are constantly telling our men to slow up, and have car under full control at all street intersections, and I am inclined to believe that this hesitancy or giving of right of way to autos, makes the drivers more careless, and puts the burden of preventing collisions almost entirely on the railways company. No doubt, were we to dispute the right of way with truck or auto drivers, there would for a little while be a considerable increase in accidents with vehicles, but I am of the opinion that within a short time conditions would be much improved over what they are today, in that drivers would become more cautious.

CHAIRMAN KOEHLER: We are very grateful indeed, Mr. Fennell, for this detailed account of the activity which is being promoted by your company. Doubtless Mr. Fennell's remarks have caused many others to think about the things he has said, and have precipitated some questions.

S. J. HENKEL (Pittsburgh Railways Co., Pittsburgh, Pa.): I understand the \$50 is awarded to the division making the best record over the previous month. How is that awarded, how is it distributed, and in what way is it used?

MR. FENNELL: Well, it would be quite difficult to explain how it is awarded other than through the schedule of points. We worked out these tables so that it

gives every division a fair trial, no matter what number of miles they operated or what the conditions are under which they operate. The money itself is given to the division committee, which is composed of the general committeemen and the Brotherhood trustee of that division. They put that into a fund. Each division, through its Brotherhood organization, is allotted out of the general treasury of the Brotherhood, so much each month for social activity. They add this to that. For instance, one division that has been most fortunate in winning the \$50 Accident Prize, was economical and hung on to their money for a year. They added it to what they received from their allotment and gave to the entire division force, a chicken dinner picnic. They had about 950 pounds of fried chicken.

L. R. BROWN (New York State Rys., Rochester, N. Y.): Are the men paid for their time in attending those meetings?

MR. FENNELL: Generally, they are not. That is, these meetings I speak of. Last year, we inaugurated, not so much for safety, but for things in general, what we called (for want of a better name) "Sales Conferences," where we brought in to the main office groups of 50 men at a time, including every car and bus operator. We had them for an all-day session after the morning rush at nine o'clock, until four-fifteen in the afternoon.

W. F. KEELER (3rd Avenue Railway System, New York): Do you use mirrors in one-man cars? We do in buses.

MR. FENNELL: We use them both inside and out. The outside mirror gives a vision of the rear step. We have an exit at the rear, and the outside mirror is so focused that the operator can see a person stepping off when the door opens, thereby eliminating the danger of the passenger's clothes being caught in the door.

W. J. ROUNTREE (Georgia Power Company, Atlanta, Ga.): I wanted to ask Mr. Fennell in awarding the division prizes, if the operating conditions on the various divisions are sufficiently similar to avoid getting a reaction from one division that another division had the better chance to win. What brought that up was your statement that one division had been very successful in winning the prizes.

MR. FENNELL: We think, and the men think (in working it out with the committee) that they have equal representation. Each of the divisions has practically the same conditions, the same open track, and the same congested sections. By putting it on the mileage basis for every 100,000 passengers carried and so forth, we feel it is very fair. We have never had any criticism of that nature at all.

MR. ROUNTREE: We found it necessary, down in Atlanta, to change our system from straight monthly competition, to improvement over the same month of the preceding year, each division thereby working against its own record made the previous year.

MR. FENNELL: Yes, I also mentioned that we use the records of the preceding year as a means of determining progress.

MR. STOUT (Altoona Valley Ry., Altoona, Pa.): In connection with the window wipers, I just wondered what success you had with them?

MR. FENNELL: It depends upon what you call success. They clean off snow, rain, and a light sleet.

MR. STOUT: Our company experimented quite a bit and hasn't found anything yet that is entirely satisfactory. Of course, on the buses, the window wipers work all right.

J. R. NOTT (Pittsburgh Rys. Co., Pittsburgh, Pa.): The question of conversion to 100 per cent one-man operation, no doubt, has been very interesting to our entire delegation. How did you take care of the surplus men?

MR. FENNELL: We felt in going to one-man operation, that it was an economy measure principally, but at the same time, we felt that the public should receive consideration in that economy. We increased the service some 25 per cent, which automatically took care of the men who had come off of the rear end. We anticipated this some eight or nine months prior to its becoming effective, and

we hired no men prior to that time. It now stands that way. We haven't hired any men in Kansas City since January of 1927.

MR. NOTT: No men were let out?

MR. FENNELL: No men were let out. There were some men, however, that would, within a very short while, have been in order to retire. Even without the one-man feature, those men have been retired on pension, or have been furnished lighter positions. For instance, one man is now running the elevator in the main building. We are very proud of the fact in Kansas City that we have never had a wholesale forced reduction in our transportation department, and we don't expect ever to have one.

CHAIRMAN KOEHLER: If there are any further questions relating to this paper, will you please reserve them for the discussion on Thursday morning? Our time is getting shorter and we must proceed.

Our next subject is the Promotion of Accident Prevention Through Interdepartmental Cooperation. That subject is going to be presented by Mr. John J. Reynolds, Claims Attorney, Boston Elevated Ry. Co. Mr. Reynolds also represents the Claims Association of the American Electric Railway Association, with which our Section has very cordial relations.

Promotion of Accident Prevention Through Interdepartmental Cooperation

By JOHN J. REYNOLDS

Claims Attorney, Boston Elevated Railway Company

Accident prevention work falls logically into two principal divisions: Industrial and Public. We shall deal chiefly with the former.

A minute inquiry into the possible causes of *all* accidents would carry us too far afield and is beyond the scope or needs of this paper. We shall, however, refer suggestively to certain conditions under which accidents may, and in fact do, happen.

We know that education, cooperation, safety organizations and methods, rather than mechanical safeguarding, are given larger emphasis in safety work because it is at bottom really a problem of organization and education—that to get the right attitude, to arouse and maintain interest and to get started toward constructive action and follow it up, is the big task.

Right here I wish to refer briefly to one thing which doubtless works toward interdepartmental cooperation, and that is the welfare policies now pretty generally adopted by Electric Railways. I mention it not only as a humanitarian policy, and as a way to keep employees in the service, thus minimizing labor turnover, but as one which promotes both individual and collective interest.

The industrial accident problem and the Workmen's Compensation cost that the railways are seriously facing today, make this subject a particularly timely one. The tragedy of preventable accidents has been like a huge shadow obstructing the sun. Well may we be dismayed by it. Earnest men and women have been sincerely and intelligently laboring for many years to drive that shadow away. To think of it, is like awaking from a bad dream. The heavy toll demanded by this common enemy is the price of carelessness. In spite of all the work that has been done, in spite of all the money its prosecution has cost, in spite of all that has been done to focus public attention upon this awful toll in human life and suffering, it continues to sweep through the country and the industries like a sand storm, leaving in its wake a deplorable human wreckage. In spite of all the efforts that have been made to create a conception of its staggering economic waste, a survey of current accident history makes one pause and ask: What curious impulse is it that causes men to be careless?

Is it any wonder, then, that this accident prevention question is now attracting the widest attention? Never before, it would seem, has so large a public displayed such an interest, not only in the cause itself, but also in what it means humanely and economically. We now take part in safety movements and discussions, and witness experiments which are not limited, as formerly, to a very few restricted groups of industries, of railways and of safety organizations. It is a hopeful sign of our age that even the general public is devoting a keen interest and oftentimes even a passionate interest, in this great work.

If it is true that "there's a sneaking suspicion in some unregenerate quarters that employees get fed up with safety programs," as we recently read in a technical journal, it is unfortunate. That such safety programs are imperatively necessary and important to both the employee and the public may be seen by studying the recent general accident history. "Approximately 95,500 persons were killed in accidents of all kinds in the United States in 1927. A total of 100,000 deaths may occur in 1928 unless greater efforts toward prevention are made." (*Accident Facts-1928-N. S. C.*)

In considering this subject "the element of fatigue should not be lost sight of, for it is a prolific cause of accidents and its economic cost is said to be over two billion dollars per year in production alone. This is at least four times the actual fire loss, and it is not for one year alone, but it occurs, like the fire loss, year after year." (*See: Practical Methods for Relieving Fatigue—Safe Practices Pamphlet No. 50, National Safety Council.*)

Those states in which accident prevention activity has been of longest duration and has been given the most serious consideration have the lower accident frequency and severity rates.

It must be admitted that for the length of time in which Workmen's Compensation has been in operation in the United States, and for the length of time in which intensive accident prevention work has been going on, we have achieved really remarkable results. Since the tendency is toward liberalization of benefits, however, it is manifestly important that there shall be no let up in either activity or intensity to reduce accidents to an irreducible minimum.

From the economic standpoint alone, this necessity is emphasized by the fact that a more liberal policy on the subject of Workmen's Compensation was followed during 1927, by the Legislatures of 31 States, two Territories and by the Congress of the United States, the laws having been extended to cover more workmen, to increase benefits, or to make the laws more effective and just.

Now to discuss briefly the question of departmental dependence. The first fact to be considered is, shall we interpret it as a term of limitation or of extension? We have elected to treat it in a broad or comprehensive sense, since departmental action has an influence on human life beyond department limits, even when such department is not consciously aware of this influence. It excludes the idea of any logical halting place between a thoroughgoing spirit of earnestness and a thoroughgoing feeling of interest. Where obstacles in the road of progress cannot be surmounted, they must be removed. Departmental efficiency is clearly influenced by the number and seriousness of its failures and accidents.

While the performance of each department is measured largely by the results it achieves, they are not in any practical sense isolated departments, and failures or accidents in one frequently are but the beginning of a train of events which affect other parts of the organization. To illustrate, briefly—a preventable failure—a preventable accident—defective car equipment or cars which are not maintained in proper running condition—improper or inadequately designed mechanical or electrical parts—improperly constructed or poorly maintained roadway and track—inadequate power supply—unskillful overhead construction, which is infrequently and carelessly inspected—all affect more than one department, and chiefly, of course, that of revenue.

Departments function only through individuals who represent them. Too often some employees seem not to have had a proper appreciation of the fact that the goodwill and success of the railway is built up or destroyed through their actions, their failure to act, their failure to cooperate, just as much as through failure of the management itself.

The policies of all departments may properly be said to have the same general objectives, hence they should be formulated with a view to protecting not only the interests of *the* department, but of the whole organization. To get the best results in our efforts toward this 100 per cent interest, it is fundamentally important that there should be as few individual differences as possible in the interest of employees, not only in their own special job but in the general business welfare and success of the employer, too. This phase of our problem is not without its difficulties, however, for it presents a question which is rather exploratory and inclusive, in that it may be somewhat of a puzzle to find just the best way to dissipate the individual difference in interest manifested by some employees. Such an attitude should not discourage us, however, since that which puzzled Solomon may well puzzle us also. The entire responsibility to do this rests, in fact, on the management, on department heads, and on all employees generally. Every department is affected by the manner in which this duty is realized and performed. It is this interdependence of all departments of an organization which makes the individual interest and actions so important. Should there be a tendency toward the development of a departmental, as distinguished from an interdepartmental outlook, then obviously it is not conducive to the best interests of the organization as a whole, in that there is then the danger that it will result in taking a restricted view of the *railway's interests*.

This does not mean, of course, that in dealing with other departments a department head and its employees should not protect his department's interests. It simply means that high standards should be observed and that the situation should be viewed in the light of the probable results in the long run, rather than the immediately apparent advantage to be gained.

Heads of departments, superintendents, foremen, and other supervisory officers have in all probability been selected because of special skill which has been acquired, no doubt, through long experience in their particular field. Their training has tended to give them a broad outlook, thus giving them special knowledge upon which to base an appeal for constructive interest. This is particularly true of foremen, inspectors and other supervisory officers, because they ordinarily spend a good part of each day among the workmen, and in that way are able to keep in close touch with, and informed of conditions and tendencies of employees. These close contacts place them in a position where they can be of great service in developing this spirit of interest, and if they are awake to their opportunities, may often make suggestions which will result in spreading this interest to other departments. They have opportunity for constant and more immediate personal contacts than heads of departments, for whom, unless they are big, broad-gauge men, and their action might be colored by what appears to be their own interests. men, the organization is narrowed down to the perspective of their own department.

Departmental activities susceptible of standardization, should be standardized. In some departments many activities can be standardized, although for the operation of the department as a whole, perhaps it is never possible to reach the ideal of complete standardization. Accident prevention work is made effective in day-to-day operations by means of operating procedures. The methods of control of necessity employed by railway managers under modern conditions, tend to focus attention upon such devices. Not that there is anything novel in their employment in the railway business—for a procedure is merely a statement of the accepted way of doing a thing, work—but because of the realization that, with the necessary

delegation of operating details to subordinates, management must assume responsibility for their systematic instruction by providing standard methods.

There is necessity for frequent review, (this cannot be too strongly emphasized for governing conditions are seldom static) and any unusual occurrence or requirement is likely to disturb the existing plan of procedure and require a revaluation of the standards.

The question of the attitude of the individual department employee is too important to be left entirely to chance and his own discretion. It is of grave concern to the railway, and if proper control is to be exercised and systematic interest secured toward the elimination of accidents, the policy defining these relations should be thoughtfully conceived and consistently applied. Only by such means can a uniformly high standard of performance be hoped for. What constitutes a proper standard of conduct from the standpoint of the relation of one department to another is perhaps sufficiently answered by the statement that it ought always be such as will contribute to the best interests of the whole organization—and to its interests only, where there is a conflict of interest.

Interdepartmental interest and coordination is the road to profitable operation of the railway as a whole. It is of no avail to save a minute here or a dollar there in machine work or assembly, if that saving is lost in slow interdepartmental appreciation of the cost of preventable accidents, which not only waste time and lower production, but gnaws at the very vitals of the railway revenue. And so we see that every executive, each department head, superintendent, foreman and employee owes it to himself and to his company, to get the facts on what is being done in his department to prevent accidents, and contribute what he can from his experience toward their complete elimination. Every department head, yes, every supervisory official, is or should be interested in providing ways and means by which his subordinates may receive adequate training and acquire technical skill, and safe habits of conduct, as well as a spirit of cooperation with other departments.

Heads of departments should requisition the purchase of modern machines or tools only, to secure the utmost efficiency and the safety of workmen using such instrumentalities; or, where machines or tools used, are manufactured by the railway, permit the use of only those which are built according to skillful and safe design. Supervisory officials should labor with employees to find the safest way for them to do their work, by seeing that they are trained to be skillful in the use of tools, and by helping them to better ways of working.

Probably no one thing in railway department operation is more important than the safety of employees. Experience has taught that working conditions have a tremendous influence on the safety spirit, and on the character of the work that employees will turn out. That a safe workman is the best safety device, is axiomatic. That more will be accomplished for the prevention of accidents by educational methods than through any other means is an accepted fact. But we must not overlook the further fact, that this presupposes that the railway itself has done everything reasonably practicable to make the place of work safe, both physically and mechanically. Obviously, for accidents due to causes or conditions which were capable of causing accidents, which were beyond the immediate control of the workman, as distinguished from an accidental condition or from a simple act of carelessness or individual behavior, the railway's officials are themselves not free from fault.

Almost every department has some spot where accidents may happen, where some condition is a special accident hazard. Perhaps you already know of such spot or such condition, and are trying to remedy it. Perhaps you are like some other department heads foremen or employees, who do not fully realized the opportunities for greater safety, for greater efficiency, through the use of special guards to protect such spots, and through prompt cooperation to remove those

conditions. In either case prompt attention on meeting such conditions may help you to easily, quickly and cheaply solve many of your accident problems, and thus provide another major economy factor for your department.

Just as vital to the economical and safe operation of the industrial plant of the electric railways as lungs to the life of man, is the question of shop heat and ventilation; therefore, I wish to say just a word about it. Take the two elements, for instance, of heat and ventilation that enter into the question of safety and morale. Are some workers in your shops air-starved, or warm and comfortable while others are too cold to work properly, which, of course, means to work safely? Then why expect efficient or safe work from a shop force where heat and ventilation are neglected? Entirely aside from the obvious humanitarian viewpoint, neglect here is evidence of inefficiency. Men do not work up to standards of either quality or safety, under uncomfortable circumstances, whether of poor ventilation or heat.

Another thing of great importance is your scheme of lighting shops or other places in which men work, for good lighting is the bulwark of good morale and safety, in that it will throw a stimulus around men and women workers that will help them give their best. Deep shadows, sharp contrasts, dark corners and both direct and indirect glare reduce speed of vision, make men slow up; increase eye-strain and early fatigue, which first and last is responsible for a great many accidents. Tired eyes and eye-strain in your shops cost you money. Under the influence of good lighting, however, men are more alert, they remain cheerful at accustomed tasks over longer periods of time, and there are fewer accidents. It may thus be seen how important is this matter of lighting in any undertaking to prevent accidents.

Just as essential as heat, light, ventilation, or safety devices, to preserve the health and safety of your workers, and to help them fight the fatigue which causes accidents, is pure, cool, refreshing drinking water.

Still another important thing in this war on accidents is that you have a clean and an orderly department, and adequate room or space for your men to work in, for cramped working space spells accidents. There is profit in order. A well ordered shop increases safety, increases personal efficiency, and greatly increases output.

In some of the shops of the electric railways, employees are obliged to do their work while seated, which leads us to point out that even such an apparently unimportant thing as a simple work chair, is a factor worthy of consideration in connection with the efficiency and safety of the worker. At home you like a certain chair. Why? Because you rest or work more comfortably. Imagine sitting eight hours or more every work day in the year, on any old chair that was given you. It is not at all remarkable that such an employee becomes tired and fatigued, less efficient, an unsafe worker and more liable to accident. Surely you will agree that employees with spines held erect by proper chairs, lungs breathing free and easy, heart functioning normally with natural blood circulation, are more alert and efficient, that they work more quickly, accurately and safely.

What a wonderful satisfaction a department head must get from knowing that conditions in his department are safeguarding his men, are conducive to health, to cheerfulness and to safety! He is doing his utmost for his men, which should mean that they will do their utmost for him.

Another thing to be considered in any movement looking toward accident prevention, is the necessity of having a prompt and full report of an accident, since a systematic compilation of accident records is the foundation of a well organized accident prevention. Therefore, it is imperative to have an adequate system of reporting accidents, a proper method of analyzing and classifying them, and a workable plan of coordinating the accident activities of the different departments for purposes of effective prevention. It is not by chance that records and

reports of accidents have come to occupy so respected a position in the estimation of the modern executive. As long as the number of accidents remained low, a measure of knowledge of them could be maintained without great reliance upon formal records; but with their increase, this personal knowledge has become impossible and the executive has been forced to develop new methods of keeping informed. His complete dependence upon the accuracy of the reports and records thus requires that their preparation shall occupy an important place in the organization. It has been truly said that statistics alone will not prevent accidents, but the study and analysis of statistics are essential in determining what to do. Maximum success in accident prevention work necessitates tabulations of accidents that will show who, and what, was responsible for each accident, all leading to the formulation and administration of definite plans for prevention.

Still another important thing in our work for accident prevention is to have a "Fact-Finding Body." This has been found to be of great help in reducing accidents, in that it has developed both individual interest and organization efficiency. It is therefore obvious that to do the best work for prevention there should be such an agency, which may consist of a committee of employers, and a committee of employees, or outside experts in personnel work, but preferably the three agencies sympathetically cooperating. The scope of the activities of this agency should at least cover the working conditions, the health, the accident problems of the different departments, for they are the base of regularity and decreased labor turnover, and also because they may mean contentment, as well as the elimination of fatigue and worry, the latter being now a well recognized cause of accidents. The perspective of this fact finding agency, not being restricted by departmental limits, should be able to see the entire problem, and so viewing it, carefully analyze it, and make corrective suggestions before it is too late. By it and through its work the railway is provided with another important and powerful means of coordinating interdepartmental relations, for establishing standards of performance and procedures. This strong coordinating influence is bound to favorably affect your accident rate. This body will unravel the true facts and fix responsibility where it belongs. Where there is no such agency, matters may become hopelessly involved, "alibis" offered, sometimes accusations are made; and departments assume a defensive rather than an understanding attitude in their dealings with each other, and the result is very apt to be that preventable failures and accidents continue to happen. This fact finding agency, however, with mind unfettered, uninfluenced either by sentimental feelings or passion, may be expected to view the subject with the cool, calm eye of an analytical investigator, and courageously deal with causes, reason, and effects, rather than with details or circumstances which may be immaterial. One of its duties might well be to inquire into the physical condition of employees, by having a physical examination not only of the new employee, but a re-examination of others, to determine whether or not he has any physical defect which might seriously increase likelihood of an accident to himself or others.

We shall now consider briefly the educational phase of our problem. It should be remembered that the most valuable activity in behalf of interdepartmental cooperation for the prevention of accidents must take place in the educational field, and that there can never be too much of it. From every point of view, the overwhelming necessity and importance of educating employees and public in accident prevention and safety work is universally recognized.

Our educational work should not take the form of cramming, for it is a usual experience that if one tries to remember too much at once, one forgets more quickly. Nor should we depend too much on "outlines"—that sorry attempt to push camels through the eyes of needles and so administer a get-knowledge-quick course to the employee.

A recognized stimulus to memory is interest, therefore, everything reasonably possible must be done to educate employees and awaken their interest in all departments.

No matter what may be said to the contrary, the history of the accident prevention movement testifies without exception in any state, that the attempt to secure even an approximate reduction of accidents without invoking educational aids and methods is foredoomed almost to complete failure. Nowhere has it succeeded, nowhere can it succeed without the help of these important factors. So, as a final conclusion drawn from this fact, it may be stated that any scheme directed to secure interdepartmental cooperation in preventing accidents should have its base in educational effort.

The educational program must be designed to meet the needs of all concerned, and when so designed it results in harmonizing the interests of all departments and their employees, and hence promotes better interdepartmental interest and safety. Some central authority capable of appreciating the interests of all departments should devise the procedure and see that it is enforced. While your educational program may not always claim, or even require, psychological precision, it well merits general attention for it will make the employee think.

We are conscious how fantastic a thesis one would seem to be supporting who should claim that *all* accidents can be prevented. We now find, however, most of the larger industries including the railways, Government departments and commissions actively engaged in educational work having for its object the fullest blossoming of the safety bud, and where the dangers incidental to industry may be warded off by an ordered regime, common sense and constructive education.

During the past 25 years industry has made its greatest advances in science, and in safety to life, and the railway industry has taken part in this development. There is neither time nor space here to tell about the very large number of things that have been attempted by and for industry to prevent accidents, nor to describe the measure of their success. I shall only note the significant fact, which no thinker has failed to perceive, that there still exists a tremendous gap to be filled or explained, and the formidable leap across to the no-accident side requires the utmost of education and sincere cooperation for safe conduct. Disguise the requirements under any name you may, the clean-cut fact still confronts us, that the great chasm which exists, may be enduringly bridged only by and with the help of the educational and safety factors. Experience records that mechanical safety devices, of themselves, are insufficient. While I shall not burden you with a lot of statistics I wish to stress the fact that safety methods, no accident competitions, building up attitudes and habits of safety in the individual foreman and employee, reduce both the frequency and the severity of accidents.

Don't neglect to warn each individual employee of dangers which may not be apparent. Notices warning of dangers should be conspicuously placed about your shops and premises and, if necessary, should be printed in foreign languages so that your foreign employees may be able to understand them.

We but express a thought that has been worn threadbare from use, when we say that to interest the employees of the railway in the accident prevention movement is something worth working for; just as high farming increases the yield of an acre, so education will increase the yield of the employee in terms of interest and safety.

It has been stated that, "it is fundamental that each foreman should conscientiously recognize that it is part of his responsibility to teach his men to do their work more efficiently," and I wish to add, also to do it more safely. Hence we ask you: are you keeping pace with new developments in your line of work, new methods, new equipment? For new ideas are constantly being perfected. What was considered the "last word" in doing your job a year ago, perhaps is now out of date. The way to keep abreast of the times is to consult and study

the literature dealing with your specialty, attend the group conference meetings of your department, read your company bulletins and develop the habit and practice of keeping up to date. Then you can give maximum service by taking full advantage of all the benefits new safety and economic methods are bringing about.

Department heads should be held responsible for the workers' safety, therefore it follows that a high accident rate should count against the promotion of any executive or sub-executive as it indicates his failure properly to educate the men under him.

Instruct and educate your employees to realize that the absence of sudden shocks, jerks and sudden strains in doing work that requires heavy lifting or other considerable physical exertion will greatly reduce the chances of back injuries, hernias, abdominal wrenching, and any number of other bodily accidents or troubles entailing not only physical pain and disability, but mental anguish as well.

It is several years since our general manager, Edward Dana, pioneered into the field of educating the railway employees on this property, and today this work has become one of the great outlets of cooperative activity in all the departments of the railway. It is the hope and inspiration of all ambitious employees, who are attracted to it by the unusual opportunities it offers for broad self-improvement, for greater occupational information, and especially for increased knowledge of the technique of the railway business.

This sort of educational work is bound to spread and as a result we know that within the past few years there has been decidedly increased cooperation among interdepartmental groups through the medium of meetings, lectures, and varied entertainments, which has made the spread of interest and of good feeling more rapid and permanent, and which cannot but have a steadying effect and be a healthy stimulus toward accident prevention and general efficiency.

In undertaking this educational work the railway embarked upon a venture that has become increasingly popular each year. This simply means that the rising popularity of the educational program, as evidenced by the affirmative and enthusiastic response of the different departmental groups, has brought the railway face to face with the alternative of either continuing this mutually helpful work, or disappointing a very large number of ambitious and earnest employees—we have every hope and confidence that the former will be the course chosen by the railway which, in furtherance of its function as an educative agency for the employees, will include in its yearly educational program the more advanced phases of the transportation business.

Could we properly treat this subject without emphasizing both the necessity and the importance of cooperation? We think not.

We may accept as true the proposition that all departments must cooperate in eliminating accidents. Starting with this premise, it follows that we should understand what is meant by cooperation.

The adjective voluntary as applied to the cooperation of railway employees, or to the management of the affairs of the railway, must not be taken as implying that there is any very wide choice open in those matters, for such cooperation is really compulsory, since if it be foregone affairs will remain either unmanaged or inefficiently managed. It therefore follows that one has flatly no right to conduct one's self as his individual inclination dictates, if so conducting himself means doing what he pleases without regard to the interests of the railway, of one's fellow employees, and the public. This is both an economic and a natural law, for the violation of which, penalties are inevitable; hence we may be sure that necessity will make short work of our aspirations toward utter impunity.

Management and employees,—efficient, willing, intelligent, interested, both on their toes in reciprocal relationships—working with each other and together with dignity and integrity, and in a spirit of mutual helpfulness, and for the promotion

of the best interests of the railway: those are the factors which tend to promote and sustain constructive and safe interdepartmental activity, and in outline is what we understand cooperation to mean.

In connection with the factors thus explained careful consideration should also be given to the following important propositions:

a. The progressive electric railway company is not operating its property just to furnish work for its employees. Some of the things many employees do are so plainly against the interests of both the railway and themselves, however, that one often wonders how and why they act as they do. The success of any railway depends largely upon how well its employees perform their duty—honestly, courteously, without trouble and without accident.

b. If in any department coordination is lacking, if any department fails to properly function at the right time, it indicates a lack of the right kind of cooperation.

c. No matter how good the electric railway, how large the mileage, how great the number of passengers carried per car mile, the financial success of the railway is measured only by net corporate profit or loss. Profitless prosperity does not help either the railway or its employees very much. Finding a way to stop the leakages that prevent net profit or loss, whether this leakage is due to accidents or other causes, so that the fullest measure of net income may be available for the railways, should be a matter of great concern to each of us.

d. Learn to count men among your assets. It is their brains, their alert minds, their eyes, their hands, their efficient operation remaining throughout the work-day, which permits you to lower the cost of running your departments, and hence increase the net revenue.

Therefore, have an open mind—don't disregard, without giving it fair and full consideration, a suggestion made by an employee for the safe conduct or economic operation of your department. When necessary, be big enough to put aside the defense mechanism, by which the mind seeks to expel or repress unwelcome ideas.

A responsive stimulus to interdepartmental cooperation in accident prevention is the appeal to departmental pride to have,—(1.) the longest no accident record; and (2.) the best record for the number of hours worked without a lost time accident.

When the department or even the entire plant has found it possible to go month after month without a single lost time accident, the remaining appeal is to keep up this no-accident record as long as possible.

Such cooperation, such coordination, constructively dwelling in and practiced in a particular department, goes beyond the limits of the particular department to affect the thinking and the attitude of those in other departments. It develops new alertness and interest, and pride develops in the men in all departments, who like to feel that they are associated with the systematic effort and methods that such cooperation reflects.

The personal impressions of railway employees, their likes and dislikes, their naturally favorable reaction to a sense of fair treatment, and their feelings of resentment and their desire to retaliate in the face of sharp practice, all are bound to color their actions. Their personal equation is ever to be reckoned with in business, for no matter how utilitarian or impersonal the organization may seem, it derives its character and tone from the personalities of the individuals whose cooperation gives it life.

Avoid assuming an air of superiority, we must avoid the "highbrow" attitude, for you cannot interest your employees unless you are interested in them and sympathize with them, since behind their forehead is a human brain, and in their breast beats a human heart.

Be tactful, for it is a matter of common knowledge that the chief use of tact is in persuading others to accept one's opinions, and no doubt this accomplishment is as desirable for railway men as for others. Be careful of your criticism, since

when one is critical, one is not necessarily judicial or even logical. An unguarded remark to an employee has been said to be as bad as an unguarded gear. It is important to have your men in the right frame of mind, for what the men think is important to the safety of the whole organization, and to make them think the right things about their employer, is the employer's task—nor is it a small task.

Pretty generally, men work because they have to work; not because they seek excitement or need cigarette money, but because they must support themselves, their home, and those dependent upon them; it follows, therefore, that it is only in rare instances that it is impossible for men to see on which side their bread is buttered. Of course, against stupidity, even the "Gods" labor in vain.

War is not fought in kid gloves. Our war on accidents cannot be so fought, either. It is a never-ceasing fight, and so we plead with you to keep on the battle front, for the plea of the railways for interdepartmental cooperation is a plea to which all departments must listen. Whatever, then, may be one's position with the railway, he is doomed to failure unless he is willing to and does in fact, cooperate to promote the interests of the railway and to prevent accident. It is a principle to which all must subscribe, and upon the altar of which all must kneel.

We're born to duty, stern daughter of the voice of God, and try as we will, strive as we will, we can't shuffle it off. Therefore, those who are unwilling to do everything reasonably possible to promote the principles of interdepartmental cooperation, need feel no surprise if the official thunder clouds swiftly gather and burst with crushing violence on the offenders.

There are yet many things to be done, and many things to keep doing. We should strive to develop a force of employees on a high standard of integrity of character, who will have the devotion of any army and the loyalty born of a deep and sympathetic understanding of human values and human relations and who fully understand and appreciate the necessity, value, and advantages of cooperative methods.

It is more than likely that the next ten year period will see marked advances in the work of accident prevention. The development of any phase of this work is dependent upon the amount of constructive thought given to it and to the action taken upon this thought. The tendency toward better and more scientific personnel work is in itself an index which unquestionably reflects the industry's attitude in this important phase of its business.

The electric railway world has long experienced with dismay the ever present accident menace, with its seemingly inevitable increasing costs, both for industrial and public accidents. With this constantly increasing burden, we may see through the steadily increasing use of the automobile, the jaws of competition slowly closing about many electric railways. One may think that this is strong language. Well, it is strong language. But strong language is sometimes needed and, if it visualizes for us a situation which should be apparent, it may be helpful. The railways are not quite helpless yet, however, for there is a way out. One of those ways is to stop accidents which, it has been estimated, in 1926 cost the electric railways in the United States substantially \$45,000,000. Other economies can also be effected, although these are not for us to discuss at this time. Let us all make our work help instead of hindering, and have no "ducking" of responsibility. Do your job with precision and unfailing accuracy, then we will meet the rigid requirements of electric railway service. Make every factor a favorable factor. If you do it, you will find that it is possible to defeat the closing jaws of competition, pressing on you in your present situation. Unless you do it, although you may now be big and strong financially, you may find that the jaws are relentlessly closing.

This accident problem, in spite of all the changes that have come about, is still the same old problem. One need but study its history to be satisfied of this. Take

but a cursory view of the marvels of modern mechanics, of modern maintenance methods, of the ingenious and useful devices and contrivances designed for and intended to solve this problem—with automatic machines which are almost fool-proof—and then remember that, with safety incorporated in the design, construction and installation of industrial equipment, it is possible to prevent only about 25 percent of industrial accidents through mechanical means, and that for the prevention of the rest, we must turn to educational methods, better supervision and improved morale of employees, one may then realize why the solution of our problem depends so much upon education and the creation of a constant spirit of cooperative safety—why it is necessary to have the fullest possible cooperation between the several departments of the railway, all coordinating to stamp out thoughtlessness and carelessness.

The accident prevention movement, with its roots in the past 30 years of American history, has risen strongly in recent years and is surely, if slowly, leading the mind of the people to a better understanding of the place the movement really has in the hearts of the masses, and also to a clearer understanding of the part that safe conduct plays in human progress.

Cooperating earnestly with the railways, we find the National Safety Council. As the light of the sun is broken up into the beautiful tints of the rainbow, so the transcendent character of the work of the men and women who promote the cause of the National Safety Council is reflected in the safer life of our fellows, to whom we are drawn by one of the best and deepest impulses in our nature.

Worshippers at the shrine of accident prevention are beginning to realize, however, that devotion to the cause and efficacy of methods or volume of accomplishment, do not always go hand in hand. They are discovering, too, that the fight cannot be carried on with too little regard to the cost to certain properties of getting the best results.

Today, one of the most hopeful signs on the accident prevention horizon is the National Safety Council. This organization presents in permanent form the record of what has been done in the field of Safety and the methods by which it has been accomplished. Active membership in and sympathetic cooperation with the Council will not only cut down your expense for accident prevention work, but will also increase the efficiency of your standards.

On its humane side the Council may be said to be a collection of constructive, cooperative acts and records in the cause of a safer life. It is with constant advertency to these two facts that its work must be appraised and interpreted. One cannot say too much in commendation of this work. As a record of achievement, it stands out like torches lighting the way to a more interesting and safer life. From its reports and records there emerges, with critical perception and a humane understanding possessing all the force of life, a wealth of suggestions and analyses concerning a great many questions and practices which are vital to the successful operation and maintenance of the electric railways. In these records is the story of years of constructive endeavor, behind which always is the Council's resolute purpose, amounting to a sense of destiny, fulfilled only when the industrial life of the worker and the life of the public is made as nearly 100 percent safe as is consistent with modern conditions. Its work is unsurpassed in interest and importance. It is far in advance of all other agencies for safety, and it speaks with all the weight of a great authority.

In conclusion, to paraphrase a familiar biblical simile, "Let the heavens rejoice and the earth be glad, let the sea and its billows be roused, let the fields and all in them rejoice, that this fair land of ours has in it such an organization as the National Safety Council, whose work hath found the hearts of the people; and the mountains and hills shall sing praise before it, and all the trees of the land shall clap their hands in approval of its humane purpose and efforts."

CHAIRMAN KOEHLER: We thank you for this very generous contribution. Gentlemen, I must ask that we defer discussion on Mr. Reynold's paper in the interest of time. We still have the paper of Mr. D. A. Scanlon. Mr. Scanlon is the General Superintendent of Railways, Northern Ohio Power and Light Company, of Akron, Ohio.

One-Man Car Operation from a Safety Viewpoint

By D. A. SCANLON

General Superintendent of Railways, Northern Ohio Power and Light Company, Akron, Ohio

During the past decade, the cost of furnishing electric transportation has steadily increased and during this same period practically all operating companies have faced serious competition from both the independent bus and the individually owned automobile. Of the two competitors, probably the latter has been and still is the greater menace to the very life of the electric railway business.

Many railway companies have practically overcome bus competition through the acquisition of independent lines. This has been accomplished usually at a tremendous cost to the operating company, whether the lines were purchased from independent operators or established by the company. A very substantial investment was necessary to inaugurate bus service. New buildings, equipment and workmen were required to operate this new phase of transportation, which a few years ago appeared to be more or less of an experiment. However, at the present time, there appears to be no question as to the necessity or permanency of the bus as a transportation unit.

Regardless of the expense involved in overcoming bus competition in many localities, it has been accomplished; but competition presented by the privately owned automobile has not been overcome by transportation companies. Present indications are that it cannot be overcome. Not only have we suffered the loss of revenue from fewer passengers carried, but we have been seriously handicapped by the very instrument which has taken our business. Traffic congestion in many of the larger municipalities has become so acute that it is almost impossible to operate a passenger carrying vehicle, whether car or bus, with any degree of accuracy or efficiency. This is another feature over which the transportation organization has very little control. In this connection, I might say I am convinced that operating officials, and particularly safety engineers, should cooperate very closely with local safety councils, city officials and chambers of commerce, in regulating traffic to the best interests of all concerned. I regret to say we do not have a local safety council in Akron, however our company is represented, through our safety department, in all activities in this direction and our problems have received favorable consideration through this contact.

I have mentioned briefly some of the major factors, particularly decreased revenue, which, to my mind, were the principal reasons for many railway companies inaugurating one-man car operation. During the past five or six years, most railway companies have established one-man car service to some extent. In a few of the larger cities the one-man car is operated only in sparsely settled districts, where few passengers are carried and traffic is not congested; however, the one-man operated car is proving its efficiency to such an extent as to justify its exclusive use in some urban centers. Not only has the one-man car proved successful in urban service, it is now being used exclusively on some interurban lines with a marked degree of satisfaction. An example of such operation is the line from Buffalo, New York, to Erie, Pa.; from Alliance to Canton, Ohio; from Akron to Wadsworth, Ohio; and from Canton to Massillon, Ohio. The last mentioned line

maintains a fifteen minute schedule during an eighteen hour day and operates at high speed. Automatic spacing signals are used and during the three-year period this line has been operated with one-man cars, we have not experienced even the slightest car collision, in fact, accidents of all types have been fewer than when operated with two-man cars. The Stark Electric Railway company, operating from Alliance to Canton, Ohio, reports a similar experience since changing to one-man operation. I have not received a report of the success of the Buffalo and Erie operation; however, from observation, having had occasion to inspect this system, I am personally convinced it is entirely satisfactory from both a safety and efficiency standpoint.

The Pittsburgh Railway Company started to operate one-man cars in 1926 and has since steadily increased this service and, according to its report, experienced a slight increase in the number of accidents per 10,000 miles operated as compared to two-man operation; however, it is also stated the company experiences fewer serious accidents with the one-man cars than with the two.

During the first half of 1928, as compared to the last year, this company reports the percentage of accidents per 10,000 miles operated as 2.93 per cent on one-man cars and 2.79 per cent on two-man cars. This slight increase is accounted for by the fact that most one-man cars are operated by conductors, who, for a period at least, are not experienced motormen or operators.

A very interesting report of successful one-man operation was received from the Houston Electric Company, Houston, Texas, showing the per cent of accidents per 10,000 revenue car miles operated for a four year period—1924 to 1927 as follows:

	One-Man per cent	Two-Man per cent
1924	6.33	7.71
1925	7.18	9.67
1926	7.24	8.79
1927	5.62	6.96

This notation was attached to the above comparison:

"We are completely sold to the use of one-man cars on this property and our plans are for the elimination of two-man operation as soon as possible. It is our opinion that an operator on a one-man car is more apt to avoid accidents through being kept busy, than with two-man operation which does not require both men to be alert at all times."

The Kansas City Public Service Company, (Kansas City, Missouri), while not submitting comparative statistics, reports a very favorable experience in accident prevention since the adoption of one-man cars.

The Wisconsin Power & Light Company, (Fond Du Lac, Wisconsin), reports as follows:

"It has been our experience in operating one-man cars to find that our accidents have been decreased; has made better operators of our men and has built up better relations with the public, due to the fact that all operators come in contact with the traveling public. Like other utilities, we have found a few minor objections to one-man operation, but on the other hand the advantages of operating them off-set the disadvantages and are the winner by far."

The People's Railway Company, (Dayton, Ohio), submits the following summary of its experience in one-man operation:

"This summary includes figures from the City Railway, Peoples Railway, Oakwood Street Railway and D. & X., which are all of the local companies operating front entrance and rear exit one-man cars over various periods from January 1, 1922, to June 1, 1925. The accident figures were compiled for the periods that

these companies were operating two-man cars and then compared with the figures taken after the respective companies had inaugurated one-man operation. Over the period of two-man operation, the accidents were 413.502 per million car miles and 50.277 per million passengers. For the period of one-man operation, the accidents were 368.822 per million car miles and 48.817 per million passengers carried; showing a decrease of accidents in favor of the one-man car period of 10.8 per cent per million car miles and 2.91 per cent per million passengers."

The Gary Railway Company, (Gary, Indiana), reports as follows:

"Since the latter half of 1927, our property has been 100 per cent one-man operation and our number of accidents and incidents for the first six months of 1928 have been reduced over the similar period of 1927, with approximately 60 per cent one-man operation, from 479 to 315 accidents.

"It would hardly be fair to believe that this decrease is all due to one-man operation as we have constantly endeavored to reduce accidents by the installation of safety devices, safety programs and rigid safety discipline of trainmen.

"The important feature of one-man operation from a safety standpoint is that all one-man cars should be equipped with every known safety device. We know of no accidents on our property that can be attributed to the one-man operation of cars.

"We have also found that on an average, conductors make better one-man car operators than motormen.

"Operating at present 100 cars over 250,000 miles per month with an average of 5,180 miles per accident for the six months of 1928, it can safely be said that one-man operation has materially helped our accident record."

From the Virginia Electric and Power Company, (Richmond, Virginia), where a mixed service is maintained, came the following summary of the company's experience for the year 1927:

City of Richmond—Population 203,000

Total car miles operated.....	7,958,231
One-man miles operated.....	5,665,377
Per cent one-man miles operated.....	71.19%
Two-man miles operated.....	2,292,854
Per cent two-man miles operated.....	28.81%
Total number of accidents.....	3,106
Number of accidents one-man cars.....	2,141
Per cent of accidents one-man cars.....	68.93%
Number of accidents two-man cars.....	965
Per cent of accidents two-man cars.....	31.07%

City of Norfolk—Population 188,000

Total car miles operated.....	5,070,554
One-man miles operated.....	2,998,440
Per cent one-man miles operated.....	59.13%
Two-man miles operated.....	2,072,114
Per cent two-man miles operated.....	40.87%
Total number of accidents.....	2,517
Number of accidents one-man cars.....	1,414
Per cent of accidents one-man cars.....	56.18%
Number of accidents two-man cars.....	1,103
Per cent of accidents two-man cars.....	43.82%

"The conditions of operation are about the same for both one and two-man operation. All lines of importance in both cities enter or pass through the congested business area."

On the property I represent, we are operating one-man cars exclusively in three cities, namely, Akron, Canton and Massillon, and also on two suburban lines, serving an aggregate population of approximately 500,000, and generally speaking, we have found such operation advantageous from every viewpoint, particularly in the reduction of the number and seriousness of our accidents.

Many mechanical safety devices have appeared since the advent of one-man cars which have contributed to their safe operation. We have placed flood lights across the entire front ends of our equipment which have materially reduced head-on collisions with other vehicles. Ratchet gongs have been installed on all city type cars. This has proved an effective safety measure. All cars have been equipped with automatic treadle exit doors which lends greatly to maintaining schedules; in fact the treadle doors, which operate only when brakes are set and power off, have eliminated entirely the possibility of passengers falling from moving cars. With the two-man operation this class of accident presented serious possibilities. There is, however, some danger of passengers being caught in the automatic doors and we have found this a rather difficult hazard to overcome. Elderly and feeble persons are prone to cling to grab handles or door casings and are struck by the closing door. Women accompanied by small children are sometimes struck by the doors because they lift the child from the treadle after they have alighted. The weight being removed, the door closes *before* the child is clear. However, this condition can best be controlled by the operator, who is thoroughly instructed to watch the alighting passengers by means of the rear vision mirror, locking the door open whenever there appears to be danger of it closing on them. Our door accidents are continually decreasing as the car operators and the riding public become more familiar with the operation. I can not say we experienced an increase in accidents of this nature since operating one-man equipment as door accidents were more or less frequent before that time. All cars are equipped with automatic power and brake control so that they can not be moved while any doors remain open.

Following is a summary of accident experience in City service on the Northern Ohio Power and Light Company's property during the past two and one-half years—1926 to July 1, 1928—indicating car miles operated and passengers carried per accident. All occurrences reported, regardless of whether or not they involve the company in any respect, are included in this comparison:

	1926	1927	1928
Total car miles operated.....	5,649,518	4,918,739	2,461,314
Total number of accidents.....	3,165	2,208	843
Miles operated per accident.....	1,785	2,228	2,920
Percentage of accidents per 10,000 miles operated.....	5.60%	4.49%	3.43%
Total passengers carried.....	37,533,989	33,382,497	16,505,425
Passengers carried per accident.....	11,859	15,119	19,579
Percentage of accidents per 100,000 passengers carried.....	8.43%	6.61%	5.11%

The above compilation indicates our experience prior to and after the installation of one-man service. The greater per cent of all operation in the year of 1926 was two-man, as it was not until the latter part of that year a few short lines were changed over. In February of 1927, the system was entirely converted to one-man equipment. I do not contend that the operation of one-man cars has, by

any means, been entirely responsible for the progress we have made toward safe operation. It must be considered as a contributing factor, however. In this connection, I mention a few major activities on the property I represent which have also contributed to our safety records.

We have a full time safety organization, under the direction of Mr. Shaw, which has carried on a very effective accident prevention program during the last six years. One feature of our safety work which has proven very beneficial is the awarding of gold safety emblems to men who operate a period of one or more years without being involved in an accident of any nature. During the past four years the safety department has compiled individual accident records and during that time 195, or 26 per cent, of all the men employed in road service have received honor badges indicating one, two or three years of continuous service without an accident of any description.

In addition to our regular safety meetings, daily posting of accident records in car stations, and the display of safety bulletins, we have established permanent schools of training for all car and bus operators. Each school is under the supervision of a full time instructor who stresses every conceivable feature of the transportation business which leads in the direction of safe and efficient operation.

I trust I have not tired you in giving statistics or in drifting away from the subject assigned. In conclusion permit me to make the assertion that from the experience of other railway organizations mentioned, and from my own experience and observation, I am thoroughly convinced that one-man car operation is practical, economical, and a matter of good business from a safety viewpoint.

CHAIRMAN KOEHLER: Mr. Scanlon, we thank you very kindly for having brought out these very interesting facts. Gentlemen, we again must ask that discussion be deferred until some later time.

ADJOURNMENT

October 3, 1928

A. W. KOEHLER, Chairman

**The Milwaukee Electric Railway and Light Company
Milwaukee, Wis.**

The second session was called to order at ten o'clock by the chairman, A. W. Koehler.

CHAIRMAN KOEHLER: The subject which will be discussed for us this morning is one that is particularly timely, and one that is intensely interesting to every one of us. We are exceedingly fortunate in having as our principal speaker a man who is eminently well qualified by reason of his intimate contacts with electric railway properties all over the country, having himself been the operating head of a sizeable company.

It is a privilege and a pleasure to introduce Mr. Lucius S. Storrs, Managing Director of the American Electric Railway Association.

Reconciling Increased Speed with Safety

By LUCIUS S. STORRS

Managing Director, American Electric Railway Association, New York City

While it always is a pleasure to attend a meeting of the National Safety Council, this year I am especially proud to be here and speak for the local transportation industry of the United States. The reason for my particular feeling of gratification today is that the industry which I represent has made a remarkable record in accident preventions during the last year. The electric railway industry long has been an active member of the National Safety Council and in season and out of season has firmly believed in expounding the gospel of accident prevention. Even when safety work was regarded lightly by many and scoffed at as theoretical, our industry "stood pat." Now, with figures to prove that intelligent educational effort finds its reward in reduced accidents, we are more than pleased to proclaim the facts of our success to the world.

Briefly, the electric railway industry during the last year has reduced its fatal accidents to one person in every 155 million carried.

In other words, a total number of passengers approximating one and one-third times the total population of the United States is carried in safety to every single passenger fatally injured.

Now, the electric railway industry is embarking on a new field of endeavor. It believes, and tests conducted during the last year tend to confirm the soundness of its belief, that not only can passengers be carried in greater safety but that the speed at which they are carried can be materially increased without adding to their danger. Later I shall cite the experiences in a score or more of cities which will prove that this theory of speed with safety is entirely correct.

The present top speed of electric railway cars in many urban communities is not in excess of 12 miles per hour. The average probably ranges somewhere between 8 and 11 miles per hour. It is only fair to say that many more companies make an average speed of 8 miles per hour than make 11.

The local transportation industry firmly believes that if it could increase the speed of its cars to approximately 15 miles per hour it would relieve traffic congestion, decrease accidents appreciably and add greatly to its revenues.

There can be no question that increased speed of public transportation would cause owners of private automobiles to leave their cars in garages in increasing numbers. The chief complaint that the electric railway man today hears from private automobile owners is that street cars do not provide a quick ride. This

undoubtedly is a just complaint and the reason for it is two-fold. Primarily, street congestion is so bad that electric railway cars cannot possibly attain high speeds in urban centers. Secondly, engineers have not kept pace with the demand for increased speed. The city car which can make 15 miles per hour in safety and comfort is not yet developed. However, engineers are working on this problem and doubtless they will solve it some time before collateral problems of traffic congestion are solved. None will deny that if the speed of cars were increased to 15 miles per hour, which is the average now attained by private automobiles in cities, that many motor car owners would be only too happy to leave their automobiles in garages and patronize public service.

While there are a score of cities in the United States which are proving daily that both increased speed and safety can be accomplished, probably the outstanding one is Chicago. Traffic congestion relief has been effected, greater speed attained and accidents decreased there.

That you may have first-hand information about results accomplished in Chicago, I am going to take the liberty of quoting a few remarks from Mr. E. J. McIlraith of the Chicago Surface Lines, with whose remarkable traffic engineering record all of you are familiar. In describing the Chicago situation Mr. McIlraith recently said:

"We have an average speed of operation for the surface railways in Chicago of about 11.3 miles per hour at the present time. There is no other city with which I am familiar—and I think I know most of them—which can approach that speed. That speed is actually attained as an average between terminals throughout the day.

"Now, with an average speed of 11.3 miles per hour we have a very low accident record, and I think you will agree that we have as busy streets and as narrow streets on the average as any other large city has to contend with. It is true that in Philadelphia the streets are individually in the central section much narrower but when used as one-way streets the actual space for traffic in that one direction is greater than we have for one direction in each street in a city like Chicago, and, in fact, in most American cities.

"If the speed we have obtained permits us to operate in so large a city with comparatively few accidents something must have intervened to prevent accidents and to permit the trainmen to be able to operate with the intense street traffic without getting into trouble. More than half of the Surface Lines trainmen in Chicago were able to go through an entire year without a chargeable accident, not without an accident, but without a chargeable accident. If, somebody runs into the rear end of the street car with an automobile that is not necessarily the fault of the motorman or of the conductor of that particular car. Having carefully classified our accidents we find that more than half of our men have been able to go through a whole year without a chargeable accident. Where the streets are as intensely used as we have them in Chicago, that means the coupling of increasing speed and accident prevention; this may not be so difficult as many people think.

"Speed can be kept high, traffic can be kept moving and accidents may be prevented if the proper attention is given to the right things. Therein lies your problem namely, discovering what it is that prevents accidents and what it is that motormen and conductors should do on the streets. It calls for a careful analysis of the details of the management job, for getting down to the men's problems, knowing what they are doing, seeing that they understand what you expect of them and that they know what you expect them to do.

"Too many railways send out their operators, after training them for a week or two in a school and then dare them to learn how to be good motormen."

"A special survey of the industry which I have made to bring the facts for this paper up-to-date reveals that virtually every large company in the country is showing increased speed and decreased accidents. There are of course, exceptions to this rule, but in most cases there are special reasons for these unusual situations.

If you will bear with me, I shall deal in alphabetical order with reports from these various outstanding cities, giving you the high lights of what is being done in them toward furthering the increased speed and safety movement.

Over a five year period from 1923 to date, the speed of cars in Atlanta has increased about six-tenths of a mile per hour, or from 9.18 to 9.75, and accidents have been decreased approximately 25 per cent. It is notable that in 1926 the speed in Atlanta did not increase, but accidents increased appreciably. This was due to the introduction of a new type of car with which the motormen were unfamiliar.

"A man operating a fast schedule realizes that his entire and undivided attention is required and he is more on the alert and therefore more apt to anticipate traffic and other hazards of operation," says Frank H. Butler, vice-president of the company.

The Union Traction Company of Indiana, a high speed inter-city line, says that recent increases in speed have not caused increased accidents.

The Baltimore situation is most interesting on account of the highly congested, narrow streets of that city. While speed there has increased only slightly during the last year, the company has been able to decrease collisions between motor cars and traction cars by approximately 13 per cent. An interesting feature of this situation is that the inauguration of skip-stops was followed by a decrease in accidents at points where accidents had occurred before the skip-stop system was installed.

Birmingham, Alabama, has found it possible to increase speed from 9.6 per mile an hour to 10 miles an hour and, coincidentally decrease the cost of its accidents for its last fiscal year. This city shows an increase in the total number of accidents during the last year, but this is declared to be due to the fact that a number of minor accidents of a character previously ignored were reported. It is interesting to note that this company has not had a single fatality in recent years. Intensive safety work among the employees is credited with bringing about many favorable results.

The International Railway Company of Buffalo, rapidly is rolling up an enviable accident prevention record. During 1927 the company showed a reduction of 15 per cent in accidents of all kinds as compared with 1926. During the first six months of the present year the reduction over 1927 was in excess of 31 per cent. No material change has been made in speed on this company's lines owing to the fact that recently the type of car has been changed and the motormen have not been wholly familiar with the new equipment.

The Chicago, Aurora & Elgin inter-city lines maintain a speed of 45 miles per hour between terminals and yet in the face of this it has been able to decrease accidents recently. Its 1927 decrease was 5½ per cent. The greatest change was shown at crossings where decreases were brought about by the installation of better protection.

The Chicago, North Shore & Milwaukee line, winner of the electric traction speed contest in 1927 with a record of 41.8 miles per hour between Chicago and Milwaukee, has not had a single passenger fatality due to a collision in the last eleven years. The speed with which this company won the electric traction trophy was an increase of six miles per hour over 1920.

Likewise, the Chicago Rapid Transit Company, which operates the elevated lines, has not had a passenger fatality during the last five years. During this period the speed of express trains on the line have been increased from 16.6 miles per hour to 19.7 miles per hour.

I now want to make reference to another large city property without naming the city and for very peculiar reasons. The president of the company is superstitious regarding accidents. He believes that when you are making a good record you should keep quiet about it and that touching wood, consulting a voodoo doctor,

or carrying the left hind foot of a rabbit captured in a grave-yard in the dark of the moon, will not prevent accidents if you talk. However, he has permitted me to say that in his city, with a population of more than 500,000, he was able last year to decrease his accidents 10 per cent. This record also was made with an increased speed.

The Connecticut Company, operating practically all local transportation service by electric railway and bus lines in Connecticut, decreased its accidents approximately 5 per cent during the last year. Its greatest decrease came in collisions with motor vehicles. It had no passenger fatalities.

Speed on the Texas Electric Railway of Dallas, an inter-city line has been increased somewhat without increasing accidents. The Dallas Railway & Terminal Company increased its speed about one-third of a mile per hour during the last year. It had no fatalities to passengers and the cost of accidents in per cent of gross revenue was lowered appreciably.

Denver Tramways stands well out in front in this new movement. Over a seven year period cars have been speeded up approximately one and one-half miles per hour and accidents cut approximately 50 per cent despite a doubled registration of automobiles.

James P. Tritton, Superintendent of the Indianapolis Street Railway, joins Mr. Butler of Atlanta in declaring that he finds men who run cars at high speeds pay more attention to their duties than others. This company has increased the speed of its cars approximately one mile per hour during the last year.

Omaha cars have been speeded up approximately five per cent and accidents decreased during the last year. None of eight fatalities was attributable to increased speed.

Accidents have decreased steadily during the last five years on the Pacific Electric Company lines. In 1923 the total number was approximately 10,500 and this year a total number will not exceed 6,000 or a reduction of more than 40 per cent.

Los Angeles has found it very difficult to increase speed on account of the rapid growth of the city. Stops are becoming more frequent due to the development of outlying sections. Only limited train service, in the opinion of D. W. Pontius, General Manager, will make reduction in schedules possible.

The Louisville Railway Company, winner of the Anthony N. Brady accident prevention prize this year, reports the speed of its cars has been increased slightly during the year and fatalities decreased 300 per cent. Speed gradually is being increased on all lines and eventually faster schedules will be maintained throughout the city.

Public Service Coordinated Transport lines, of New Jersey, reports the introduction of a bonus system for employees has greatly reduced the number of accidents thus far this year over 1927. Public service territory is a particularly trying one owing to the vast increase in the number of automobiles used.

The local New York situation is one of the most interesting in the country both from the standpoint of speed and accident prevention. Surface lines in the greater city have made strenuous efforts to increase speed and decrease accidents. Brooklyn City Railroad has done stellar work by a bonus system for the men and safety talks. Companies on Manhattan Island have not been so successful. Congestion on this narrow strip of land is, of course, simply terrific and undoubtedly the time is not far distant when some radical measures must be adopted to relieve the chaotic situation. Meantime the Third Avenue Railway System is conducting a steady campaign against parking and other forms of traffic congestion and doing its utmost to decrease accidents. Undoubtedly in the long run this will have a good effect.

While we are on the subject of New York I want to say just a word regarding the safety of the subways. Unfortunately, in recent months, the Interborough

Rapid Transit Company had an accident during the rush hours. It was due to circumstances over which executives could not possibly have had any control. Despite this accident, which resulted fatally to eleven persons, the subways remain the safest railways in the world. It was interesting to note in connection with this unfortunate circumstance that most of New York's daily newspapers, which cannot always be called entirely friendly in their attitude toward the company, were extremely fair. They pointed out that such accidents are bound to happen on any common carrier and that they should in no way decrease public faith in subway travel.

Intensive safety work in Milwaukee has resulted in a decrease of 22 per cent in the number of persons injured during the last year. This company, like others, has not been able to increase its speed greatly on account of changing the type of cars. Greater speed undoubtedly will be shown as men become accustomed to the new form of equipment.

Analysis of the accident record of the New Orleans Public Service, Inc., shows the total number were decreased more than 15 per cent during 1927 and 1926. There were no passenger or employee fatalities during the entire year.

Providence is another city where traffic congestion seems to practically preclude increased speed for the present. However, the company through intensive and highly intelligent accident prevention work, has succeeded during the last five years in decreasing its annual number of accidents more than 40 per cent.

Washington, D. C., presents a peculiar situation. The capital of the nation has broad streets and many families containing several wage-earners. As a result, the average number of automobiles owned is exceedingly high and traffic congestion is as bad probably as in any city in the United States. In the face of this situation the achievement of the Washington Railway & Electric Company in increasing speed on its lines three-quarters of a mile per hour during the last year was remarkable. A slight increase in the number of accidents is shown, but a statement from the company says that these were not attributable in any way to the increased speed. The Capital Traction Company reports that it is hopeful of accident prevention work in Washington in the future, although the present does not show a great deal of change. A safety campaign early last year resulted in decreasing collisions between motor cars and the electric railway cars about 20 per cent.

Conditions are improving in St. Louis, and to anyone familiar with the local situation there, this is encouraging. Probably no city of its size in the United States needs an untangling of its traffic problem more than St. Louis. The downtown streets are narrow, parking is allowed for limited periods on many of them, and traffic control is poor indeed. A better lighting system and more officers to handle traffic are badly needed. In the face of this it is virtually impossible for any transportation company to increase speed. However, the company has shown that accidents can be decreased by intelligent work. During the last three years the total number of accidents per million car miles has been decreased from 429 to 410. In S. W. Greenland, general manager of the company, the safety movement has a firm and enthusiastic friend, however, and I am sure that if it is humanly possible for the speed and accident prevention record to be bettered during the next year, Mr. Greenland will bring it about.

A letter from C. V. Wood, president of the Springfield Street Railway Company, throws an interesting sidelight on what happens to speed when buses are substituted for high speed rail lines. He reports that the average speed of his cars decreased in 1927 due to the fact that most of the high speed interurban lines were discontinued and buses substituted. He finds that the new light-weight car, a notable addition to the Springfield service during the last year, can be operated through streets with greater speed and equal safety. This property has had no fatal accidents to passengers in recent years.

The higher speed movement is well in hand in San Francisco where the Market

Street Railway Company operates. Mr. M. McCants, vice-president in charge of transportation, recently wrote me that he was speeding up his entire service. He is an enthusiastic devotee of both increased speed and safety and believes that they go hand in hand.

I have given you, rather sketchily I fear, a cross-section of the speed and safety situation as it exists today in the electric railway field. To summarize it very briefly I should say that, with a few notable exceptions, local transportation companies generally are speeding up their cars and making better accident prevention records. I am hopeful that within the year such progress will be made in mechanical equipment that we can report to you that we have greatly increased our speed and decreased our accidents at the same time.

We in the electric railway field know where the chief credit for our great safety record belongs. It belongs distinctly in the ranks of our employees who are running our cars today with greater safety than ever before. Credit for arousing their enthusiasm in accident prevention should go, of course, to executives, but if the industry had not been possessed of a body of loyal, enthusiastic men, anxious to do their very best to prevent human suffering, this record never would have been achieved.

Many friends of our industry have said many kind things in recent years regarding our accident prevention work. We are appreciative of all this, but we want to assure all that merely because we have made a good record in the past and have done much toward carrying forward the movement, we have no intention whatever of resting on our oars. We want to be increasingly active in this great work and are ever ready to carry on our share of any assigned national or local task.

I want to say that several years ago, Mr. Nicholas F. Brady, son of Anthony M. Brady of traction fame, established, in memory of his father, an annual award to the electric railway that conducted its affairs with the greatest degree of safety during the preceding year. I know of no one thing that can do more to improve public relations in any particular community than the recognition of an industry at large of the outstanding accomplishment of that one particular property.

We have of necessity, for many, many years, had to tell our hard luck story to the public. We have tried to impress them with the problem. We got into the condition of being considered—not a yellow cur, but not a very highly esteemed citizen in the community. It got into our own organization. We were rather apologetic of our job at that time. Fortunately, that is long since passed, but the attitude of the public, the public mind hasn't entirely in many communities changed.

If, however, in any one of those particular communities, the company could by its achieved high record, obtain recognition national in its scope by such a thing as this Brady Award, it does do, I know positively, a very great deal toward changing the entire public situation. Fortunately, our properties were entered in the contest before the war, and received the Award. We made the maximum use of it in all of the cars in general throughout the county, didn't we, Mr. Jordan? The result was, it was the one thing from which we started a change in public attitude.

This Award was discontinued during the period of the war. In the meantime, Mr. Brady had become dissociated from the traction and of public utilities. He had gone into the power and lighting end, but I prevailed on him a year ago to reinstate the Award. Prior to that, there was one award given, a gold medal (a silver replica to the officers and a bronze replica to the employees). In order that it might be more inclusive and give more people the opportunity to accomplish something, he conceived the idea of dividing the companies into three classes; those of large cities with maximum vehicle mile operations, medium sized cities, and small cities with small vehicle mile operations; so that the smaller and medium sized cities might have as good an opportunity to get an Award as the larger cities.

The gold medal was to go to the large city, the silver medal to the medium sized city, and the bronze medal, to the small city.

That Award was granted this year, as of last year's operations. Much to my disappointment, only seven contestants appeared as claimants. They divided themselves between the three different classes. I told Mr. Brady, or conveyed word to him, that it was merely a starter and if we could continue, that I was quite sure he would find that the industry as a whole would recognize the opportunity he was affording. This year (and the contest was supposed to close October 1) four contestants entered, all of them in the one class.

Now, you are overlooking something. I hope very much that some of you may be able to prevail on your executives to wire in that you want to be a contestant in your particular class. I am quite sure we can prevail on Mr. Brady to extend the period of time for entrance up to October 15. The presentation of your claim is a very simple thing. It is taken care of entirely through the American Museum of Safety.

If you should not get the award, it perhaps adds a little bit more to your desire to improve your condition. Some man whom you hadn't thought of as being a little better than you, may get the award. The next time, you will try to be a little better than he, perhaps. I think that an industry that is doing so much in the matter of public safety ought to recognize this opportunity that exists right in their own communities. I feel very keenly about that and I wish there were some words I could use that would prevail on a larger group to enter the contest.

CHAIRMAN KOEHLER: We are exceedingly grateful to you Mr. Storrs, for having discussed for us this very vital problem on reconciling increased speed with safety. I know that in the majority of minds, there are many questions.

G. T. HELLMUTH (Chicago North Shore and Milwaukee R. R., Chicago, Ill.): I should like to ask Mr. Storrs whether the Award is open to electric interurban railways, or only to city railways?

MR. STORRS: Every kind of electric railway property in the world.

H. P. ASHWORTH (Pittsburgh Rys. Co., Pittsburgh, Pa.): Mr. Storrs made the statement that motormen are sometimes put on the job and then they trust to luck. I would like to ask how the men are trained—according to the ability they show, or are they given a certain fixed period of instruction.

MR. STORRS: I think that is an individual question, almost entirely. Some men can get their feet on the ground quicker and know what their problems are quicker than other men. There is a certain psychology about it. I think it is up to the man's immediate superior. I merely said a great many motormen are given cars and are dared to become good motormen.

MR. LYNCH (Director, Kansas City Safety Council, Kansas City, Mo.): When I have met Mr. Storrs previously in other gatherings, we have been friends. I told him this morning that friendship ceases, because he is here with his own gang, and that I would see if I couldn't start a battle right here in his own home-town.

This matter of speed and safety of the street railway is a very serious problem, I think. In the first place, I would like to say that I can see no reason from Mr. Storrs' presentation, why we should accept the conclusion that increased speed will make safer operation. Mr. Storrs brought out nothing which would indicate that there has been any change made which would make safer operation at higher speeds. In other words, what I mean is that these same properties, so far as I can see, would have had still better safety records had they not increased their speed. Mr. Storrs has given nothing to make us believe this increased speed has made it safer. He pointed out one property that has had a big reduction without increasing its speed. So, let's don't be confused in this issue here.

Now don't misunderstand me. I don't want to say that increased speed cannot be

obtained and still reduce our operating accidents per million car miles, or on whatever basis we care to establish our contest.

I do have considerable sympathy with the street car people as a safety man. If we can get more people to ride street cars than are riding motor cars at present, our record of accidents to street users will be better. The thing that I have in mind here this morning is, what has the street railway done particularly to make the operation of cars at higher speeds safer? I was hoping Mr. Storrs would tell us some of the things that he has done.

The training of the men naturally is a very important item for safe operation at any speed, if you please. The question of man failure, of course, can be found in industry. As a matter of fact, perhaps 70 per cent of the causes of accidents are due to man failure. Equipment failure also enters into it in industry. I can see no reason why equipment failure shouldn't enter into it as well in the street railway problem. I wonder if we shouldn't consider some of our operated equipment and see if it is as safe as it could possibly be made.

MR. LYNCH: I wonder if this matter of right of way is receiving the proper attention. Getting down to a concrete example, Mr. Fennell said yesterday, he wondered if the street car, by slowing down at intersections, wasn't really breeding a contempt of the street car at those intersections. I agree, perhaps that is so. I don't like to call it contempt. I think what actually is happening in the minds of the public is that you are developing (in the mind of the motor car driver) the fact that the street car can stop if the operator sees the motorist.

The psychology of it is this; the motor car operator, not ever having been a street railway motorman, doesn't know how far a street car has to go before it can stop. Motorists assume a street car can stop as quickly as they can after they see each other at the intersection. The motorist approaches the intersection, and he is in the habit of seeing the street car come up slowly in order to make sure to be able to stop. He then begins to assume that a street car can stop anyway.

Why don't we educate the public in the distances required for a street car to stop, at 20 miles per hour, for example? I tell you, they have no conception of the distance that it takes for a street car to stop. It takes a motor car going at 20 miles per hour with two wheel brakes, 27 feet to stop. They can do it with four wheel brakes in some 22 feet at 20 miles an hour. I believe it takes a street car at 20 miles per hour, some 140 feet to stop. I may be wrong on that. You street railway people all know what it is, I assume. I wonder how many of you do know how far it takes? I won't ask you individually, but the public should know about it.

This question of the right of way came up down at the Hoover Conference. Mr. Storrs will bear me out. I was pleading for the street car to have the right of way at intersections. They wrote it into the model municipal code that way, that the street car would have the right of way at the intersection. I went a step further and asked, "When does the street car enter the intersection?" I claim the street car entered it whenever it was close enough to the intersection to make it mechanically impossible to stop the car without going across the intersection.

The men said, "Well, when is that?"

I said, "140 feet back from the far side of the intersection, at the average running speed of 20 miles an hour."

Then, the automobile men and insurance men who were there threw their hands up and said, "What do you mean, the motorist must stop when he comes to a street railway track?"

I said, "I am only interested in safety on the streets."

My idea is that we must either make the motorist stop by legislation or we must educate him to such a point that he will stop, knowing the hazard he is facing when he approaches a street railway track at an intersection. It would be foolish to put the regulation into effect that an automobile must stop when approaching a

street car track, without some education. We have found for many years that unless an ordinance was apparently equitable, it was not self-enforceable, and if such a thing isn't possible, there is no need in writing it into the record.

The whole thing that I want to make a plea for here today is, that we study our equipment, make sure that the street cars are equipped for the safest possible operation. Then, conduct an educational campaign in your communities so that the people will realize the operating conditions of the street car, so that they will realize how far from the intersection braking power must be applied for a street car to stop. You might carry on a little campaign in your car cards as to how far it takes a motor car to stop going at 20, 30 and 40 miles, with two and four wheel brakes. Twenty-five out of thirty motorists think they can stop at those rates of speed with four wheel brakes within one car length of their motors. I have heard them testify in court that they could do it. We know it is absolutely impossible to do it. If they don't know anything about the motor car, they know much less about the street car.

Then, we should find out for ourselves what the street cars can do, taking them out and testing them. Take a loaded car and take a light car with your maximum air brake main reservoir pressure, or whatever you call it. See which gives the best brake, we will say. Then take that same car out, put a dead load in it with a minimum governor setting, and see what your distance is. Then see if those figures are what you want to tell the public. That motorman knows nothing about how far it takes to stop without counting his passengers and looking at his air pressure.

I say a lot can be done yet, inside the industry about the equipment, and through propaganda to the public in order to create the proper respect that the street car deserves upon the street. I say it deserves respect because it is limited in what it can do. Before we speed up, let's get that respect established by propaganda to the public.

T. G. BRABSTON (Birmingham Electric Company, Birmingham, Ala.): I am speaking as a representative of the street railway and as an ex-president of the local Safety Council, so that I am viewing this thing from two distinct angles. In the first place, this question of safety—the best proof of it, as with pudding is in the eating of it.

I have two twenty mile lines down there about which I would like to say something. This gentleman should take into consideration the fact that when we say "schedule speed," we don't mean free running speed, but we mean speed between terminals, including all service and passenger stops. On those lines I have a schedule speed of 13 miles an hour, and those lines have consistently run from 30 to 40 and 45 thousand miles per chargeable accident. I think that is one of the best indications of what a line can do that you can find. These lines are partially suburban, partially city. I have two other lines from which the schedule speed varies during the period of the day, from 11¾ to 12 miles an hour, and are mostly in traffic. Those lines, before the speed was increased, had about 9¾ to 10 miles per hour. Since that speed has been increased on those lines, the chargeable accidents on them have been reduced practically 50 per cent.

Of course, there is among our colored population down there, an exchange of comments on the operation of these cars. They are the 65,000 pound cars. They don't stop readily or easily. The colored folks say, "Boss, when you hears dem motor cars say 'peep peep' you better step on the brake, 'cause they ain't going to stop."

That doesn't mean these fellows are going to recklessly go down the line trying to hit everything. As the record shows, accidents have been reduced 50 per cent, but the public has learned, when a 65,000 pound unit is coming down the street at a fair rate of speed on a well defined rigid track, it isn't going to stop as quickly

as an automobile. Naturally, the weaker vehicle must pay some deference to the heavier one.

In respects to the matter of braking and stopping, I think the average street railway man will bear me out when I say that there is no car probably anywhere in the United States that has a 100 per cent braking efficiency from a mechanical standpoint. I don't mean by that, that they have defective brakes. No man who has run a car at a rapid rate of speed is going to complacently stand on the front end of the car and handle it if the brakes are no good. No operating official, no superintendent or no railway is going to permit a car to remain in service on which the brakes are not effective. I say if there are such institutions, that they are way behind the procession in maintaining the highest possible braking efficiency.

On the other hand, when you talk about stopping automobiles, brake tests conducted under the direction of the Safety Council, not only in Birmingham, Alabama, but in the average city, will develop the fact that from 60 per cent to 80 per cent of the automobiles on the streets are entirely without brakes, or with brakes working under such unequal braking effectiveness, that any record as to the distance in which they are going to stop is merely theoretical.

The greatest trouble we have in automobile collisions in Birmingham, is due to a beverage down there known as Shelby County Corn; and a mixture of that with gasoline and a nut at the wheel, usually results in a collision. That tells the story pretty generally all over the country. The great trouble with the street railway industry has been that they have apologized for their presence on the street and have not maintained the speeds and the preference to the heavier vehicle. They have perhaps emphasized the point of hitting no automobiles under any circumstances—the Alphonse and Gaston act when they came to a crossing. When you educate the public up to the knowledge that a car cannot stop, that it has a schedule to maintain and that it is going to pass on a rigid track, the automobile passenger or driver is going to give preference to the street car. That has been our experience, and we have endeavored to educate the public through the National Safety Council. As a result, we are reducing automobile accidents and collisions with street cars consistently day-by-day.

Just to give an idea of perhaps the psychological state of mind the people have down there: for the year up to date, we have had something like 990 automobiles sneak up behind street cars, slamming into them while they were either standing still or getting away from a stop. On the other hand, we have approximately the same number of collisions where motormen (accidents which we do not consider are chargeable to the motormen) collide because a car approaches from the rear of the street car and pulls out in front of it. We have those constantly.

I believe from my experience both as a director of the Safety Council and as an operator of 175 miles of railroad, that the necessity for educating the driver to the fact that the car is not always going to give him the right of way is a very important and potent factor in the prevention of accidents. The higher the speed, the greater respect the other is going to have. I don't mean we are ruthless in our instruction to motormen to hit automobiles or to have accidents, because they are taught to prevent them if it is humanly possible to do so. I pay a tribute to the man on the platform for his efforts in that respect. We have something like 40 men who have gone six and one-half years without having a chargeable accident during that time. More than 50 per cent of our 700 men have gone from 6 months to six and one-half without having chargeable accidents. Certainly that is a tribute to the man on the platform, who is doing the job.

DANIEL MAHONEY (Pittsburgh Ry. Co., Pittsburgh, Pa.): In regard to speed, we all recognize the necessity of speed. I believe that speed tells a man to be intensely on the job because of the hazard he is confronted with on account of speed. Now then, in order to carry on at this speed that we desire to have, cars should be equipped so that we can increase the speed going uphill. For, if we

have to depend on making our speed going downhill on narrow streets where automobiles are parked (sometimes within two or three inches from the track, where we merely pass them by a hair) it is extremely dangerous. If we have to depend on the grades downhill to make up our speed, speed is absolutely dangerous and it is criminal. If we wish to have speed, let the builders of the cars equip them so we can make this speed going uphill.

Our speed has increased in Pittsburgh just as in every other city. We are doing our best, and the men appreciate the fact that we must have speed. In the matter of braking equipment, we take a car out in the morning, and it is thoroughly satisfactory. Perhaps all you managers don't know this as well as the man who runs the car, but you can take a car out and work half a day, turning it over to the late man at four o'clock in the evening. The late man enters it. The emergency stops, naturally, have had an effect on the braking equipment. When I turn a car over to a man in the afternoon, he puts a trial or two on it, and his braking power has been reduced 50 per cent. I don't think there is any necessity for me to say any more, but what I advocate in speeding up the cars is to make the time in going up hill and not down hill where the cars are allowed to run recklessly in order to keep up with the schedule.

HENRY D. BAMBRICK (Pittsburgh Ry. Co., Pittsburgh, Pa.): Regarding speed, I know quite a lot about it, both on the railroad and in other places where speed is important. A great many motormen really don't know how to use air. When some motormen get into close quarters, they probably pick up 30 or 30 pounds of air without pulling sand. The consequences are, that the car is going to slide; by the time you have your air released and do what you should have done in the first place, the damage is done. I have been very fortunate myself with respect to freedom from accidents, because the barn foreman knows I will not operate a car unless it is perfectly right.

We have a great many one-man cars in Pittsburgh. Some of the cars have been converted. In the old days when they broke a man in, if he was not satisfactory after being placed on for a day with the early and late man, he would probably be given a job as a conductor. You can't take a conductor, and within three or four days, turn him into a first-class motorman. I want to say in all fairness to our own people, if more time and attention was given to training, they would get better results. I think it is to their own benefit to do so.

MR. POWELL (Louisville Railway Co., Louisville, Ky.): I would not have gotten up except for the benefit of Mr. Lynch. We have increased the speed in Louisville during the last two years. Two things Mr. Brabston didn't mention, and I want to speak of them for Mr. Lynch's benefit. One city line is 17 miles long to the round trip, all within a congested area, and it was having more accidents than any other line on our property, and I think that we are as safe as any body else. The Brady Award gives us that credit. I was chiefly concerned with this one line, so I increased the running time of 96 minutes to the round trip, to 90 minutes to the round trip. The accidents were cut in half the first month on that line, and we then increased the running time to 88 minutes for the trip, with still the same results. That line has been a winner of our monthly contest numerous times since. They are very proud of the fact that they carry the banner on their car house for about one-third of the months.

That is not all due to the increased speed at all, because before we increased that speed, we first started an educational campaign among the men in getting their support on what we were doing, and why. Then we put interlocking devices on all electric switches on that line, making it impossible for a man following to throw the electric switch under the car in front of him. We also saw that the intersections were repaired and put in good condition. Then we placed inspectors at the heavy loading points morning and evening to get the cars away quickly.

Another point I want to make is in the increased miles per hour. On our property we do not interfere with the present schedule time in the rush hours. We found by careful check-up and study of the line, with the decrease in riding in the daytime and at night which we experience in these periods, that it was possible to increase the speed considerably in the daytime and at night. We brought the miles per hour up to approximately 15 miles after eight p. m., which gave us a tremendous increase in the average miles per hour for the entire day. During the last six months, I have increased the speed to 15 miles per hour on five lines. The task I have as soon as I get home from this convention is to increase the speed on one of the major lines. I think we can cut the time down to 75 minutes and still get the Brady Award next year.

G. T. HELLMUTH (Chicago No. Shore & Milwaukee R. R., Chicago, Ill.): What about the use of the magnetic brake?

MR. POWELL: It would be a wonderful brake except for one reason—when the car goes over the switch a great many men use it and ruin it. Outside of that, it would be all right.

MR. SPECK (Pittsburgh Rys. Co., Pittsburgh, Pa.): In regard to increasing speed schedules, I would like to ask if they find it advisable to get out a crew of men to maintain a schedule or let the men operating those cars, see what they can do first? The reason I ask is, in Pittsburgh, we have a crew of men called "speed-up men." These men work a day now and then, and they might take chances where others wouldn't. I maintain that the man who is on the car under proper education with a proper knowledge of how to handle the car, will do better work than these so-called "speed-up men." I wonder what other properties are doing, whether they are picking their own men regardless of standing or anything else, and putting them on just for a day or for a trip. Do they ride along with them to find out what they are doing, or what? I claim it is more advisable to let the man on the car go ahead and see what he can do.

CHARLES GORDON (Electric Railway Journal, N. Y.): I don't like to see this discussion get into the minutes indicating the idea that electric railways are increasing speed with any inference that they are increasing the maximum running speed in city streets. That is not what we are doing, we are increasing the run-time. We can only do that in about three ways. First, through increased alertness on the part of the operator of the car; second, through starting the car quicker; and third, through stopping the car quicker.

Any of you men know that in city service, making seven or eight stops per mile, there is only one way in the world that you can increase the schedule speed outside of increased alertness on the part of the operator—either through starting or stopping quicker. I think Mr. Lynch's comment assumes, in a small measure at least, that we are talking about increasing the maximum speed of the electric railway operated on city streets. I think you will all agree that that is not what we are doing. I wanted to make sure that the minutes, at least indicate that thought.

E. HOLLIBAUGH (Pittsburgh Rys. Co., Pittsburgh, Pa.): I hear considerable discussion here of chargeable and non-chargeable accidents. I would like to know how they arrive at the decision in classifying accidents as chargeable and non-chargeable? We have not been able to settle that question in Pittsburgh. If we could just simply arrive at some sound conclusion and then analyze our situation, I think we would make a reasonably good showing there.

MR. HENRY (Pittsburgh Rys. Co., Pittsburgh, Pa.): That question Mr. Hollibaugh asks came up last year, and a committee was appointed to settle that.

CHAIRMAN KOEHLER: There are a number of companies who have adopted, I believe, the American Electric Railway Association's recommendation of designating chargeable and non-chargeable accidents. The Milwaukee Electric Railway, for one, has that system. The substance of it is this: the definition states that

any accident, which, by the exercise of reasonable forethought, foresight, skill, and diligence on the part of the operator, could have been avoided, is a chargeable accident. Please note the words "reasonable care, forethought, skill," et cetera. By the same token, any accident which, through the exercise of reasonable skill, forethought, and so on, could not have been avoided, will be called a non-chargeable accident. That leaves an opportunity for argument. You have to judge an accident on its merit. Every accident is just a little bit different. There are some accidents that are on the borderline. It wouldn't hurt our conscience to call them chargeable or non-chargeable. That type of accident falls within a class which we are bending our efforts to avoid. It is an accident perhaps that could conceivably have been avoided, so we let it fall into the chargeable class.

MR. HENRY: In other words, there ought to be a uniform standard.

CHAIRMAN KOEHLER: Yes. We went a step further than that in Milwaukee by establishing what we called a Reviewing Committee, composed of the assistant superintendent of transportation, general claim agent, and the safety director. Later, there were invited to these meetings, all of the division superintendents. All of the accidents in which there was any doubt were discussed so that everyone might have a word to say about them and so that there might develop that uniformity of judgment that is necessary to make that system a success. After that committee had functioned for about a year, it was discharged because there was no longer any need for it. Uniformity of judgment had been established. Consequently, the matter of chargeable and non-chargeable accidents, at least so far as Milwaukee is concerned (there are representatives here who will bear me out), is no longer a serious problem. We understand that what is chargeable in one division is chargeable in another. Any difference of opinion that may have existed is now gone.

H. O. ALLISON (Pittsburgh Rys. Co., Pittsburgh, Pa.): I am in a peculiar position. I have some twenty men here with me. In Pittsburgh, we have recently started to re-arrange our schedules in over-all running time. I didn't believe that Mike Lynch would start anything like that after he met me yesterday. I don't believe Mike has been long in the railway service, have you, Mike?

MR. LYNCH: I served as foreman of the carbarn under the superintendent of shops.

MR. ALLISON: That helps a lot. Anyway, we are good friends. I want to make reference to the Service Betterment report of the American Electric Railway Association. With the permission of Mr. Storrs and Mr. Lynch on that, I shall refer to what Mr. D. L. Fennell, General Superintendent of Transportation, Kansas City Public Service Co., Kansas City, Missouri, says in this report: "In increasing the over-all speed of street cars . . . it would also automatically speed up the flow of all vehicular traffic and thus make possible the still faster street car operation."

Again it says here, "In order to make this speech, we make these recommendations:

1. "By increasing the proportion of car-running time during which cars can move at maximum free running speed, and by making full use of such time.
2. "By reducing the time spent at stops.
3. "By installing superior mechanical equipment.
4. "By training car operators to utilize to the full, opportunities for increasing speed."

He says also, "lines of increasing time during which cars can move at maximum free running speeds:

"Reduction in number of passenger stops.

"Continuous motion at top speed (I think that is what Mr. Lynch referred to) between terminals is neither a practical nor a desirable idea, but reduction in the

number of passenger stops is not only feasible but is an important means of increasing speed of operation.

"In eliminating stops in congested areas, however, it must in all cases be remembered that here the short rider is found, and that if forced to walk in search of a stop he may continue walking to his destination.

"Stops to take on passengers can be reduced in number in two ways, (1) directly, by eliminating stopping points, and, (2) indirectly, by increasing service."

In the eliminating of stops and relocation of stops, it naturally means that all traffic can move more freely. Congestion is the problem of today. There is the skip-stop plan, stagger skip-stop, express street car and local bus operation, express street car and local street car operation, and also the reduction of stops by increasing the service. We have in mind the improvement of traffic conditions in the Service Betterment Report. You can improve the conditions if your car can run a greater distance freely.

I think probably that some operators get the idea that the thought is now, "You must maintain this speed of so many miles per hour continuously from the starting point to the destination." That is not so. It is in over-all running time. Our increase in speed in Pittsburgh does not amount to half a mile an hour. We are operating at some 9.02 miles per hour.

The greatest problem in the operation of street cars, of course, has come about through the use of the automobile. I think that these directors of local Safety Councils can help to reduce accidents and can help to relieve congested places if they will exert some effort to bring about a thought on the part of the automobile owner that the street car can be operated only upon the track, and if you will get the operator of the automobile to permit us to use the track when we are coming along there rapidly. Instead of doing that, they will park in front of us, alongside of us, cut alongside of us and then pull in head of us. In our educational work in Pittsburgh, we are endeavoring to bring about traffic regulations that will lead ultimately to that end. If we move freely, all traffic is also able to move freely.

Our men know that I do not object to what they say here or any other place on any subject that is brought up. These men do think for themselves, and they know exactly what they want to say when they get up on the floor to say it. They handle these things from their angle.

If we could bring about a situation or an understanding that will give all the operators the idea that speeding up is not going to mean reckless speeds in congested districts, but proper speeds in the over-all running, we will get the proper results. There are places where an automobile can move safely at 50 miles an hour. There are other places where it can only proceed safely at 10 miles an hour. In that manner, we want to increase speed. To refer to it as "speeding up" is entirely wrong.

I think too, that we have been the under dog. I would go so far as almost to echo what Mr. Storrs didn't want to say when he referred to the yellow dog. They have been taking care of automobiles and pedestrians at all points, even in the middle of the squares and intersections. We have been taking care of them too.

Now about the education of the personnel. We say to the operator of the street car, "If you see a motor vehicle approaching an intersection and you are in it, don't look toward him but go ahead, and then for his own self-protection, the automobile will not keep on coming." If the motorman looks toward the operator of a motor vehicle, nine chances out of ten, the motor vehicle will keep on coming and they will get into an accident.

We have the usual number of motor vehicles running into the rear ends of stopped cars and into the sides of cars, yes, even into the front ends. They do that frequently. There was a fatality on the Beaver Valley Line just last Satur-

day. A man drove right into the front end of a lighted street car. That may have been a mixture of "White Mule."

Two men who are with me are the chairmen of the safety committees of the various car houses. We have started one-man car operation more generally, and we started with what you have been referring to as "speeding-up." There has been a considerable amount of discussion on our property in that connection. It has been thought that it would increase accidents. As a matter of fact, minor accidents have increased, but as a matter of severity, they have *decreased*. That was with the first month of the operation. They are now on the decrease, all of them. I think if we do gain some little respect from the automobile driver on the speed problem instead of being kept back in the horse-drawn vehicle class, we will speed up all traffic. We will relieve congestion and we will bring about better operating conditions for the automobile driver and for the street car, and in that manner, we will reduce accidents. Free-flowing traffic does not have accidents. I don't think Mr. Lynch could dispute that. It is congestion that brings about the greater portion of accidents.

CHAIRMAN KOEHLER: I wish that the discussion might go on, but Mr. Storrs must get away. I am going to ask if he will summarize the discussion.

MR. STORRS: We didn't think we were going to start quite so much when Mr. Lynch and I framed this. I didn't intend to go into the particular mechanical details. I assumed everybody knew them. It is unthinkable that any organization would try a program of getting the cars operating at a less over-all time without going through three steps. In the first place, they have got to have the equipment so it will accelerate more rapidly.

(Mr. Storrs requested that his discussion be omitted from the record at this point.)

MR. STORRS: Equipment, then, is the prime essential. It is unthinkable that anyone would try a program without having that equipment so designed that it would accelerate and decelerate more rapidly. The main thing, of course, is the intensive training of the men who operate the cars. They must understand that the car is a new piece of machinery that they can't take out unless they have had the preliminary education that is so essential. Above all is the education or publicity given to the public of what it is all about, that free-moving traffic is what you are after. I think Mr. Lynch has been thoroughly answered, and the next time he gets into a row, he will, as usual, succeed in getting the answer for it.

CHAIRMAN KOEHLER: Gentlemen, our next subject is The Shop Employee's Contribution to a Safe Railway. This subject is going to be discussed for us by Mr. Harry Cordell, Master Mechanic, Chicago, North Shore & Milwaukee R. R. Company. I take great pleasure in introducing Mr. Cordell!

The Shop Employee's Contribution to a Safe Railway

By H. CORDELL

Master Mechanic, Chicago North Shore & Milwaukee R. R. Co.

The main spring of the complex industrial world of today is mechanics. Every industry, irrespective of what the product is, relies on mechanical engineering to find ways and means for greater, safer, and more economical operation. The railroad industry is no exception—here, if any place, is required super-intelligence, skill, foresight, quick thinking, accurate judgment, team work, and above all, the right mental attitude toward the safety of others.

Such being the case, the shop or mechanical department employees, contribute more toward the safe operation of a railroad than any other factor,

be that factor an individual or a department as a whole. Things and thoughts have changed. The shop department, or (let's be up to date) the mechanical department, was not considered a very important institution some decades back.

Most anybody could tinker around the old-time steam engine, with its simple construction as compared with the super-locomotive or the complicated electric car of today, or putter around the horsedrawn street car.

The transportation department in that era could and did reign supreme. The mechanical and electrical geniuses, however, could foresee the need of improved methods and more efficient and complex equipment was proposed and gladly accepted.

Being of a generous mind and aware of their limitations, the transportation men readily transferred the responsibility to maintain the equipment, to an organization whose personnel was especially trained along mechanical and electrical lines.

Another reason why the shop employees were, and perhaps are yet in some places, considered of minor importance is their lack of contact with the public.

We admit that there is nothing spectacular in our work or position. Hidden away from the glamour and refinement in which other departments work, being dressed in overalls against broadcloth and brass buttons, dirt, oil and grease, against immaculately clean hands and face, we still faithfully and uncomplainingly carry on, unmindful of the praise and compliments which are showered so bountifully on the men in blue when their passengers reach the end of the journey safe and on time.

You have seen the grape juice advertisement, "Don't thank me, thank Welch." This could be changed to a slogan something like this: "Don't thank me, thank the shop department," and be used in the trainman's reply to the patrons.

Sometimes our men, growing tired of the placid, uneventful life of the shop, venture forth and seek employment in the transportation department, taking with them the training and ability to observe and act, thereby greatly enhancing their new associates. But why paint the lily!

For fear of being considered an egotist, blowing my own as well as my department's horn too loud and long, I want to say that I appreciate the fact that all branches of work which go to make up a railroad organization, whether it be the transportation, track, overhead, traffic or mechanical department, have grown so complex, so interrelated, so interdependent, that safety and efficiency can only be obtained through complete unity in thought and action. This coordination is brought about by study, personal contact and observation.

Every employee on a railroad must feel and shoulder responsibility and consider his or her job as the all important one, on which depends the safety and welfare of not only himself, but his fellow employee, the traveling public, the company, and the commonwealth served.

The shop employee is particularly involved in this requisite. To foster such an attitude among the employees, leadership must be considered first. The foreman will show by his sincerity, his every act and order, well defined principles based on the predominating factor—safety.

He is not only a boss, but an instructor. His orders carry with them detailed plans which will carry the work through in a safe, speedy, and therefore economical way. Such a foreman meets his men with a cheery "good morning," starting the day right. The task completed, a word of praise, a compliment for work well done, thereby creating a desire for greater effort. This is our ideal foreman.

But what about this one? His orders carry an air of superiority and aloofness, which is not pleasing nor inspiring to his men. He assumes that everybody knows what is to be done. His short and tart reply to information asked is repelling to the men, who, rather than be admonished for apparent stupidity, proceed along wrong channels, where danger, waste and cost run amuck. Good men are held down because they might prove too conspicuous. No credit for work well done. Enter into a conversation with him regarding his work and you will find his store of knowledge is just as limited as is his capacity for leadership. The fallacy of retaining such a man in a supervisory capacity is self-evident.

The greatest good or evil comes from the inspiration the men receive from the foreman. As is the head, so is the foot!

The men under the ideal foreman will help each other by action and word of mouth. The older hands will show the new men the short cuts, the danger spots, and the way to become welded into the organization.

Will the men under the other foreman do this? No. They are copying their leader, afraid to show the new men the way, being themselves uncertain as to right or wrong.

In which of the two organizations will we find the minimum of accidents? Do you believe that the two above extremes will reflect into the equipment? Most certainly.

In no work that I can think of is willingness to instruct, help and counsel, of greater importance than in and around the railroad shop. We are all subject to that old bugaboo, man failure, and an omission of a cotter key, a nut, a pin, or other trivial part of the car, would, after the wreck, could it be clearly defined, answer many a surmised reason, forwarded by wiseacres, as to how it all happened.

Forgetfulness and carelessness are two of failure's jesting aids that always play pranks on folks. Forgetfulness sneaks around and stoops behind a fellow and carelessness walks right up in front and pushes him backward, while failure stands back and snickers.

Dare I say that many a man, due to lack of a friendly feeling toward his fellow co-worker, notices an omission or mistake and neglects to act? Yes, that is unfortunately true, and may exist to a marked degree, upon close analysis, in your own shop. What would cause that condition, you ask? There are many causes. It may be religious, political, racial, or just down-right cursedness and indifference, as to what may happen to the other fellow, the company, himself, or those whom we strive to serve and please; our customers.

Does a man of this caliber attend safety meetings unless held on company time? No. He has no time except for his own indulgence. Why does he work among men? Why is he not "stung" out by his fellow employees?

He is under foreman No. 1, where pollution is not tolerated, but thrives under foreman No. 2, polluting and putrefying the entire organization.

The esteem in which the operating department holds the shop employees depends entirely upon results, and is of the greatest importance. The public demand for unfailing service can be given only by the closest attention and inspection of the equipment.

The engineer or motorman must feel certain and at ease, implicitly depending on the apparatus to function unerringly. Starting with this feeling, promoted by past experiences, is it any wonder that the train is on time, customers satisfied and sold on the service? In order to obtain this enviable record a sound mind in a sound body is necessary.

Safety, the keynote to successful operation, must be the medicine freely dispensed by the attending physician (the safety engineer) and his assistant

(the master mechanic). The dispensary (safety meeting) must be well stocked with safety talks, pictures of operating hazards, experiences and suggestions, and large bottles of open and free discussions.

I will now mention a few of the diseases that play havoc with our safety body. I will also take the liberty of suggesting some remedies which may be found helpful.

Gout:

This dreaded disease finds an easy victim in the supervisory force.

Its first symptoms manifest themselves by stiffness in the joints, evidently making it impossible for the patient to find time to attend safety meetings.

Remedy: Send patient to the chief surgeon immediately (the general manager) for his diagnosis. If his findings show an acute state, an immediate operation may be necessary for the purpose of removing false mucus membranes (wrong attitude) after which the patient should rapidly recover.

Flat Feet and Fallen Arches:

Some master mechanics suffer from this ailment. It is an insidious disease which develops slowly.

The most pronounced characteristics of this ailment appear when things are going along nicely. The "old man" ceases to pry into details and lets good enough alone. Small defects, to all appearances of no importance, cause no indentation on the tranquillity of his mind. Gradual stagnation follows, which unless stopped, may prove fatal.

Treatment: The chief surgeon (general manager) may analyze this case as a bad case of self-satisfaction. For this he may prescribe the cure all, work. He may also prescribe trips of inspection to other properties, attending conventions, reading of magazines and journals pertaining to the maintenance work.

The antidotes mentioned should, unless disease has progressed too far, raise the patient out of the lethargy and to a realization that as long as the wheels turn progressiveness and initiative are required.

Tetanus or Lock Jaw:

This disease affects the attendance at safety meetings. It seems to assume the proportion of a pestilence in large groups. The most versatile among the men before or after a safety meeting, will be found stricken with the disease as soon as the meeting is called to order.

Treatment: A mild enema in the form of coaching, from the chairman may effect relief. A good story may act on the restricted area and bring about an abundant flow of saliva which may loosen the jaw. Once relieved, care must be taken that patient is kept in good humor and encouraged and complimented for his contribution.

Neurasthenia:

Long dull safety sessions bring about a bodily unrest which seriously interferes with the effectiveness of the meeting. This malady may affect even the best safety men, and is first noticed by shuffling of feet and chairs. As the trouble progresses, yawning and stretching follows.

Remedy: A real chairman who knows how to conduct a meeting. Live subjects and interesting talks—not the long monotone kind. A cigar or two lends a charm to the occasion. Diversified programs, and a little (not too much) entertainment to keep up the spirit of the patient, will affect an improvement and final cure.

Odema or Dropsy:

This is a serious affliction, and appears mostly while men are at work. For some unknown reason tools and material are permitted to fall causing injuries. Then again, it becomes chronic, and is evidenced by dropping material removed any old place, forming tripping hazards and it results in a general bodily disorder commonly known as "poor housekeeping."

The disease, unless checked, will become contagious and spread to the car equipment—bolts, nuts, brake rigging, motor parts, covers over electrical units, etc., will drop off the car, causing great hazards and delay to service.

Remedy: As this is a mental disease, the master mechanic should be the



attending physician, rather than the safety engineer. A consultation with the interne (department foreman) of the ward where patient works is first in order. It may be found that the trouble rests with the foreman rather than with the man. If this is the fact, a stimulus may be applied in the form of a good plain talk. This will act as a tonic and a general improvement will be noticed.

Again, it may be necessary to lecture on hygiene to the entire department. Isolated cases will call for individual dispensation, and if remedies applied have no effect, an amputation must be resorted to. This generally cures the disease.

Hoof and Mouth Disease:

This most dreaded disorder attacks the safety engineer, as well as the men. It is a serious sickness as it interferes with the routine of work, and the sufferer neglects to do his part. The most of us can only do one thing at a time and do it well. Concentration is impossible when a bedlam of voices is piercing the air.

The other counterpart of the disease is walking. Visiting from one department to the other affects the morale as well as the output. The close schedule

in which car equipment is inspected and maintained, calls for attention to business and that only.

I feel, without fear of contradiction, that hoof and mouth disease (walking and talking) can well be assigned to political demagogues and other non-producing individuals.

Treatment: The medicine applied to Odema or Dropsy will affect a cure as far as shopmen are concerned.

Medical science has not, as yet, discovered a serum that has caused even a slight improvement, when the disease attacks the safety engineer. As this scourge is spreading, I hope some one finds a way to at least check it.

In conclusion, may I just say that we in the shop department realize the important part we play and that our contribution to a safe railway, in a condensed table, consists of the following ingredients:

Knowledge of work	50 Parts
Cooperation	25 Parts
Constant Vigilance	25 Parts
Total	100% Safety

CHAIRMAN KOEHLER: Mr. Cordell, I am sure we are all impressed by your display of knowledge of the medical profession. We knew you were an able master mechanic, but I don't believe any of us were aware of all this latent talent which you possess. I know there will be a great deal of discussion, but there is not sufficient time to give justice to it in the few minutes that remain. We want to hear the report of the Nominating Committee.

I am going to ask Mr. Hellmuth now if he will present the report of the Nominating Committee, of which he is chairman.

Report of Nominating Committee

G. T. HELLMUTH (Chicago, North Shore & Milwaukee R. R., Chicago, Ill.): Mr. Chairman and Fellow Members of the Section, the Nominating Committee consisted of Mr. R. W. Emerson of Cleveland, Mr. W. H. Boyce of Pittsburgh, and myself. We made up a list of officers of the section, and our considerations were based on their service to the section and on their ability to serve the section. We have given this matter very careful consideration, and now have this ticket to present to you:

Chairman, E. K. Eastham, St. Louis Public Service Company, St. Louis, Mo.

Vice Chairman, H. K. Bennett, Manager, Providence Safety Council, Providence, R. I.

Vice Chairman, Melvin W. Bridges, Chicago Rapid Transit Company, Chicago, Ill.

Vice Chairman, Glenn H. Shaw, Northern Ohio Power & Light Co., Akron, Ohio.

Now, Mr. Chairman, if there are no other nominations, I shall move that the nominations be closed.

H. O. ALLISON (Pittsburgh Rys. Co., Pittsburgh, Pa.): I second the motion.

CHAIRMAN KOEHLER: The motion has been made and seconded. What is your pleasure, gentlemen?

(The question was called for.)

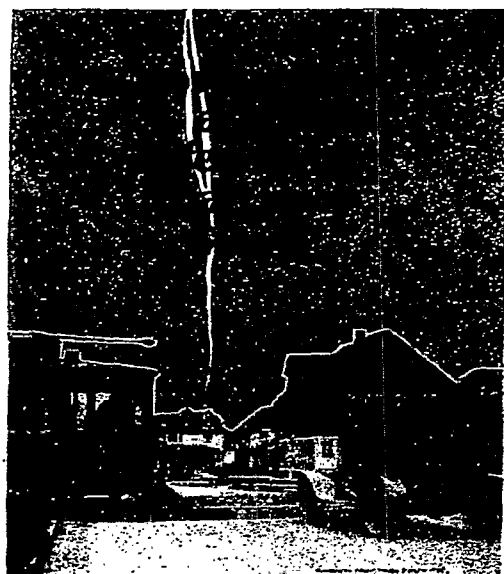
CHAIRMAN KOEHLER: All in favor of accepting the report as read will signify by saying "aye"; contrary-minded by a like sign. It is carried.

MR. HELLMUTH: I shall therefore move you, Mr. Chairman, that the secretary be instructed to cast one ballot for the election of these officers.

MR. HODGES: I second the motion.

CHAIRMAN KOEHLER: The motion has been moved and seconded that the secretary cast one ballot to elect these gentlemen to office. All in favor will signify by saying "aye"; contrary-minded by a like sign. The secretary will cast such a ballot.

Now, gentlemen, just a word. This is the occasion for your present chairman to retire from office. Before I ask Mr. Bennett to conduct your new chairman to the platform, I want to take occasion to express my deep appreciation for the very loyal cooperation that has been extended me by the vice-chairmen, officers and committee chairmen and members of the executive committee, members of



the staff of the National Safety Council as well as those members of the section who have so generously contributed of their time and thought, and who have made my administration a pleasure indeed.

We held but a very few meetings, but those meetings were very well attended. At our first meeting held in Chicago, I believe we had almost 100 per cent attendance. You can appreciate what that means when you know that these men came from long distances, leaving their work for a period of a day or two in coming and going, and remained away from their offices the greater part of a week. That has meant a great deal. Our deliberations have been interesting. There has been shown a genuine spirit of concern for the welfare of the Electric Railway Section. We have been mindful of the responsibility that has rested upon us, and we have tried to discharge our duties to the best of our ability. How well we have succeeded, I leave with you.

I am not going to take up any more time. I want to give you an opportunity to look into the face of your new chairman, and to greet him. I simply want to say now as Mr. Bennett conducts him to the platform that I wish for Mr. Eastham

the greatest success, and the very same kind of cooperation that was extended me. I want to assure you, Mr. Eastham and members of the Section, of my continued interest and support. Anything at all that I may be able to do during the coming year, I will do cheerfully.

(Chairman-Elect Eastham was escorted to the chair.)

CHAIRMAN EASTHAM: Gentlemen, I am deeply appreciative of this honor. However, like most honors, there is a corresponding responsibility involved. In accepting the honor, I say to you I accept the responsibility and will meet it to the best of my ability. It would appear that our section may be faced with certain rather serious difficulties in the years immediately before us. These difficulties are related to those which face the electric railway industry as a whole—decreasing revenues and lightened finances. I fear that some managements, sorely beset, will, in the general effort to curtail expenses, make the mistake, as I view it, of cutting down on their accident prevention organizations. Some reflection of this is found in the net loss of memberships in our section for the past year as shown by Mr. Boyce's report. In the interest of accident prevention work as a whole we should meet this problem boldly and convince management by argument and results achieved that now more than ever is the time for increased activity in accident prevention. The sound reasons are: That the cost of accidents is the largest item of useless expense in any company's budget; that sincere accident prevention work is one of the best avenues to public and passenger good-will; that accident prevention work, while an integral part of efficient operation, yet has such important tie-ups with employee and public relationship as to deserve and require trained direction and leadership.

I have a further conviction that for those of us who are safety workers and for our industry as a whole, we should spend increasingly more time and effort toward reaching and educating the general public on all matters affecting public accidents. This can best be done, it is my belief, through closer cooperation with all other agencies working toward that end, particularly local safety councils, the public and parochial schools, police departments, citizens' traffic committees and state and national conferences for uniform, well-worked-out traffic laws.

My message to you for the next year, as safety workers, whether as manager or motorman, is this: Cultivate a code of ethics as high as our basic aim of saving human life and limb. Stand up and be counted always for those policies which in your judgement will best conserve the life, liberty and happiness of your American fellow-citizens, yes, and of your fellow-man the world over.

That our Section may start its activities promptly and energetically, I am setting the precedent of naming our committee chairmen at this time as follows:

Membership: Samuel H. Reid, Bureau of Safety, Chicago, as Chairman. Vice Chairman, Mr. Arthur Gaboury, of Quebec, Canada.

Publicity and News Letter Editor, the man who served us so faithfully and so well during the past year. Mr. Buell W. Nutt, of the Safety Equipment Service Company, Cleveland, O.

Poster and Slide, Mr. L. R. Brown, of the New York State Railways, Rochester, N. Y.

Program Committee, Mr. T. G. Brabston, of Birmingham, Alabama.

Engineering and Statistics, Mr. Edward Maltz, of the Cleveland Railways, Cleveland, Ohio.

Members-at-Large, Mr. R. W. Emerson, G. T. Hellmuth, and Daniel Fennell.

Those gentlemen, the committee chairmen, plus the members-at-large, plus the officers of the Section just elected, will constitute the Executive Committee. I am going to ask all of those gentlemen who are here (and I hope you will pass the word along to those who are not) to meet with me in my room this afternoon for a very brief session so that we can get our sectional activities started promptly.

Now, gentlemen, just one other word, the success of the work of this section for the next year depends fully as much, if not more, on the cooperation of you individual members, you representatives of your companies than it does on the officers and the committee chairmen. The report that was made from the Poster Committee, that on a request last year sent to 50 companies for assistance, only one answered, I think we should improve upon during the coming year. The same has to do with getting out our *News Letter*. Mr. Nutt is going to take the time to do this work from his own business, and he certainly deserves the help of all of us. I want the help of every one of you. I feel that your officers should be entitled to that. I expect it and I believe that I will get it. I want to say that tomorrow morning's session will open (if there is only one man there) promptly at nine-thirty o'clock. We have a good deal in the way of discussion. We have left room for that on the program for tomorrow, and I know we want to start on time. The program for tomorrow is most interesting, embracing a playlet and picture given through the courtesy of the Public Service Company of New Jersey. I am going to ask you all to be there promptly at nine-thirty. When we come here to these meetings, the benefit comes from us all attending and in discussing the matters that come up.

S. H. REID (Bureau of Safety, Chicago, Ill.): I don't think there is a man in this Section that fails to appreciate the splendid service that our retiring chairman has rendered during the past year. He has shown unusual ability as a leader, as is evidenced by the attendance at the various executive meetings which he has held during the year. I therefore think it proper at this time that we should extend a rising vote of thanks to Mr. Koehler for his splendid services.

(The members arose and applauded.)

ADJOURNMENT.

October 4, 1928**E. K. EASTHAM, Chairman****Safety Director, The St. Louis Public Service Company
St. Louis, Mo.**

The third session was called to order at nine-forty o'clock by the chairman, E. K. Eastham.

CHAIRMAN EASTHAM: Now, gentlemen, I trust we won't have any great amount of disorder today, because if I hit this table too hard, it is going to bust. We have sent out for some question cards which will be placed at your disposal, because we have more time left today for discussion than at any of the other meetings. When the cards are passed around, if any of you gentlemen have any matters that you want brought up under the head of the general discussion, aside from the discussion left from the previous sessions, put them on the cards and we will cover just as many of them as possible.

The first paper on the program this morning is by Mr. Arthur T. Warner, General Manager of Traffic, Public Service Coordinated Transport, Public Service Corporation of New Jersey, Newark, N. J. I think it should be very interesting to us all because the bus is coming to play an increasingly important part in most of our transportation systems. I understand that Mr. Warner will be a few minutes late. We have had some very interesting programs in the last two or three days, and due to lack of time, it has been necessary to forego discussion. Is there any point with reference to the papers that we have already had, or any other point that the delegates would like to bring up at this time?

MR. HAUGHT (Pittsburgh Rys. Co., Pittsburgh, Pa.): I would like to ask the man from Chicago how they arrive at the conclusion in the accident percentage of 70 per cent human failure and 30 per cent mechanical failure. How is that arrived at?

MR. GORDON (Bureau of Safety, Chicago, Ill.): Naturally, we keep records. Otherwise, we wouldn't know where we were, and over a period of years, you will find that 90 per cent instead of 70 per cent of the accidents are caused by man failure. Just as an evidence of that, we had a stenographer in our office whose duties it was to recopy or to make cards from accident reports. She had a great many of them. In commenting upon them, she said, "It looks to me as though nearly all these things are caused because somebody didn't do something he should have done, and he should have known it was wrong."

I said, "Well, our statistics show that the big majority of our accidents are caused by man failure." At that time, 75 per cent was quoted.

"Why," she said, "it looks to me more nearly like 100 per cent."

That was a stenographer's viewpoint from going over the accidents that came into our office. We are backed up on that statement because of our own records.

E. HOLLIBAUGH (Pittsburgh Rys. Co., Pittsburgh, Pa.): I feel that that stenographer was right because I don't think we can examine an accident without being able to trace some mistake along the line where someone was negligent. That is where the human element enters. If it is a mechanical failure, it might be the result of improper tests. I don't believe we can have an accident without in some way, being able to trace it to the human element. Just where we are going to stop, I think, is the general attitude in mind.

S. H. REID (Bureau of Safety, Chicago): In 1925 we began keeping fairly accurate statistics of accidents with a view of determining the cause over a period of five years, beginning with 1924, it was. We found that about 78 per cent of the employee accidents were due to what is generally called "man failure." The

second period changed that somewhat by reason of improvements that were made in the mechanical conditions. The obvious physical hazards were reduced. Consequently, the number of accidents due to physical conditions of the property over which the injured might have not had any control, are decreased. At the end of the second period, that percentage was about 58. At the present time, it is 49 per cent. That, of course, is by reason of the improvements that were made in the physical conditions of the property.

So far as fatal accidents are concerned, we find that almost all of them have happened because somebody disobeyed a rule or failed to use some safety appliance that had been provided. We have those statistics, Mr. Chairman, covering the accidents to the public. I am speaking purely of employee accidents. I think the figure of 90 per cent or even higher, due to man failure, is very conservative.

WILLIAM WILSON (Pittsburgh Rys. Co., Pittsburgh, Pa.): In behalf of my brother trainman here, I think that he has the wrong idea in this way: We are trainmen. You men are officials. He has the idea that you are trying to put the responsibility for all the accidents upon the trainman. Some of us might take the stand that you are wrong on your percentage. In my activities in the safety movement, I have found out, as Mr. Hollibaugh says, that you can trace accidents back to man power. Contributory negligence is one of the greatest accident hazards that we have to contend with. I think the National Safety Council traced several accidents back to man power in this manner: There was a man operating a car with a man sitting up close to him, talking to him. A man stepped out from the corner, who was knocked down and his arm was broken. The report was made out by the motorman, but the National Safety Council went a little bit further.

They interviewed the man who was talking to the motorman. "When you were talking to the motorman," they said, "what were you talking about?"

"Well, he had a little trouble at home, a few nasty words with his wife, and he didn't see the man when he stepped out from the curb because he had his head toward me, talking." Perhaps Mr. Hollibaugh had that in his mind.

MR. SPECK (Pittsburgh Rys. Co., Pittsburgh, Pa.): Speaking of the 75 or 80 per cent man failure, where are you putting it, on the employee or the man in the street? Let us differentiate between the two. The way it appears now, all the responsibility is on the trainman. Mr. Wilson spoke of a man being hit by the street car. The man on the street had as much right to see the car as the trainman had to see the man on the street. The man on the street had a larger thing to see.

Are we putting it all on the trainman in determining that percentage and not on the man in the street, or the vehicle? I think we should deliberate on that.

MR. GORDON (Chicago Bureau of Safety, Chicago, Ill.): We have to place this accident prevention matter on the individual, be he motorman, engineer, clerk, or pedestrian. When we say man failure, we mean the fellow who leaves the monkey wrench on top of his step ladder so that when he steps off to move it, it falls and hits him on the head. That is man failure. We also mean when a motorman stands with his hand on the controller or air valve handle and deliberately bumps into an express wagon that can be seen for a mile in broad day light, with nobody around him, that it is man failure.

We must always say that it is man failure on the part of the operator on the front end of a street car when he talks to a passenger in violation of his company's rules. Let the passenger talk, but the motorman doesn't need to talk. Neither does he have to look around at the fellow while he is talking to him. Therefore, it is man failure. Then it goes back to the company in violation of a rule, where the company's officials knowingly permit a violation of that rule.

It then becomes a habit and a practice, and the first thing you know some fellow doesn't know about the practice and he disobeys his book of rules. In the case I have in mind, that same thing happened and seven people were killed. The company was censured for that accident, not the man on the front end of the car.

CHAIRMAN EASTHAM: Mr. Warner is now here, and the balance of this very interesting discussion can go over.

Mr. Warner, I have already introduced you. Without any further introduction, I will call upon you now.

Bus Operation from a Railway Man's Point of View

By **ARTHUR T. WARNER**

General Manager in Charge of Traffic, Public Service Coordinated Transport, Newark, N. J.

I come from an organization located in New Jersey, that is today operating some 1,700 buses and 1,500 trolley cars and furnishing a complete system of local transportation to approximately 90 per cent of the population of that state.

I would rather, therefore, change the subject as I start to discuss it, because the transportation organizations that today are operating both cars and buses are not railway men. They are adapting all the best elements of all the means available to them to supply their communities with the necessary local transportation. Consequently the railway man of the past, as such, is rapidly disappearing, and in his place we have the transportation man.

Times, mental attitudes and points of view, have changed somewhat to the railway man in the last ten years. Way back in 1914, just prior to the start of the World war, we in the east heard many tales of points in Texas, California and other places throughout the southwest, where people were running automobiles for a nickel a ride. We rather laughed at it, and thought it was another California publicity stunt and like the perpetual sunshine, roses, oranges, etc.

About six months or a year later, however, the first laugh had changed to a frown and we were beginning to realize what it meant to go up against jitney buses that flooded our streets in this section. They settled upon our lucrative business areas like swarms of 17 year locusts. They picked out the spots where the business was the thickest and skimmed the cream. Without permanency, stability, reliability or regulation they established themselves, and lived on business that the local railway organizations had taken decades to build up and establish. All sorts of prophecies were made that these old jitneys were simply a fad of the moment, that they were economic monstrosities, and that people would not long stand for such plainly illegitimate operation and that the jitney would die of its own weight. But somehow or other they continued to exist. Of course, regulation in some form began to develop shortly, but by the time regulation did come, buses were fairly well established and a bus riding habit had been only too well formed.

At the end of the war we in New Jersey found between 1,200 and 1,500 buses in direct competition with our street car lines and threatening our very existence,—and New Jersey was no exception, other states were exactly similar to ours. Up to that time the railway industry had looked upon the motor bus as an enemy, which it must fight to death, but the time was arriving at which the larger and more aggressive railway organizations were beginning to experiment with the bus, to accept it as an ally, to see its possibilities, as well as its shortcomings and to make use of its good points, to fix for it a place in the transportation field.

I am reminded of a story of a traveler motoring through the sunny south, who stopped at the side of a field, wherein a small boy was hoeing potatoes.

Some conversation took place and finally the traveler said, "Son, what do you get for hoeing?" The youngster replied, "Nothing if I do, and hell if I don't." This unfortunately illustrates only too well the way some of our railway officials viewed the bus situation. They felt that there was nothing in it for them if they engaged in bus operation, but that they would be in hot water if they didn't. Thus it has taken between 10 and 15 years to turn the local transportation agencies to a point where they are ready to accept the bus and bus operation as part of their job. Since 1923 or 1924 this change has been under way very rapidly and we find now that practically all of the larger local transportation agencies are giving at least a portion of their service with buses.

I have been advised that I should dwell upon the safety element in bus operation. I hardly need to say that operation, to anybody raised in the railway business, is always *safe* operation. With us *safety* has been the first element of service. Every railway slogan has had safety in it somewhere. Safety always; safety first; safety, service and efficiency; safety, courtesy and loyalty. There are dozens and dozens of them, but safety appears in each. So when we started to consider the bus as a vehicle with which to carry our patrons, as a means by which we could furnish a service such as we were accustomed to give with our trolley cars, we looked at the high, light, single tire, often brakeless, vehicles and wondered what elements of safety they contained,—and we set about to develop what in the first place, was a safer vehicle.

Changes in design which have always catered to safety, have been marvelous throughout the last ten years. In 1918 the buses were then made-over truck chasses, with high frame, three or four steps to climb, low roofs, no lights, no ventilation, no heat for winter operation, single tires in the rear,—consequently skiddy, uncertain brakes. In short, certainly not a safe vehicle from the point of view of street railway operators. I think that I may say without contradiction that the rapid development of the bus from that stage to today has been due to the fact that railway organizations have seriously taken over bus operation and have materially assisted the manufacturer and designer so that the bus of today is the answer. I doubt if independent operation could have developed the bus anywhere nearly as rapidly as the efficient and experienced organizations that have been serving for years local transportation to their communities.

I will not go into a long technical discussion describing the various stages in the development of the bus of 10 years ago to the vehicle of today. Let it be sufficient to say that the modern bus is a safer, more comfortable and more dependable vehicle from all points of view. Chasses have been lowered, which has brought down the center of gravity; we find dual wheels on the rear, which has done away with skidding; four wheel air brakes are now in order; buses are now well lighted; good ventilation exists; all of which, in brief, gives the patrons a ride which will compare favorably indeed with that in an expensive limousine.

Various regulatory bodies have done much to increase safety provisions in bus design by adopting specifications making it necessary to have all vehicles equipped with elementary safety devices. Our New Jersey Commission, for instance, in its specifications requires the following details which are certainly a part of any safety program: Window guards, partition behind the driver, emergency door, grab handles and railing, ventilating system, heating system, gas tanks properly located and protected, mirrors, fire extinguisher, lights, in addition to specifications requiring a certain strength of chassis frame and other mechanical details.

My own company is one of those which is strongly in favor of the gas-electric drive, which by the elimination of the transmission and all gear shifting has, we

believe, additional safety features. The operator's hands, being free from gear shifting are just that much more available for other duties. The lack of gear shifting also gives freer acceleration, eliminates the jerking of the passengers, which comes from sudden gear shifting and consequently gives a safer and more comfortable ride.

Of course, all my observations are based largely upon my own experiences in New Jersey. Five years ago today we had less than a dozen buses running on two short country lines. Today we have over 1,700 buses which will operate over 55,000,000 bus miles this year and carry over 325,000,000 passengers. So you can see we have certainly opened our arms to the bus as a means of modern transportation within the last five years, and today the system in London is the only one in the world that surpasses us in size.

Certain factors in bus operation have an immediate appeal from a safety point of view. The first of these is, I think, the factor of pick up and delivery at the curb. With municipal street traffic in its present state in any of our larger communities, a vehicle that is able to take the passenger at the sidewalk and deliver him at the other end of his journey also at the sidewalk, has a distinct safety appeal. Today an excursion into a metropolitan street is fraught with considerable danger. A man takes his life in his hands and one realizes that the apostle must have had a picture of modern conditions when he wrote of the "quick and the dead." The next element wherein bus operation differs from car operation from a safety point of view is that the bus, being dirigible and not operating over a fixed track, has a flexibility impossible with a street car. This tends, I believe, to the safer use of the highway. A bus is not tied up for long because the vehicle ahead of it breaks down. Traffic jams will, therefore, not be caused in bus operation to the same extent that they are in car operation.

We have found in the development of an operating personnel, that the same intensive methods of training are necessary with bus operators that we have always used with our car platform men, except that, as a rule, a would-be bus operator comes to us with a driver's license and some bad habits of driving, which he must unlearn before he can become a first class bus operator. Our schools of instruction are flooded with ex-truck drivers and ex-taxi cab men and we find that our first duties are to make these men overcome bad habits that they have acquired in the earlier employment. This is something we never had to do with the trolley operator. Of course, the car operator is running on a fixed rail, has only one place to go, and other vehicles using the highway know this. They can regulate their own movements accordingly and consequently the car operator is never subjected to the accusation of being a road hog the way the bus operator is. The very dirigibility of the bus gives it an element of uncertainty as far as other vehicles go, that is absent in the street car.

I want to digress from the strict discussion of safety to give you a brief picture of the different ways in which we are using buses in New Jersey at this moment. In our larger communities such as Newark, Jersey City, etc., the trolley system is still carrying the backbone of our mass transportation. We have inherited sizable bus operations that parallel these car lines and we use this bus service coordinated with the car service in such places. We are rerouting these bus lines to adjacent parallel thoroughfares so that there will not be a duplication of service on the same street and the bus will be placed on a highway not occupied by car tracks so that it may develop to some extent a territory of its own.

In other municipalities, such as Paterson, Plainfield, New Brunswick, etc., we have discontinued our street car service and replaced it with bus service. These have been on lines of comparatively light traffic, where street car operation

was over single track with turn-outs and where the flexibility of bus operation has been developed to its fullest extent. We have installed new bus lines as feeders, crosstown routes, extensions into new developments and to open up new territory.

We have also placed in operation a considerable number of so-called "Deluxe" bus lines. We call them "Super Service" lines. These are vehicles specially designed for greater comfort and interior attractiveness. They differ from the regular bus in the same way that the parlor car differs from a day coach. There are individual seats, well upholstered, and extremely comfortable, there are curtains in the windows, mirrors in the panels, interior finish of a pleasing design. These vehicles furnish the patron as comfortable a ride as in his own limousine. We charge a higher fare for this service and it is furnished on a basis of a seat for every passenger. Routes such as these, chosen so as to serve neighborhoods that would naturally patronize more expensive and higher class service, are developing rapidly in our territory and give evidence of having great future possibilities. This is a field for the bus that the street car never had.

Another service developed which is distinctively bus as it grows, is the longer special trip touring parties, chartered or special buses. This business is growing by leaps and bounds. On July 4th of this year, we had 221 buses engaged in taking private parties to various points all over the east. We have sent buses from New Jersey to Florida, to Canada, to Chicago, in fact all over the eastern part of this country, and most of these parties come in for repeat orders. Last summer we handled the annual excursion of one of our larger insurance companies taking 3,000 of their employees in 90 odd buses from Newark to the Jersey shore and return. This trip formerly had always been handled by special trains on the steam road. Their committee asked this year if we could furnish them buses. The rate we quoted was 20 per cent higher than that offered by the steam road, but they decided to try it with buses this year because of the pick up nearer home, the delivery at the beach, and the relief from train schedules. On their return the committee in charge informed us that they were converted to buses and would not voluntarily return to trains.

I have just cited a few of these cases to show that the bus has and is creating more and more a distinct appeal of its own with the traveling public. There are small elements in bus service that the trolley cannot give, that the steam road cannot give, and if the local transportation agencies are to meet the competition which the privately owned automobile is giving today, they must go to the buses, because the bus gives the service which approaches more nearly that of the private car.

The bus has now reached the point where it must be and is accepted as a part of the transportation industry. The vehicle is being developed rapidly. It is being continually improved in design to give greater safety, greater comfort and a wider range to its use. Its adoption by so many transportation agencies has led to the use of modern operating methods, of operating forces trained for their work, and continually under the eye of executives who have been brought up with safety as their watchword.

I would, however, be lax indeed, if I allowed this occasion to pass without an appeal for greater cooperation in our safety campaigns from those who have, after all, the greatest power to produce safety results. All our states, all our larger municipalities, all governmental agencies that exist, have passed and now have in force laws, ordinances and regulations governing the use of highways in the interest of safety. These laws should be uniformly enforced. I refer not only to speed regulations but to parking ordinances, jaywalking, the elimination

of left hand turns, in fact every kind of so-called traffic rule. The work of the Hoover conference has been a great step to bring about a uniform system of traffic control and regulation. We in New Jersey are now enjoying the first fruits of this conference. Our legislature within the last three months has passed a uniform traffic act. We have, we feel, enough laws and regulations and the thing remaining for us to do is to enforce, uniformly, justly and fully the laws we now have, so that the bus, the car and private automobile may each use the public highways so that each may travel with the greatest possible safety.

CHAIRMAN EASTHAM: I greatly appreciated the talk made by Mr. Warner. I don't know of anything that will be of greater importance to our industry, as time runs on, than this subject. The industry must have a thorough understanding of the place of the bus. Of course, with us as safety men, we are interested in the safety features in that connection. We have some time for discussion of this particular paper while Mr. Warner is here.

G. T. HELLMUTH (Chicago, North Shore & Milwaukee R. R., Chicago): There are two questions I would like to ask Mr. Warner. First on your gas-electric cars, you mentioned the use of electric brakes. You mean you stop on reverse in emergency?

MR. WARNER: There are two motors in opposition so that the motors are bucking each other in that case, so the power acts as a brake.

MR. HELLMUTH: That is a good deal like the reverse on a car?

MR. WARNER: Somewhat.

MR. HELLMUTH: Then, secondly, do you find your claim cost in operation of motor coaches less than the claim cost in operation of street cars?

MR. WARNER: Mr. Brown, our claim agent is here, and he can give you that information better than I can.

MR. BROWN (Public Service Corporation of New Jersey, Newark, N. J.): Mr. Warner explained we started operation in 1923 and gradually added to the units during these years, so we are constantly taking on new buses, new units. Of course, you all know that claim expenditures reach a peak gradually over a period of five, six, or seven years. For instance, if you take on a brand new proposition, there is nothing due for the first year. I would say that half of your expenditures are made on an old proposition, where you have been operating for years. About half of the expenditures during a given year would be on the current accidents. So, gradually that is built up until a peak is reached. We haven't reached the peak yet because of the addition of units.

I think from my observation, taking into consideration the improvement in mechanical devices, operation, and so on, that the claim operation on the buses will cost slightly less than on the railroad. Of course, the bus has many advantages, as Mr. Warner has outlined. The very fact that the bus can deviate from its course in given situations, which is impossible for the trolley, is important. Then too, if you are figuring your results on percentage of gross expenditure, the bus has very much less carrying capacity, which also comes into play. I think on the gross revenue basis, that the bus is going to cost (for all city operations) less than the railway when it reaches its peak.

MR. WARNER: There is one point there I would like to explain. We have a bonus system in effect this year. It was started last year. This year it has been modified to some extent as a result of our experience last year. We set up three bonus periods a year, of four months each. We have practically set up \$20 for each man. If he runs for four months with no accidents, he gets \$20 at the end of four months. For the first accident he has, \$1 comes off; for the second accident, \$1.50 comes off; for the third accident, \$2.50. If he has more than three accidents, he is out of the picture. So, he either gets \$15, \$17.50, \$19, or \$20.

In addition to that, each garage has a garage prize based on the number of improvements made this year over last year on a mileage basis. On that basis, the small garage has the same opportunity as the large garage. That means if a man has his three accidents, he is still eligible (if he belongs to a careful garage) to come in on the average prize. It also means that everybody in the garage is interested in the record of every other man in the garage.

As I say, a change was made this year as a result of our experience last year. We wanted to make it so that every operator would have an interest in the accident record of every other operator in addition to his own. The result of that is a reduction (while running more miles and more vehicles this year) of some 1200 accidents this year compared to last year. Whether those 1200 accidents will enable us to save enough to pay that full bonus or not, I can't answer you. I don't believe anybody else can answer you, because it is actually more than 1200 accidents. The tendency is to go up. We have not only started the upward trend, but we have now established the downward trend. There is 1200 plus whatever the normal increase would be. The more vehicles you get on the street, the more accidents you are going to have. There are more vehicles on the street this year than last year.

G. T. BRABSTON (Birmingham Electric Company, Birmingham, Ala.): I would like to ask a question in respect to that bonus system. What has been the effect on the unreported accidents? I am sure from all of our experiences under a system of that kind, we find a certain tendency on the part of the operator (which is a natural human bent) to be lenient with himself on an accident he doesn't think is serious, but that same accident may cause a great deal of trouble with the Claim Department at a future date.

MR. BROWN (Public Service Corporation of New Jersey, Newark, N. J.): The unreported accidents were not increased. I found that accident reports decreased very materially, but they used good judgment in discriminating, so the actual result was, that there was not an increase in unreported accidents. With that bonus in the back of their heads, they did not report as many trivial matters as before.

MR. BRABSTON: Isn't it your experience that it is the usual practice and custom of the person that wishes to magnify one of these trivial accidents, to wait five or six months before he presents a claim? That is a delayed situation rather than an immediate one.

MR. BROWN: That is sometimes so, but I don't think it is generally so. I am taking the results over a long period.

MR. HELLMUTH: I should like to answer Mr. Brabston's question, because that bonus award business is my pet. I arranged a lot of data and communicated with many properties. It is just as Mr. Brown said. Last year, his company was operating 1,500 buses?

MR. BROWN: Mr. Warner said about 1,700 at this time.

MR. HELLMUTH: One-fourth of all the bus business being done by electric railways was done by the Public Service Railway of New Jersey a year or two ago. Their volume of experience therefore, is so large that it pretty well represents the correct average. If that isn't enough, let me say that with the street railway companies and other bus companies, that the experience has been almost universal in that unreported accidents have not increased. Of course, in one way that is due to a number of the companies making a penalty of two accidents as a charge for every unreported accident against the man who doesn't report it and it afterwards turns up.

MR. BROWN: Our discipline is quite severe. That also covers our street railway operation of how many cars?

MR. WARNER: About 1,400.

MR. DONNELLY (Pittsburgh Rys. Co., Pittsburgh, Pa.): I would like to ask Mr. Warner if he has any sand equipment on those buses for bad weather to keep them from skidding and causing accidents.

MR. WARNER: You mean chains?

MR. DONNELLY: Don't you use sand at all?

MR. WARNER: Sand and ashes; ashes more than sand. We put a mixture of ashes and sand on all bad grades with spreaders. That is done as soon as any ice condition appears, but only on a very few places do we use chains.

MR. STOUT (Altoona, Pennsylvania): I want to ask Mr. Warner if he has anything to designate bus stops along the highways, especially out in the outlying districts where other fast-moving traffic might be following the bus? We have had the experience that they sometimes run into the rear end of the bus because they weren't expecting the bus to stop. Do you have designated stops?

MR. WARNER: We use the same system as on the trolleys. Bus stops are trolley stops except at places where bus stops are designated where there are no trolleys. Out in the open country near side corners, the stops are usually marked with markers on the poles. That is the usual system, although I guess most of the drivers stop right in front of any farm house.

E. HOLLIBAUGH (Pittsburgh Rys. Co., Pittsburgh, Pa.): We have been afraid of the individual bonus for several different reasons. Unreported accidents was one reason. Another was the way of arranging this bonus so that the individual men who participated would have no hard feelings. One man might have an the non-chargeable accidents and he might be afraid he would get into hot water. Then, we also thought that the bonus might eventually play out and we would have to get something to take its place after a while.

I can see where this bonus that goes to car houses would eliminate the element of individual controversy. We had a little prize last year for men who went a certain period of time without an accident. Then they wanted to make it an accident of any kind. Finally, in awarding the prize, we discovered it was going to create a great deal of hard feeling within the district. Some of the car houses gave the buttons out indiscriminately to the poor devils who had accidents, the same as to the rest to avoid any hard feelings.

MR. ALLISON (Pittsburgh Rys. Co., Pittsburgh, Pa.): Mr. Brown, what is the average cost per accident on the coaches?

MR. BROWN: I haven't figured that, but it is about 5½ per cent of gross revenue.

MR. ALLISON: You don't have the cost per accident?

MR. BROWN: You mean all accidents reported?

MR. ALLISON: No.

MR. BROWN: I could readily do it.

MR. ALLISON: The second question would have no value in this case, probably. Have you made any estimate of the cost of the bonus system in comparison to the cost of accidents to see which is costing the most?

MR. BROWN: I don't know as there is any way in the world to determine just what effect the bonus would have. After all, the money is what you are after.

MR. WARNER: I think I can say this, if it were possible at the end of this year to segregate the cost of accidents and not have any of the claims run over, that at the end of the year the bonus would pay for itself, and more.

MR. BROWN: This will give you a rough idea: Our claims were about 20 per cent this year.

MR. ALLISON: That will help a lot.

MR. BAMBRICK (Pittsburgh Rys. Co., Pittsburgh, Pa.): In 1903, the Pittsburgh Railways Company paid a penny an hour for every hour operated free from

accident for six months. Many of the men got prizes. I got quite a large one myself, but that plan caused a lot of dissension. Some of the trivial and unreported accidents later turned out to be severe accidents. Last year the question was brought up in trying to devise a bonus plan.

MR. WARNER: I will tell you one way in the detailed operation of the plan that we have tried to eliminate that. We established a so-called appeal list. If a man was sick on the car, it was an accident. The operator called that accident appealable. If a car was standing still and an automobile came up and bumped into the rear of the car, that would be an appealable accident. There were other similar cases. That worked out in this way: If an operator had an accident that he thought was appealable, he filed an application for appeal. The division manager and division claim agent sat as a committee on that appeal. If the accident came within the appealable list and he could prove that it was subject to appeal, they granted the appeal, and that accident was not charged to him.

S. H. REID (Bureau of Safety, Chicago, Ill.): I think one very important question in connection with the bus operation of which Mr. Warner spoke, is the question of training operators. I should like to have Mr. Warner tell us just what his procedure is in training an operator from the time the man is employed until he is allowed to take a bus out on the street or highway alone.

MR. WARNER: A man goes to school for instruction. In the first place he must have a state driver's license. He goes to school and spends from three days up there working on a stripped chassis and learning how to drive all the different makes that we use, our operating methods, reports, fare collections, and so on. I say three days—it is more than three days. The time usually runs from five days to a week. He then goes to the garage to which he is assigned and is sent out with an operator there for instruction and practice on the line on which he is to work. He learns the stop streets, dead stops, heavy traffic points and so forth. After another week or more there, he goes back to the school of instruction for final instruction and examination. The whole instruction course, I would say, takes sometimes from twelve days to three weeks.

MR. REID: Is he allowed to operate these buses over the lines without passengers?

MR. WARNER: No, he operates with a regular driver. It is left to the driver's discretion as to whether or not he should operate for a mile or so. If, at the end of the mile, he is all right, he is allowed to drive more into the heavier traffic. He picks up the regular operation in that way.

MR. REID: How about medical examination?

MR. WARNER: He takes a medical examination first, before he is given any instruction at all.

MR. REID: Then do you have periodic re-examination after that?

MR. WARNER: No, we have the instructors doing follow-up work all the time.

MR. HELLMUTH: Can he get the state driver's license as a result of the instruction you give him without examination on the part of the state?

MR. WARNER: He must have that before he comes to us.

MR. HELLMUTH: You want a man who has already learned to drive?

MR. WARNER: He has to know; we don't want to, but we have to. It is a state law.

MR. HELLMUTH: Could he get a license as a result of what you have taught him?

MR. WARNER: Yes.

MR. HELLMUTH: You prefer a man who is new?

MR. WARNER: I would rather take a green driver.

MR. ALLISON: Is he paid for the training period?

MR. WARNER: Yes.

MR. ALLISON: How much?

MR. WARNER: One dollar and a half a day.

MR. SPENCER (Providence, R. I.): Your men come from street railways?

MR. WARNER: Most of them, I believe, come from outside. We have, though, had a large number of men transferred from cars. We have a great many men that are operating both cars and buses today. We have a number of operating stations where both buses and cars are run. The men on the extra list particularly, are operating both. A man may run a car in the morning and a bus in the afternoon.

MR. REID: Are there any rule books covering bus operation?

MR. WARNER: I think we do have one.

GEORGE MCGAFFIN (3rd Avenue Railway System, N. Y.): If a man presents a chauffeur's license when applying for a position, would that qualify him to drive a bus?

MR. WARNER: No, sir; not until he goes through our instruction.

MR. MCGAFFIN: Would it qualify him to drive the bus with instruction?

MR. WARNER: Yes.

MR. MCGAFFIN: If a man presents a chauffeur's license, can he drive a street car also?

MR. WARNER: Our state driver's license is issued to drive an automobile.

MR. MCGAFFIN: Suppose a man had never driven anything except a three-speed commercial car and applied to you as a bus driver?

MR. WARNER: A man can't drive any motor vehicle in New Jersey unless he has a state driver's license.

MR. MCGAFFIN: Yes, but suppose he has never driven anything but a three speed commercial car and he gets onto a bus with four speeds?

MR. WARNER: He must forget about that and learn how to drive the bus.

MR. MCGAFFIN: Yes, but does he take passengers on the first time out?

MR. WARNER: He goes to school for a week or more.

MR. OLMSTEAD (Wisconsin Power & Light Co., Milwaukee, Wis.): On our property, we have consistently kept away from bonuses and prizes, and we have a wonderful accident record on bus operation. I think our education of the driver is a good deal more extensive than Mr. Warner gives. I should like to ask him if he didn't have the bonus, would he have had more accidents?

MR. WARNER: I believe we would.

MR. ALLISON: That is only belief.

MR. WARNER: Only belief, my judgment. I don't see how you can avoid it.

MR. OLDHAM: We are avoiding accidents, and we don't have a bonus or prizes.

HARRY CORDELL (Chicago, North Shore & Milwaukee R. R., Chicago, Ill.): I am not a bus man, but I have been thinking, however, judging from what we read in the papers about private automobiles in the garages backing out and running over people (we had 34 cases in Chicago), that we have that very condition on buses. The bus driver may back up without calling the pedestrian's, garage man's, or anybody else's attention to it.

Wouldn't it be well for us to consider an automatic noise-making device, so that when the bus is in reverse, it would automatically signal the people in the rear of the bus that it was backing up?

MR. ALLISON: That is a good suggestion.

CHAIRMAN EASTHAM: Gentlemen, we have a trained and high-priced cast of actors backstage here. You probably saw them going in there in droves. This discussion is most interesting, but I am afraid we can't keep on the bonus proposition. I have heard more discussion on that in the five years I have been associated with the section than anything else. There never has been a unanimous

opinion reached along that line. However, we can take it up again after the playlet is completed.

This is a play, "Whose Fault," presented by the Public Service Company of New Jersey, through the courtesy of Mr. A. J. Van Brunt, Director of Safety Education. After that, the balance of our time will be given over to discussion along this same line or other lines.

"Whose Fault?"

A PLAYLET IN ONE ACT

By JOHN M. ORTS

Assistant to Director of Safety Education

and ROBT. A. McARTHUR

Superintendent Employment-Instruction

Public Service Coordinated Transport

Directed and Staged by Mr. McArthur

CAST OF CHARACTERS

STENOGRAPHER.....	Miss Florence McQuirk
DIVISION MANAGER.....	Mr. Robert A. McArthur
CLAIM AGENT.....	Mr. William Schnable
SUPERVISOR.....	Mr. W. B. Graham
DIRECTOR SAFETY EDUCATION.....	Mr. John M. Orts
SUPERVISOR OF INSTRUCTION.....	Mr. W. E. Rice
TONY THE TRACKMAN.....	Mr. James Barnstable
AN INSPECTOR.....	Mr. William Dannenberg
A CAR OPERATOR.....	Mr. Edward Ryan
A BUS OPERATOR.....	Mr. Orrin Harrison
A BUS PATRON.....	Miss Elizabeth Clark

*Curtain rises. Stenographer seated at desk typing a letter
Telephone rings*

STENOGRAPHER: Manager's office. No, Mr. McArthur has not come in yet. Who is this, please? Yes. Can I do anything for you? Mr. Warner? Yes. Yes, why that report was signed and sent in yesterday afternoon. It should be in your office now. Very well. Thank you. Good-bye. *Telephone again rings.*

STENOGRAPHER: Manager's office. No, but I expect him any minute now. Is there anything I can do for you? Yes sir, *(pause)* I see. *(pause)* Yes sir, *(pause)* All right, I'll tell him as soon as he comes in. Yes sir, Good-bye. *(Makes note of the call and resumes typing.)*

MANAGER: *(Entering)* Good morning, Miss McGuirk. What's new this morning?

STENOGRAPHER: Mr. Schnable dropped in about twenty minutes ago to see you and said he would be back. Mr. Van Brunt telephoned a few minutes ago to remind you of the meeting of the Safety Committee at eleven o'clock and is anxious to have you attend it if at all possible.

MANAGER: Oh, yes, I remember about that meeting and I intend to be there. This is the morning we set for the investigation of that bad accident.

STENOGRAPHER: Yes sir, Mr. Graham said he would have the operators, the trackman and the inspector here at ten o'clock and he would be here himself.

MANAGER: Did you notify Mr. Orts and Mr. Rice also?

STENOGRAPHER: Yes sir, they will also be here at ten.

MANAGER: Very well. *(Starts looking over papers)* *(Claim Agent enters.)*

CLAIM AGENT: Good morning Mr. McArthur.

MANAGER: Good morning, Mr. Schnable. I'm very glad you dropped in. How do you account for that bad verdict the jury gave yesterday in the Wilson case?

CLAIM AGENT: Yes sir, that was a bad verdict. Here are the facts in a few words. In the first place it was an unreported case. We finally located Operator Henry, No. 4114 who was in charge of the car, and got his story which was the old one; "This lady fell after she left the car, I followed her to the sidewalk to get her name and she said she was not hurt, so I didn't bother getting the witnesses or making a report." They put the Operator on the stand yesterday and tried to prove that he opened the doors before the car had come to a full stop, and on cross-examinations he lost his head entirely and didn't know anything about speed—miles per hour—how far it would take him to stop his car going at a certain rate of speed, etc. In fact he proved by his own testimony that this lady might have fallen from the sky for all he knew; went all to pieces and shoved twenty-five hundred dollars into the waste basket.

MANAGER: I am very sorry to hear that, this fellow is a good operator and has a remarkably good record.

CLAIM AGENT: True, but without any witnesses to back up his story and left alone with the burden, he went blank.

MANAGER: I believe Section IV of the new Traffic Law is going to help us in these unreported accidents. God knows we drill our men enough in the importance of getting witnesses.

CLAIM AGENT: *(Getting up to go)* That's the answer to the whole problem.

MANAGER: Are you in a hurry to get away, Schnable?

CLAIM AGENT: Well, I have a call or two to make—Why?

MANAGER: I have arranged a conference this morning to discuss that bad crash at last Tuesday. The others will soon be here and I would like to have you sit in.

CLAIM AGENT: That's fine. I can spare the time. *(Sitting)* *(Stenographer exit.)*

MANAGER: Schnable, that accident has me greatly upset. We have been having a few of the same type recently and we must adopt some means to prevent them. I've spent a lot of time just trying to figure out how a collision such as this really could occur. Here is that car, operated by one of our oldest men. A man who has been travelling up and down that street for years, knows every alley and corner where danger is likely to exist. Then we have the bus operator, a good driver and a fellow who is never known to lose his head in any kind of traffic. Both the car and the bus reach the corner about the same time and both stop to discharge and pick up passengers. Both evidently start up about the same time and we have that awful crash. How they could come together with sufficient force to crush the life out of one poor fellow, injure two others badly to say nothing of the damage to both the bus and car, is beyond me and I am sure the discussion this morning will give us something to work on.

STENOGRAPHER: *(Entering)* Mr. Graham, Mr. Orts and Mr. Rice are here.

MANAGER: Show them in. *(Graham, Orts and Rice enter with greetings, etc.)*

" *(To Graham)* Are your men here, Mr. Graham?

GRAHAM: Yes sir, both operators, the Inspector and trackman.

MANAGER: Fine. We'll hear the trackman first. *(To Stenographer)* Call Tony in. *(Tony enters.)*

MANAGER: Good morning, Tony. Take a seat.

TONY: Gooda morn, boss. (*Bows and sits.*)

MANAGER: Where were you Tony when this accident happened last Tuesday afternoon. Just tell us, what did you see and what did you do?

TONY: Wella Boss—I was standing at de track, justa like did, (*standing and waves arms*) when all a once dis a bus comma outa dis street; den one beeg crash—I looka and see de bus he turna disa way round, OH! I says mabie one, two or twenty-five killed. I run justa lika hell to telephone. Key no fit; can't open box. Den I run to de store on de corner. Oder man usa de telephone. Den I run to de car barn.

MANAGER: Ran to the car barn? That was six blocks—In the name of common sense, what for?

TONY: Maybe tella dem do something?

MANAGER: Well the car barn was a long way was it not Tony?

TONY: Yes, Boss I all excita. I wanta do someding.

MANAGER: What did you do then, Tony?

TONY: I tella dem at car barn; dey know it ahead. Den I come back, everything all gone; justa littla glass in da street, I clean up. Dotsa all, Boss.

MANAGER: So that's all you know about it, Tony?

TONY: Yes, Boss.

MANAGER: Well, the next time you are around when an accident occurs, you let someone else do the telephoning and you help get things moving.

TONY: Yes, Boss.

MANAGER: All right, Tony, that's all. That testimony will be a great help to us (*laughing*) (*Tony exits*)

MANAGER: Mr. Graham, explain to me just where and how this accident happened.

GRAHAM: Operator Ryan, in charge of the eastbound _____ car claims he stopped on the near side of the intersection and picked up about ten or twelve passengers. Some did not have the correct change. When all had boarded, he closed his car and made change for the passengers on the platform.

MANAGER: Yes, I see. But we have a rule prohibiting making change while operating.

GRAHAM: Yes sir, we have.

MANAGER: Then Ryan's at fault for disobeying that rule.

GRAHAM: Yes sir, he is.

MANAGER: All right, go ahead.

GRAHAM: Bus Operator Harrison, in charge of the _____ bus, southbound also claims he stopped to discharge and pick up some passengers, and then started across _____ while the trolley was still standing. The trolley operator claims the bus was still standing when he started. Anyway the left front corner of the car caught the front part of the bus, fatally injuring a passenger who was standing on the step of the bus and hurting two others inside.

MANAGER: Were the doors open on the bus?

GRAHAM: Harrison states he was just closing the doors when the accident happened.

MANAGER: Well, he must have started with them open for a passenger to be on the step.

GRAHAM: That's the way I see it.

MANAGER: And that negligence resulted in the death of one person and serious injuries to two others. How much damage was done to the equipment?

GRAHAM: Very little to the car. The bus had the upright corner, door and first panel caved in. The driver of the bus swerved with the car or the damage would have been greater.

- MANAGER: I see. *(To Claim Agent)* We are spending a lot of money for this type of accident, are we not, Mr. Schmale?
- CLAIM AGENT: Yes, we are, and this one is going to cost plenty.
- MANAGER: *(To Graham)* Who was the Inspector at that accident? *(Stenographer rises and goes to door.)*
- GRAHAM: Inspector Dannenberg.
- MANAGER: *(To Stenographer)* Have him come in. *(Inspector enters.)*
- MANAGER: Good morning, Dannenberg. *(Motions to a chair.)*
- INSPECTOR: Good morning, Mr. McArthur. *(A general good morning.)*
- MANAGER: Dannenberg, what time did you arrive at the scene of that accident at ——— last Tuesday afternoon?
- INSPECTOR: 4:22 p. m., the ambulance was just pulling away.
- MANAGER: I see—and what did you find in general? How was the crowd talking, etc.?
- INSPECTOR: Well, as far as I could learn, some of the bystanders seemed to think it was the trolley operator's fault and some thought otherwise. But I secured several names and turned them in with my report.
- MANAGER: Did you hear anyone say how the trolley car was being operated?
- INSPECTOR: A number of the same people said the Operator did the best he could and made a very good stop.
- MANAGER: Any comment about making change while in motion?
- INSPECTOR: No sir.
- MANAGER: We are having a number of this type of accident, that is with vehicles coming from the left or from a blind side as it is called, are we not, Dannenberg?
- INSPECTOR: Yes sir, we are.
- MANAGER: Can you think of any plan or means in which this type of accident can be reduced?
- INSPECTOR: A general campaign of instruction and a bulletin posted in the Car House may help.
- MANAGER: That's a good idea. *(Making note of same.)* All right Dannenberg, that's all, thank you. *(Dannenberg exits.)*
- MANAGER: *(Turning to Instructor)* Mr. Rice, have you a question on your examination sheet regarding the making of change while car is in motion?
- INSTRUCTOR: Yes sir, I have a sheet with me. *(Hands sheet to Manager.)*
- MANAGER: *(Reads sheet)* I see, that's very good. Do you talk personally to the men about using care in approaching intersections, making change and starting from a standstill without looking to the left?
- INSTRUCTOR: Yes sir, both on preliminary and on final examination. The Instructor on the school car also—
- MANAGER: I see—that's fine. Well keep at it and have all your instructors follow this up closely every day.
- INSTRUCTOR: Yes sir, I'll start a special drive on this.
- MANAGER: *(Addressing all in office)* My object in calling you gentlemen here this morning is to see if something can't be done to put an end to this type of accident, which is reaching an alarming stage. I want you to hear the statements of both operators in this particular case and then determine just where the blame should be placed.
- (To Stenographer)* We'll hear the car operator first. *(Stenographer exits.)*
- DIRECTOR SAFETY EDUCATION: Is there not a rule in the rule book covering these subjects also?
- MANAGER: *(Producing rule book from desk)* Yes, Mr. Orts, both subjects are fully covered here—*(designating rule in book)* *(hands open book to Orts).*
- (Operator enters with Stenographer.)*
- MANAGER: Good morning—take a chair.

OPERATOR: Good morning, Mr. McArthur. (*Sits.*)

(*Cast talks about accident.*)

MANAGER: Now, Mr. Ryan, I want you to feel right at home and to understand that I did not bring you here to discipline or discharge you, but that was a very bad accident and I want you to tell us all you can about it—just how it happened and the cause—Just a minute—How long have you been operating a car?

OPERATOR: Seventeen years, sir.

MANAGER: That's a long time. How long have you been operating a one man car?

OPERATOR: About four years, sir.

MANAGER: I see. Were you a motorman before operating one man cars?

OPERATOR: Yes sir.

MANAGER: Are you a married man?

OPERATOR: Yes sir.

MANAGER: Have you any children?

OPERATOR: Yes sir—six.

MANAGER: How do you like to operate a one-man car?

OPERATOR: Better than two. Most of the conductors were nothing more than excess baggage.

MANAGER: Now tell us in your own way just how this accident was caused.

OPERATOR: I made a stop at _____ Street and picked up about a dozen passengers, started my car—

MANAGER: With doors open?

OPERATOR: No sir, I always close my doors before I start.

MANAGER: I see. Go ahead.

OPERATOR: Some of the passengers did not have the right change and I was making change, when—

MANAGER: Just a minute. This intersection is usually a pretty busy place, is it not?

OPERATOR: Yes sir.

MANAGER: And in this instance you were making change as your car started across this busy intersection? Surely you know careless work such as this is a violation of the safety rule—

OPERATOR: I know that rule, sir, and always try to observe it, I never take a chance expect when necessary, and this time I thought it necessary.

MANAGER: (*After pause*) Well, go ahead with your story—

OPERATOR: As I was saying, I had just started my car, when the bus shot out of the side street, the front left corner of my car caught the right front corner of the bus turning it around.

MANAGER: How near to your car was the bus when you first saw it?

OPERATOR: Well it just shot out of the street and was there that quick—(*snap fingers*).

MANAGER: I see—now don't you think this accident might have been avoided if you had given more attention to the operator?

OPERATOR: I hardly think so—I have had them come at me in every direction many times; these bus operators think they own the streets. I did my best.

MANAGER: You did your best. Well, killing one man and sending two to the hospital, smashing up a bus and a car doesn't look very good does it?

OPERATOR: No sir, it does not.

MANAGER: What was the condition of your car, as to brakes and sand, etc.?

OPERATOR: The brakes were good—sand wasn't working.

MANAGER: (*All attention*) Sand not working, why?

OPERATOR: Well I was late pulling out and did not get a chance to try it.

MANAGER: Then your sand did not work at the time of the accident.

OPERATOR: No sir.

MANAGER: If the sand had been working, wouldn't it help?

OPERATOR: It may have helped a little, but this accident couldn't be avoided—the bus was too close.

MANAGER: Did you look to the left before starting your car?

OPERATOR: Yes sir.

MANAGER: Do you always look to the left before starting your car?

OPERATOR: Well I think so.

MANAGER: *(To Stenographer)* You may call in the bus operator. *(Exit Stenographer.)*

MANAGER: *(To Operator)* The habit of making change while the car is in motion and starting a car without looking to the left is getting to be a serious neglect on the part of our operators. It has reached a point where a large percentage of front end collisions occur just from this neglect and they are always bad ones.

(Bus operator enters with cap on side of head but after looking around sheepishly removes same.)

(Stenographer enters and goes to desk.)

BUS OPERATOR: Good morning.

MANAGER: Good morning. Let's see, your name it—

BUS OPERATOR: Harrison is my name. *(Cocky.)*

MANAGER: Oh yes, Harrison. That was a bad accident you fellows had last Tuesday.

BUS OPERATOR: Well it was a pretty bad accident but I don't think I was to blame.

MANAGER: No?

BUS OPERATOR: No, the trolley car was standing still when I started across the street, then he started up and—

OPERATOR: That isn't so—I started my car when—

BUS OPERATOR: Aw, what are you talking about, don't you suppose I—

OPERATOR: Yes I know just what you did, you pulled out right in front.

BUS OPERATOR: That's all bunk. *(Heatedly.)*

MANAGER: Wait a minute—wait a minute—we are not going to get anywhere with you boys arguing. Now let him tell his story. *(Pointing to the Bus Operator.)*

BUS OPERATOR: As I was saying before the cloud burst—

OPERATOR: Yes you're a cloud burst too—

MANAGER: Now, now, *(directing both hands at operators)* *(to Operator)* sit down.

BUS OPERATOR: The trolley was standing when I started my bus across—just as I got to the eastbound track he started up and hit the side of my bus. I tried to swing with the trolley when I saw him coming at me but couldn't make it—

MANAGER: Did you have your doors closed?

BUS OPERATOR: Well, I was closing my doors as I started up.

MANAGER: Passengers on the step?

BUS OPERATOR: Well, the last passenger was just pushing in.

MANAGER: Isn't it a fact that you started your bus with the doors open and passengers on the step?

BUS OPERATOR: Well, I only went a little ways.

MANAGER: Yes, and that brings out the fact that your view to the right was obstructed when you started in that manner with passengers on your step? Had you allowed all your passengers to get inside and then closed your doors before starting, that poor fellow would be alive today—just think that over. *(After pause)* Do you attend the safety meetings held at the car house?

BUS OPERATOR: Some of them—

MANAGER: What do you mean by some of them?

BUS OPERATOR: Well, whenever I get up in time. I got a pretty late run.

MANAGER: What sort of a program do they have at those meetings?

BUS OPERATOR: I don't know. They do a lot of talking.

MANAGER: Have you ever offered any suggestions as to how the meetings should be conducted?

BUS OPERATOR: I sent in a recommendation once and then I quit. They said something about it at one of the meetings but I wasn't there.

MANAGER: Then apparently you take about as much interest in safety work on the property as you do in the safe operation of your bus. I mean as far as the education of your part of the work is concerned.

BUS OPERATOR: They want you to go to safety meetings, union meetings, all there is—is meetings.

MANAGER: Do you realize the question of human life is involved in this discussion?

BUS OPERATOR: Yes sir.

MANAGER: Then you say a safety meeting is not interesting?

BUS OPERATOR: I've been to some that were and others that weren't.

MANAGER: Is that the reason you don't take an interest in the safety movement?

BUS OPERATOR: They want you to go on your own time. Why don't they pay us if they want us to be at every one?

MANAGER: Aren't the meetings for your own benefit?

BUS OPERATOR: Partly yes. It isn't all one sided.

MANAGER: Do you think you could contribute in some way to the promotion of safety?

BUS OPERATOR: Well, I think after this accident that I will attend more meetings and jump into some of the discussion that they talk about.

MANAGER: That's very good, Harrison, I'm mighty glad to hear you say that.

(To both Operators) I want you men to think over your mistakes in this case, for you both are at fault for the accident. Get your heads together so that it won't occur again. Don't be so quick to place the blame on the other fellow; be more careful and do your individual part to prevent accidents. You may both go now. I shall probably want to see you again later on and I'll send for you. And by the way, (as both operators rise to go) when you boys get outside, shake hands and realize that we are all working together and we can't have any bad feelings toward anyone if we want to make a success of our job. That's all—good day.

(Stenographer shows both operators out.)

SCHNABLE: I think that was very good advice and I am sure they will profit by it.

MANAGER: I do hope so. A closer spirit of cooperation among our men is bound to show up in accident reduction.

STENOGRAPHER: (Entering) A Miss Brown is very anxious to see you. I told her you were busy but she seems all excited and insists on seeing you at once.

MANAGER: Show the lady in.

STENOGRAPHER: (At open door) Step this way, please.

MISS B.: (Entering and rushing up to the Manager's desk) Am I speaking to the Manager?

MANAGER: Yes, madam, what can I do for you?

MISS B.: Well I just want to know what you intend doing about the service we are getting on the ——— line. Are those bus drivers out there to pick up passengers or are they running the buses for a joy ride. I never saw anything like it in all my life. And when you do get on a bus (which is seldom) you have to put up with the worst kind of abuse. Your men are far from being gentlemen and don't even know the meaning of courtesy. And such riding, after you do get on; why, you are thrown all over the bus by the rough starting and stopping. You are always preaching Safety First, you should have the buses padded on the inside.

MANAGER: Madam, I am indeed very sorry to hear you criticize our men and our service in this manner. Won't you kindly give me your name and tell me your complaint and I can assure you it will receive proper attention.

MISS B.: My name is Brown—Miss Priscilla Brown.

MANAGER: And your address, please?

MISS B.: 917 Park Avenue.

MANAGER: Thank you, Miss Brown. Now tell me just what happened?

MISS B.: I was standing right on the corner of _____ Street just a little while ago—

MANAGER: What was the time, please?

MISS B.: Oh, about an hour ago. Bus No. 68

MANAGER: Which way was the bus going?

MISS B.: Which way was the bus going? Why endways.

MANAGER: Yes, yes, I know, our buses always go endways.

MISS B.: Oh, no they don't, with some of these reckless drivers they go sideways quite often.

MANAGER: Yes, yes, but in this case, which direction was the bus going?

MISS B.: Why, coming down, down, this way (*showing directions with her hands*). And he never looked up or made any attempt to stop.

MANAGER: And you were standing right on the corner?

MISS B.: Certainly, I hope you wouldn't expect a person to stand out in the street especially with those wild Indians you have running the buses.

MANAGER: Is it possible he could not have seen you?

MISS B.: See me? If I had been one of those young flappers with skirts above my knees, he would have seen me. That is all they do see. They would run their buses right up to the front porch for them.

MANAGER: Very well, Miss Brown, I will take this up with the Supervisor and—

MISS B.: That isn't all. The next bus No. 152 came along, operated by a Mr. Percy Smith, No. 6,040—at least that is what it said in the front. Well, for a wonder he stopped, and when I boarded the bus he was very impolite and gave me an argument about the other bus not stopping.

MANAGER: Now, Miss Brown, how did Operator Smith know that the other bus did not stop for you?

MISS B.: Why I told him.

MANAGER: You say he was discourteous—just what did Smith say?

MISS B.: Oh, he said the same as you, that perhaps the other driver did not see me. Well, I politely told him I did not want any of his back talk or I would report him.

MANAGER: What other remarks did Smith make that you considered discourteous?

MISS B.: (*Hesitating*) Well, he didn't say much more.

MANAGER: Miss Brown, just what did Operator Smith say?

MISS B.: Well, when I told him that I had been standing on that corner for twenty minutes and the bus ahead of him drove right on by me without stopping, he said the bus should have stopped if the driver saw me—and—

MANAGER: Yes—go on—

MISS B.: He asked if the bus was crowded and I told him no, it was not—and he said then there was no reason why it should not stop.

MANAGER: Quite so; Miss Brown you wouldn't consider Smith very discourteous with those remarks?

MISS B.: Well I was quite provoked, especially when that bus did not stop.

MANAGER: Did Smith do or say anything to hurt your feelings?

MISS B.: (*Slowly*) Well—no.

MANAGER: Miss Brown, how often do you use the buses?

MISS B.: I generally come downtown every day when the weather's nice.

MANAGER: And how do you find the majority of our operators?

MISS B.: Oh some of them are polite.

MANAGER: Some of them? Is that all?

MISS B.: Well I guess I could say the majority of them are courteous. *(Slowly.)*

MANAGER: Thank you. But it is the minority that we want to know about. The thoughtless fellows who forget their actions are usually the cause for complaint of poor service. We welcome complaints that are just and in every case we endeavor to correct the cause for such complaints. I can assure you that the failure of that bus to stop, will be investigated and proper steps will be taken to prevent any further cases of this kind.

MISS B.: I believe you are sincere and I ~~thank~~ I was too hasty in my criticism. I am glad I came in and I shall tell my friends of the kindly manner in which I was received. Please don't ~~discuss~~ that bus driver, he may have been late or had some trouble and I lost my patience. Good day.

MANAGER: Good day, Miss Brown. *(Miss Brown exits.) (To group)* I only wish these thoughtless fellows would come to their senses and make things more pleasant for everybody. Well gentlemen, you heard that lady's complaint. What is your thought?

DIRECTOR SAFETY EDUCATION: I have tried to observe and figure out; a bus driver has many things to think about and while it is very aggravating to be passed up on the street, yet there may have been a good reason for this operator's seeming neglect.

GRAHAM: That is true to a certain extent, but had this fellow been on the job he would have seen that this lady wanted his bus. Selling transportation is our business and it can't be done that way. There is never a day goes by without a complaint of running by passengers, and my men will certainly hear from me about it.

MANAGER: Well, gentlemen, I feel this discussion has aided us in bringing out the facts in this case. As I see it, I feel the trolley operator should bear the blame for not having been certain that nothing was approaching from his left at an intersecting street and also for making change while his car was in motion particularly at such an extremely dangerous place. I feel the bus operator was lax in not closing his doors before starting and permitting passengers to remain on the step with his bus in motion, thereby obstructing his vision. And I feel that the blame of both these men will be placed by the general public on every one connected with the Transportation Safety Department, all the way from Tony to myself. *(Pauses and pounds desk)* Accidents must be cut down and it's up to us to do it.

I want to thank you all for coming in this morning and I hope it will be a long time before it will be necessary for us to get together on an accident as serious as this. That is all, gentlemen. *(All but the Stenographer rise.)*

STENOGRAPHER: You are not forgetting about the safety meeting?

MANAGER: *(Looks at watch)* That's right. Gentlemen, I am going to the safety meeting now.

GRAHAM, RICE, ORTS, SCHNABLE: That's where we are bound for too. *(Moving to door.)*

MANAGER: Glad to hear it. Then let us go together. *(Getting coat and hat.)*

GRAHAM, ORTS, RICE, SCHNABLE: Fine, yes, that's bully. We'll just about make it.

MANAGER: *(To Stenographer)* You'd better come and bring your note book, Miss McQuirk. I am sure there will be many good things brought out that we will want to refer to later.

(All exit.)

(A motion picture produced by the Public Service Corporation of New Jersey on the subject of safety was then shown.)

CHAIRMAN EASTHAM: Gentlemen, I think we owe a vote of thanks to Mr. Van Brunt of the Public Service Corporation of New Jersey for this very splendid playlet and picture. I don't know when I have seen the subject brought up so clearly, these things that we as street car men, safety men, have to contend with and that the claim departments have to contend with also.

I would like for that to be shown on the minutes of this meeting, that we do extend that vote of thanks. Now, we have about half an hour remaining, and if any of you have written out cards on the matter you would like to have discussed, I wish you would bring them up here and we will cover as many of them as possible. I would simply like to ask this, we have such a limited time left that we make the discussion as brief and to the point as possible.

The first card that was turned in, I think, brings up a very interesting point. It says, "What are companies doing to protect their curve cleaners?" Has any gentleman here anything to give us along that line?

MR. POWELL (Louisville Ry. Co., Louisville, Ky.): About three or four years ago, we had two deaths due to automobiles running over our curve cleaners. There is a white coat and white cap which the company furnishes those men. They are required to wear them now, and they are very effective.

M. W. BRIDGES (Chicago Rapid Transit Co., Chicago, Ill.): I had a letter from somebody in Pittsburgh or Philadelphia about a month ago, asking what we were doing to protect our curve greasers, curve cleaners, and so on? It happens that we are operating over our own private right of way and have but a few crossings. I wrote back to the gentleman explaining that, and immediately got an answer. They had adopted a white belt with a white cross belt which had not seemed to fulfill its purpose. In addition to that, they were using a four-candle power lamp on a storage battery. This lamp was placed on the back of the cross belt, and the storage battery was put in the man's pocket. I give you that simply as a matter of information. I don't know how it works out or anything else. I think it was Pittsburgh that did that.

MR. GALLAGHER (Pittsburgh Rys. Co., Pittsburgh, Pa.): Yes. I brought that up about having a light for the sand men and curve cleaners at night. At that time I suggested a battery lamp to be worn on their caps with a light in front and back. Down there it gets pretty dark in the morning, and a white belt is of no use at all to a fellow sanding those hills. I think a light on the hat would be a better protection than a belt, because they could use it more in the morning and evening when it gets dark. Anybody will respect a red light, but they won't a white belt.

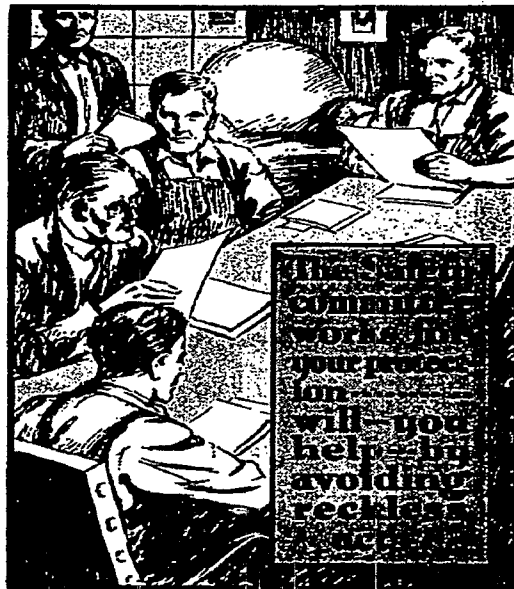
CHAIRMAN EASTHAM: Let me remind this gathering that we started a question box in the *News Letter* last year. Mr. Nutt had several questions in the last issue or two. There are many of these things that we can't solve in a few minutes' time. If any of you have had experiences and have found things worth while on this matter or any other matter with reference to safety in car or bus operation, take the time to sit down and write Mr. Nutt and tell him what you are doing, that information will appear in the *News Letter*.

With reference to the *News Letter*, I don't think we have secured a wide enough distribution. We are going to try to work out a plan whereby the member-companies will be asked how many issues of that *News Letter* they can profitably use. I believe ordinarily it goes to the safety man in charge of the particular company, but I think in many cases if there were a dozen of those *News Letters* that could be sent to different department heads, it would help materially.

We have here a question: "Mr. Fennell of Kansas City, Missouri, referred to the use of yellow lines on streets. Do the autos and other traffic observe and obey those lines? If not, what is done to the offender?" That is asked by Mr. Allen, of the Pittsburgh Railways.

MR. ALLEN (Pittsburgh Rys. Co., Pittsburgh, Pa.): I ask that question because we use outlines in Pittsburgh, and find that about 90 per cent of the automobiles and other traffic practically ignore those lines. That is the reason I asked whether or not there could be something better adopted so that it would attract attention in some way, which would cause people to obey those regulations.

CHAIRMAN EASTHAM: Mr. Fennell isn't here, but I think the chairman might say a word or two on that, because in St. Louis we have gone farther in the painting of yellow lines than most any other large city I know of. We paint them on curves, paint them to designate loading zones, paint them from time to time at the curb, designating the point where all the automobiles should park in order to allow the cars to pass at the curve; and we have found it a very splendid means of indicating to the general public and to other traffic on the



streets what they should do. Not all of them do that, like anything else that you might attempt, but it has a good effect with a sufficient number of them, so that we have found it extremely efficacious. We have found it has helped to reduce accidents and it has helped to get the cars over the line. There is no law behind it. If an automobile, truck or pedestrian disregards the lines, there is nothing that can be done to the offender. We simply have permission from the city of St. Louis to do this work. Some of it, the cities themselves should do, in my judgment, and there should be penalties for violations. But since the city doesn't do it, we have done a great deal of it and find it is very worth while.

W. J. ROUNTREE (Georgia Power Company, Atlanta, Ga.): We find in Atlanta that the general public observes the lines we put on the streets a great deal more than the lines that the city puts on the streets for parking purposes. We think too, that the clearance lines along straight track (where the clearance is just enough for an automobile when it is right up against the curb) have proven of real value to us.

T. G. BRABSTON (Birmingham Electric Co., Birmingham, Ala.): I might say we are more fortunate than our sister city of Atlanta, Georgia, in the matter of the width of our streets, which are practically all 100 feet. We are more fortunate in the matter of lines because the head of the traffic department of the police have these line making machines. They will put lines anywhere and everywhere that we ask them to put the lines. In the downtown district, the streets naturally resemble very much a crossword puzzle. The pedestrians and automobilists sometimes get bewildered trying to stay on the right side and not on the wrong side of a line. The loading zones, cross walks and curbs are all marked by the police department. I think that makes a considerable contribution to the safe progress of traffic. In addition to that, on some of our main boulevards, the police department has very cheerfully met our request in putting a line along the middle of the street to prevent automobiles, in their eagerness to pass each other, from getting too far over on the other side of the street, or on the opposing track.

There is a violation of the law in going against the prescribed regulations in going through, across and along these lines. While it is like a great many traffic police regulations, being not very rigidly enforced, when the revenue of the police department runs low, some of the traffic squad go out and pick up enough to bring the average up.

CHAIRMAN EASTHAM: I think that is a matter that can well be kept in mind by all of you on your properties. Of course, the particular city and what the city is doing, would have something to do with it, but it is well worth your consideration.

Here is a question that I am very much interested in myself: "On one-man cars, how are we to get away from passengers talking to operators?" I think it could be broadened to include cars of any kind. What is being done on the different properties to prevent passengers, and to prevent other employees (let me add) from talking to the operator?

A. T. WARNER (Public Service Corp. of N. J., Newark, N. J.): In one-man operation, I guess the only way out of it is inspection on the street and discipline for it. It is up to the individual operator. Some of them talk too much, and some don't talk enough. Some are too curt with their answers. It is a question of individual judgment, but the line can be pretty sharply drawn where there is too much talking. The only way to do it is through incessant inspection and discipline.

MR. WILSON (Pittsburgh Rys. Co., Pittsburgh, Pa.): I put that question in. We are adopting one-man cars on our lines. I haven't in mind now the city passenger, but the man from out of town. He comes in, goes up to the operator and asks him for a direction. I would suggest in all one-man cars, that a street guide be supplied. All of the cars in Pittsburgh have destination numbers on them, for example. In the street guides, the destination number could be given. That passenger could refer to the street guide to find out what car to take, the transfer points, and so forth.

CHAIRMAN EASTHAM: I might say in St. Louis, most of the operation is two-men cars. Some time ago permanent signs were put up, "Please do not talk to the Motorman." Some of the other properties perhaps don't like to do that, but I think it has some good effect. It doesn't stop talking to the motorman or operator but I do believe it has some good effect.

G. C. COBB (Supervisor of Safety, Georgia Power Co., Atlanta, Ga.): In regard to talking to operators while they are in the discharge of their duties, I would like to say that we have in Atlanta, a street car directory which all the men carry. The passengers can get them from the company or in public places where they are sold. We would be glad to mail this particular guide to any of you who are interested in this information. It goes to tell the streets that the cars proceed on,

the streets that they cross, and the number at which they cross a street. It is a very valuable guide for medium sized-cities.

MR. OLMSTEAD (Wisconsin Power & Light Co., Milwaukee, Wis.): I don't think it is possible to do away entirely with talking by the operator of a street car because there are questions which a passenger will ask that the operator has to answer. We do the same as our Chairman said, his company had done. We have a permanent sign in front of the operator. We have had some intense education for operators, which I think has done a great deal to decrease conversation. That, I think, is the only thing you can do, gentlemen, because there are some questions they have to answer, there is no doubt about that.

W. T. HANNA (Pittsburgh Rys. Co., Pittsburgh, Pa.): In Pittsburgh, our company furnished us with a pocket guide. Oftentimes on my car, there will be



an agent, a stranger who will come into the city. When he wants to find out some of the streets (as a general thing I know about all of the streets) I reach into my pocket, hand him this book, and tell him to sit down and read it. It gives the streets in alphabetical order. I then tell him how to get to his destination and what car to take. I am often congratulated on having the book and for being a help in directing people to different places.

In regard to talking on the cars, a man can talk with safety from one end of the road to the other, with a passenger, but the trouble lies in turning around to talk to the passenger. If you school yourself into operating your car and tending to your business, you can answer all these questions and look straight ahead. You will notice that some fellows always have to turn around and look at a passenger in order to answer him.

MR. MAHONEY (Pittsburgh Rys. Co., Pittsburgh, Pa.): I would like to know if the various managers of the companies that are operating one-man cars are making any effort to discourage the practice of operators making change, issuing transfers, and giving information to passengers while the car is in motion through heavy traffic.

A. L. HODGES (Brooklyn City Railroad Co., Brooklyn, N. Y.): We have issued orders to our men (which we enforce to the best extent possible) that passengers boarding the cars shall be taken care of, given change, transfers, or any other transaction that must take place between the operator and the passengers, *before* the car is started. That works out so that it does not delay the service. We have one-man operation down in the congested territory of Brooklyn on Fulton Street, right along, and it does not disturb the service.

In regard to talking to the operator (Brooklyn being closely associated with New York) we have a great many visitors, and I want to say that I agree with the gentleman who discussed that question. It is a matter of discipline. For every stranger that asks an operator a question on a one-man car, there are three firemen or policemen or employees who get up there on the front-end talking to the operator. That is something we must break up. The only way to do it is through discipline. The odd thing about it is, if you have an accident, those fellows up on the front-end, the policemen or firemen, never see a thing!

MR. HENRY (Pittsburgh Rys. Co., Pittsburgh, Pa.): Do you enforce that rule on your men, not to make change while in motion?

MR. HODGES: We do, to every extent possible whenever it is seen by the supervisory officials.

MR. ROUNTREE: We have just gone through an experience down in Atlanta that bears very closely on that question. In fact, we are working on the matter now. We are trying very hard to break up by other means than discipline, the habit of making change (doing conductor's work in other words) while the car is in motion. We find that the objection of the men on the platform to it is that it makes it more difficult for them to operate according to schedule. We think that by getting the men on the cars to try it out, we are proving to them that it doesn't. If the conductor's work is properly done, make their schedule requirements any more difficult to meet. The company is trying to enforce that rule.

With reference to talking on the platform, I don't think anything is going to penetrate that situation quite as much as the one-man car. Down there, we are running two-man and one-man cars, and the man on the one-man car is too busy to do much talking.

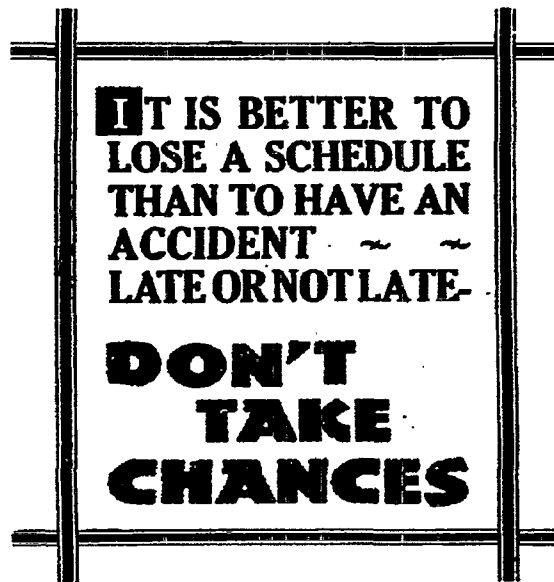
MR. WARNER: One thing about change making that seems to me to help a lot is to eliminate the necessity of making change, on the part of the operator, by impressing on the passenger the idea of keeping the proper change handy. Another idea is to place change makers at your heavy traffic points. We have the five cent short zone, with no transfers at all, so the operator has no paper to handle. We have nothing but five cents, a single coin, a nickel, to collect. We find that 83 per cent of our people are now carrying the proper change, without any outside assistance at all. That was brought about by a series of educational campaigns. We had posters in the cars "Keep your nickel for carfare," and in our little pamphlet that we get out every two weeks, we put in cards for passengers to read. That point has been strongly stressed. Consequently, we have raised the percentage of passengers who have their exact change, considerably. All that helps the operator

Then, put a man on the heavy loading platform; points of heavy traffic origin, with a lot of nickels. Let him ask the passengers while waiting for a car, "Have you your change?" He helps that operator by providing passengers with the right change and impressing upon the passengers the idea that they should have extra change. That helps the operator a great deal before the passengers even get onto the platform of the car.

CHAIRMAN EASTHAM: It might interest this gathering (those of you who use tokens) that along that line of helping the conductor or the operator through the people having their change ready, whether it is a token or otherwise, that in St. Louis, where the fare is eight cents, probably the worst (next to nine cents) single fare that there is to be collected and handled, we recently bought 50,000

token holders and gave those to our passengers who bought ten tokens, eighty cents' worth of tokens. The supply of token holders was exhausted in the first two days that they were put out. We have ordered another 100,000 of them. They are simply little metal containers, and they fit in the vest pocket. They have already increased the percentage of our passengers using tokens over those requiring change, tremendously. I think today, the number using tokens is something like 88 per cent of the total number of fares collected.

MR. OLMSTEAD: We did the same thing in Wisconsin last Christmas. Token holders reduced our delays to a great extent. Regarding transfers, those transfers are given the passengers when they get on the car. On each route we have different transfer points. Those are the only places where transfers are given.



MR. BAMBRICK (Pittsburgh Rys. Co., Pittsburgh, Pa.): I find that operators, in giving out transfers, selling tokens and making change while the car is in motion, operate at a much slower speed than they would if they did all that before they start the car. An operator will go along with two or three notches in that way, and he doesn't make the time that he could if he did all that work before he started. He could then move along with full power. I have seen that many times. If they did the change making and so on before they started up, the schedules could be maintained.

CHAIRMAN EASTHAM: Now, gentlemen, there are two questions here which, unfortunately, we will not be able to take up, although both deserve consideration. "What effect has traffic regulation on the speed of trolley cars in congested districts; and what is the best way to overcome this?" And the other: "What is the proper braking pressure on a 65,000 pound car; also on a 45,000 pound car?"

We have only a minute or two left and I don't believe we will get anywhere in that time in taking up either of those questions.

I feel that the start that was made a few years ago of giving time for discussion at these meetings is the best thing that we have ever done toward increasing

interest in the meetings. I will recommend to our Program Committee for next year that that be considered and taken care of as fully as possible, so that the papers may be given thorough discussion. I think more comes out of the discussion than the mere reading of even the best prepared papers.

There is one other thing I would like to say to this group, that is, to congratulate the Pittsburgh Railways Company and the Pittsburgh men here for having brought so many of their platform men to this meeting. This may not meet with universal approval, but I have felt, from the time when certain companies started bringing a number of their platform men to the Congresses, that it has tremendously livened up the proceedings. Those men actually operating the cars have been able to ask questions and bring out points that the balance of us might fail to do. For two or three years in the past, I have brought a group of men from St. Louis. This year, on account of the long distance to travel and some other factors, I wasn't able to do it. I hope to see that custom readopted. I would like you to consider that. It is only a personal matter with each company and each management, but I would like you to consider it and take it up with your managements. I don't know yet where next year's Congress will be held, but if it is possible, bring one or more of your platform men, not alone with the idea of filling up the hall, but of bringing out the real, essential points and factors that we want to disclose at these meetings. I think it means as much to us as safety men, whatever our titles may be, and as much to the managers that come to these meetings, to get those contributions from the men operating the cars as anything else that could possibly be done.

I believe that we have had a very interesting Electric Railway program at this Congress. I hope that we will be able to arrange an equally interesting one for you at the next Congress. I trust that you not only will attend the next Congress, but that you will come through on the plea that I made yesterday of cooperating throughout the year with the editor of your *News Letter* in any and every way that you can. When some chairman writes a letter to you requesting information, asking for suggestions, or inviting you to prepare a paper, do that, because it is by that kind of cooperation and that kind *only* that this Section can achieve its fullest success during the coming year.

MR. ALLISON: May I say one thing to you? I believe unless you bar us from your next Congress, there will be 22 safety chairmen from Pittsburgh Railways present.

CHAIRMAN EASTHAM: Fine!

H. K. BENNETT (Providence Safety Council, Providence, R. I.): May I make one suggestion, if the Section's *News Letter* is continued another year (we all hope it will and have no reason to think it will not be) may I call attention to the QUESTION BOX, and offer a suggestion that the two questions that we didn't have time to discuss, be sent to Mr. Nutt, to be placed in the first issue after the Congress?

While I am on my feet may I say that the columns of that *News Letter* are open for suggestions and questions from every member of the Electric Railway Section. I hope you take advantage of that and see that the questions come in. The answers will come forward probably in the issue following.

MR. WILSON (Pittsburgh Rys. Co., Pittsburgh, Pa.): If I am not out of order (I don't want to embarrass our Program Committee) but we men from Pittsburgh and the men from St. Louis attend these meetings and hear papers read by officials. May I suggest that you ask some trainman to prepare a paper for the next Congress?

CHAIRMAN EASTHAM: I think it is a splendid suggestion. We did, at the last Congress in Chicago (if you will remember) have a paper from a man who may not now be considered a trainman, but a member of your Amalgamated Association—Mr P. G. McGrath. I believe it was.

We haven't in any way tried to slight you. The fact is, we haven't in the past been able to know in advance just what companies expected to bring men. There has been a little difficulty from that standpoint. If Mr. Brabston will make note of that suggestion, I am very sure he and his Program Committee will carefully consider that and they will see if it can be worked in for the next Congress.

ADJOURNMENT

Joint Luncheon Public Utilities and Electric Railway Sections

October 3, 1928

T. G. BRABSTON, Chairman

**Superintendent of Transportation, Birmingham Electric Company
Birmingham, Ala.**

The joint luncheon session of the Public Utilities and Electric Railway Sections at the Seventeenth Annual Safety Congress, was called to order at one-thirty o'clock by the chairman, T. G. Brabston, Superintendent of Transportation, Birmingham Electric Company, Birmingham, Alabama.

CHAIRMAN BRABSTON: Gentlemen, we are going to be very happy at this time. We are going to be entertained by some gentlemen representing the world's greatest railroad.

(A quartet representing the Pennsylvania Railroad rendered four compositions.)

CHAIRMAN BRABSTON: I am sure we all realize now after hearing these songs, why the Pennsylvania Railroad is so distinguished for its courteous and efficient service, and I am sure I reflect your sentiment when I say to this quartet that we are greatly appreciative for their contribution.

We have at this time a rather interesting event on the program. There is constantly a rivalry between departments and companies in establishing successful records. And that reminds me of the man that came up to my town from somewhere, and said to the waiter who was a darky, "If you will wait on us now satisfactorily I will reward you with the proper sort of tip. By the way, I have never been down here before, what is the average tip?" "Well, boss, ah'll tell yo', the average tip hits a dollar." "That is perfectly all right. You wait on us properly and I will give you an average tip." When he got through, the darky asked if the service was all right and the man said "Yes," and handed him a dollar. The darky said "I thank you. I have been working here close on to three years and you am the first man what come up to the average."

We have 23 companies here who have a distinction that have certainly come up to the average. There are three trophies which are to be awarded to those companies who have established themselves in having records worthy of recognition and outstanding in the industry, and the first of these is presented by Mr. Floyd W. Parsons, Editorial Director, Gas-Age Record, New York City. I think it is a wonderful incentive and spirit that has prompted the offer of this trophy. At this time it is my pleasure to present Mr. Parsons who will make this presentation on behalf of that publication.

Presentation of Trophy

By FLOYD W. PARSONS

Editorial Director, "Gas-Age Record," New York City

In the words of the horsethief who was about to be hung and asked to speak on that occasion, I am the one most interested in this part of the performance and the least enthusiastic about it. If any of you play golf and play a blind hole and the caddy says, "It is just over the hill," and you shoot over and you find the ball is way off—that is just about the position that I am in today. First I did not believe

I could use my vocal chords. We editors dictate from seven to ten hours a day. We really work, and so I only expected to say a word.

I understand it is intended that I speak for just a few moments and then present this trophy. I visited a throat man this morning, so after leaving the throat man I went down to see my dentist and he put something in my mouth. He said, "What can you do for fifteen minutes?" I said, "If you will give me that package I will write a speech that I am going to make in about thirty minutes." So I did that. I have never been to one of your meetings. I have written stories and syndicated them and put some in the *Saturday Evening Post* and helped the movement along as best I could.

My experience with accidents started when I was six. They were building a new jail in our town. They left one of the cells outside. I was the prisoner. I had to escape. I fell off and cut my head and still have the scar. Later I jumped on a freight train and was thrown between the platforms of two cars; and the wheels went around and knocked me around until twenty cars had passed. I was still alive. That gave me a positive indication that there must be a good God that saves us. Later, I was a mining engineer and I went in with twenty-seven men to try to rescue a lot of men caught in the drainage. We organized our party and three came out. The other twenty-four came out some days later pretty stiff and dead—so that I have some acquaintance with what accident prevention means. When I first went into the mines in 1902 we shoved off and lit gas feeders and then took our coats and beat them out. That was when we talked about safety lamps, so that I have seen the development of industry, of accident prevention, for twenty-five years or more and have carried my little part in this movement in an editorial way in the big magazines.

There was a timid old lady who went to cross a ferry, and after starting she became a bit nervous and said to the darky boatman, "Has anybody ever been lost in crossing here?" The darky replied, "No ma'am, no ma'am; my brother was drowned last week but we found him the next day." So it is almost entirely a question of the point of view.

Today we are bothered with a lot of bunk and half truths. "Did you know that Harry made \$5,000 a week," said Abe to Solomon. "I don't believe it" said Solomon. Abe said "I will prove it. Did not Harry make \$5,000 in Washington?" "Yes, that is right" said Solomon "but wrong in four places. First, it was not Washington, it was Cincinnati. Second, he did not make it in a week but in a year. Third, it was not \$5,000 it was \$500; and fourth, he did not win it, he lost it."

Today we are perjuring in industry and life generally and we get a number of falsities. We believe guinea-pigs come from Guinea; lead pencils have lead in them; the staff of life is bread, the worst thing that nine out of ten can get; and that fish is brain food, but it is nothing of the kind. That the ocean is flat—nothing of the sort; it is a gently sloping hill. We take histories and fill them with exaggerated tales about the early hero. If you will examine our forefathers and what they did you will find they were a pretty tough bunch. Tremendous changes come along and cause great hazards to arise. We are always fooling with things we know little about. Radium has killed a lot of people. Radium, which you read about, is doing a lot of damage. The aeroplane—all these and other new things—are taking toll in life, but that is the only way we can improve life and relieve the over-carrying of the burdens that we shouldered under the old methods. The automobile is a great thing but the carbon monoxide from them as they roll along the streets goes into the lower parts of buildings, up the stairs and in the remote office and helps to give us a new problem in polluted atmosphere. Accidents,—the kind of taxi drivers we have—and that reminds me of a story.

A lady got into a taxi and told the man where she wanted to go. The taxi started off with a terrible jerk and the driver dodged everything on the road. When she arrived at her destination and wanted to get out she said, "This is the first time I ever rode in a taxicab and it is terrible." "That's nothing" said the driver; "this is the first time I ever drove one."

People who invest their monies in companies do not see the reports of minor accidents that cause delay and loss of time and reduction in production. The general plan we have in facing life is filled with so many inconsistencies. We go to an extreme in saving along one line and wasting along the other. That reminds me of the ducky who was going fishing, and he met an older boy along the road and he said, "What's the matter with your cheek, it's all swelled up? What have you got in your mouth?" "Well," replied the little ducky, "I'm going fishing." "Well, what have you got in your mouth?" "Worms!" The old boy said "Worms? Why don't you put them in your pocket?" "Put them in my pocket? Do you think I'm going to put them in my pocket with my lunch?"

Gases have quite a black eye. In fact the gas industry which has just awakened is about to play a dirty trick upon a lot of people who want an easy way to get out of the world. We are well along in our research to make it impossible to commit suicide with gas in comfort. The research men tell us they are well on with the experiment and when you try to take a little gas to end it all you get so damn sick before you die that your purpose is entirely defeated. Also we find that our ordinary radium gas fire is the nearest thing to sunlight. There is quite a craze around about ultra violet light. If you don't get it you can't absorb phosphium in your system. We also have discovered that in our ordinary radium fire we have ultra violet rays. The use of gas will become more prevalent because fellows will strip off nowadays and the rest of the family get the ultra violet ray for nothing. It shows how things are changing nowadays but there are new days coming on.

The utilities, I will say, have gone a long way. One hundred thirteen units were in the contest just held this year and these employed 72,000 men. Out of the 113, 93 made complete returns. Fourteen of these units came through this contest without a single lost time accident, and when you consider that the accidents in the gas industry extend from traffic conditions to fitting and on through all of the other operations of building, chemical departments and all, that is really quite some record. In this contest the unit of the Southwestern Gas and Electric Company, the unit situated in Dallas, Texas, has won first honors. They employ 105 men and they worked 181,710 man-hours, and I want to present this cup to Mr. J. Allen Read, Safety Director of this particular company. Is Mr. Read here?

Accepting First Honors

J. ALLEN READ (Safety Director, Southwestern Gas and Electric Company, Dallas, Texas): The Chairman tells me to make my remarks snappy so I am going to. This is, indeed, a surprise to me. I have not even seen our last month's report. I thought it was hopeless. I felt that the small gas portion of our company had no chance at all. I want to thank the *Gas-Age Record* for this cup and thank the section; and I am sure we will duplicate this record not only when we have a contest but also when we have not.

I want to pay a little tribute to the company that won this cup. This was not won by any individual. It was won by every employee of the Southwestern Gas and Electric Company. They operate in some 80 or 90 towns from Mississippi to Arkansas and from Mississippi to Texas. Three hundred fifty to 400 employees have just completed a year with but one lost time accident, and that happened when a negro boy threw a stone in one of the fellow's eyes. This is only the gas section but all our sections are endeavoring to prevent accidents. I thank all of you. I am just so surprised and thrilled that I can't say anything.

CHAIRMAN BRABSTON: That is fine. At this time we are going to have the presentation to this other group who have so singularly distinguished themselves. Mr. Ernest W. Beck, Vice-President of the National Safety Council, will now make his presentation.

Presentation of Trophies

By ERNEST W. BECK

**Vice-President, National Safety Council; U. S. Rubber Company,
New York City**

Mr. Chairman, I feel very much out of place here, not being affiliated with a public utility. I am pleased however to come here and encourage the proposition of a no-accident contest. The previous speaker who presented the trophy spoke of the number of contestants. I noticed one or two gentlemen making a few notes regarding the number of units without a lost time accident. I want you to know that improvement as a result of this no-accident contest is equal to 280 per cent. In other words, the persons employed to no lost time accidents were 37 to 1, compared with the record of two years ago of 12 to 1. That is wonderful.

I have been quite tied up with these contests because I am convinced that this element has accomplished a great deal. I say that from experience. My company has shown an improvement each year for the last five years over the average of the last three years. These things don't just happen. The gentleman when he accepted that trophy gave credit to where it belonged—each and every one of the organization. He knows and I know that there must be somebody at the top who is giving the contest his approval, who is approving the expense account, making out the budget, believing it is good from a financial point of view and an humanitarian point of view. The expense is infinitesimal with the enormous savings it represents.

Your contest was started in March 1928 and was operated six months and showed the good results. You have six groups, gas, electricity, combination of gas and electricity, telephone, telegraph and water. I am surprised you did not get enough in your water group to contest for a cup, especially under the Eighteenth Amendment. You, have, however, been successful in getting 113. I believe you can get more and in another year the National Safety Council will be able to report many more in the contest, and the reason is because of the success this contest has had.

Any man who turns down a sound no-accident proposition I cannot understand. He cannot be sold on safety. It is a very, very essential part of a properly organized safety program. I have been asked to present this trophy to the group known as the electric group. In this group there were seven companies who operated without lost time accidents. Competition must have been very keen. That is a wonderful record. Is Mr. Watts in the room? Mr. Watts, in behalf of the National Safety Council, it gives me great pleasure to present this trophy and I hope you and your organization will be successful in winning another next year.

Acceptance by the Electric Group

MR. WATTS (Southern, O. Pub. Service Co., Zanesville, Ohio): When an occasion like this arises, a fellow is more or less swept off his feet. We did not, until a few minutes ago, know we won it. I suppose you men want to know where Zanesville, Ohio, is located. It is midway between Columbus and Wheeling, West Virginia. Our company employs something like 135 employees actually engaged in the manufacture and distribution of electric energy. We have found by experience that the safety director cannot sit behind his desk and preach safety. He must

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get out on the firing line. As late as last Saturday we had occasion to put in a two and three quarter mile emergency line and had to employ something like 35 men. I took it upon myself to go with them to see that they got by with it. I want to take this occasion on behalf of my company and myself to thank the National Safety Council for this trophy.

MR. BECK: The losers win. I know of no factory, even if they showed red figures but what have felt that they really were better off than if they had not joined so I am going to mention as honorable the others who have operated without lost time accidents: San Antonio Public Service Company, Citizens Gas and Electric Company, Wisconsin Electric Company, Superior Water Works, and Wisconsin Power Company.

Our next group is combination gas and electric. It is a large group and the plant winning a prize is a plant working a large number of man-hours. The winner of the combination gas and electric group is the Lake Superior District Power Company, at Ashland, Wisconsin. They serve 36 companies in Michigan and Wisconsin, having a total population of 65,000 members. All companies are rendering electric service and one town served with gas and one town operates street railways. We are extremely fortunate today in having the vice-president and general manager of that organization with us. I have checked up on him and I have a wonderful record of the work he has been doing for safety. I know he must have it. You must meet the man and talk with him and you will know that he is a safety enthusiast. He is here today and it is a pleasure to have him with us. I will now present the trophy to Mr. G. W. Hodgkins.

Speaking for the Gas and Electric Group

G. W. HODGKINS (Vice-President and General Manager, Lake Superior District Power Company, Ashland, Wisconsin): Mr. Chairman, gentlemen: I am a long way from home and I want to tell you where I come from so you will live with me for a few moments in my home.

A year ago I was at a meeting and the gentleman that introduced me said that we build only nine hole golf courses in our section of the country because the summers are so short we cannot get all the way round the course. We live on Lake Superior at the western end. I have heard your safety directors talk. I have heard the men most interested expound their different ideas on safety practice but I am convinced of one thing and that is that first there must be some background to tie to. I know it is easy to issue bulletins for boards and put up your safety signs on your boards around your plants but I also know this: You men all know Abe Lincoln. You probably have all heard the story of the time Staunton wanted to do something and Lincoln said not to do it and the men went back to Lincoln and reported Staunton as having said "Lincoln's a damn fool" and Lincoln said "Staunton's usually right." You understand that Lincoln was President of the United States. A man whose every wish, every order, could have been fulfilled. Yet, he said, "Staunton is usually right."

From that attitude of mind, Lincoln developed a personal following from his bitterest enemies until today he comes to us through history almost a Christ.

In any industry you have got to develop the thing that Lincoln developed to achieve the highest degree of work, whether it be safety work or some other kind of work in your organization and when I say that, I don't mean loyalty to me—I mean loyalty to every man who has men responsible to him and men that look to him for their welfare.

If I were to wish for success, the greatest success that could come to me, it would be to have the feeling that the men who work under me believe in me and I want the men who are responsible to me to have the whole work under them of

the men responsible to them believe in them because nothing in the world runs as counterfeit as insincerity.

You can follow out a set of rules and orders because they are given you. The men that work for you know as well as you when the men to whom you are responsible are insincere. Men get wrought up and some one will criticise some man in his organization, but this is also true. You can criticise the men in your own organization but when it comes from somebody outside or somebody above in your organization you know that you will fight for every man in it who is depending on you for his welfare.

I spoke of Lincoln. It was my good fortune to be in Washington when Colonel Lindbergh came home, and I would not have missed that trip. I would not have missed seeing the things I did see for anything. I sometimes wish that some of the people back home who are sending some of the representatives down to Washington could go down and see some of the things that I saw.

You know that this country was not built in a minute or a day. It meant the sacrifice of years and sacrifice on the part of the greatest men of the nation, and that is what we mean when we talk about patriotism. You can't expect a man to come to this country off a boat and understand all the pictures that have gone before, pictures that our native born American can absorb. Yes, I went down to see the Statue of Liberty. It stands, a metal piece, and perhaps to some people it means just that. To me it meant more than that. It meant that the time of discord with France was over and we have an anchor out in the harbor, a present made to us by France; and those of us here and those of us there know what the Statue of Liberty stands for.

Gentlemen, I only cite these historical things to have you believe that the thing which will make industry prosper, which will make safety work more effective, is the loyalty which is born of association, respect and regard for the men you work for and with, and success can only come in that way.

I don't take any personal credit for this wonderful trophy I am taking home with me, and a few moments ago as they were singing their song, I wished it were possible for those back home, all of them who are associated with me, to be here today to get some of the inspiration that I will fail to take back.

You know the public utilities today are occupying so much of newspaper space. I wonder sometimes if the men who are writing these articles know men in utility business. Sometimes I doubt that they do because as I go around the country and look into the faces of such as are gathered here today, I don't believe it is possible for us to be such a damnable lot as some of the newspapers represent us to be. We all have to work. I don't believe any other industry furnishes men who are more sincerely and conscientiously trying to do the thing they should do, more than the men in the utility industry.

I want to add this, Gentlemen: I believe it was just our good fortune to have first prize. I don't believe we did any more than other organizations represented here today. We have all sincerely tried to do our best. Next year it will be some other company and I will be just as glad for you as I am for our own company.

As I go about the country I have pride in knowing the men engaged in the industry. I think this is true: generally speaking, we go back to the question of loyalty and I think the companies that have the least turnover have the greatest loyalty, and the companies that have the greatest loyalty have the fewest accidents; and I believe, the companies that have the fewest accidents have the best records in earnings.

Our Safety Director, Mr. Jule, gave me some records of accidents but I won't take up your time with those.

We should develop a sense of responsibility and gather about us younger men. It has been my good fortune to be associated with a company small enough so that I know the men.

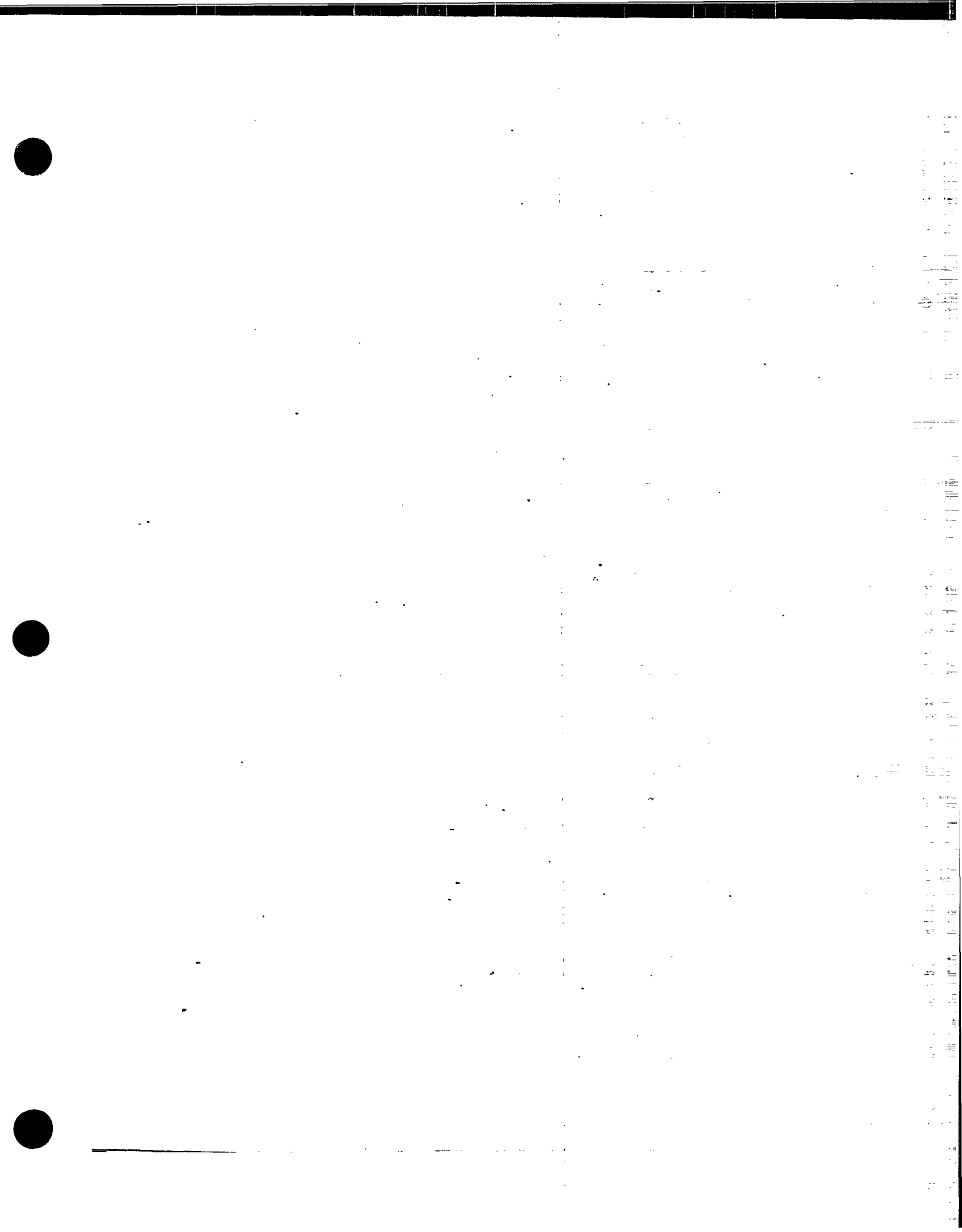
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Many of the boys are sons of fathers who are either on pension or are getting old. If there is any one accomplishment that I feel more proud of than any other, it is the fact that I have been able to gather about me young men whom I have known all my life and who have known me all their lives. We work together and it is just as easy to get into my office as it is to get into any other office on my property.

I am going home to my property with a thrill that comes to an organization in a thing of this kind. I want Mr. Jule to stand on his feet to show you the man on the property. He has not taken the prize himself but has been with the men throughout the territory. Mr. Jule!

(Mr. Jule stood up for a second.)

ADJOURNMENT



SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Employees' Benefit Associations Section

New Section Officers

General Chairman—GEORGE W. VARY, Bethlehem Steel Company, Bethlehem, Pa.

Vice-Chairman—DR. OTTO P. GEIER, Cincinnati Milling Machine Company, Cincinnati, Ohio.

Secretary—J. W. RIDDLE, The Youngstown Sheet and Tube Company, Youngstown, Ohio.

Program Committee Chairman—R. E. McEWEN, Western Electric Co., Hawthorne Station, Chicago, Ill.

Service Committee Chairman—DR. DEAN K. BRUNDAGE, United States Public Health Service, Washington, D. C.

Retiring Officers

Chairman, R. E. McEWEN, Western Electric Company, Inc., Hawthorne Station, Chicago, Ill.; *Vice-Chairman*, JOHN BAILEY, The Bell Telephone Company of Pennsylvania, Philadelphia, Pa.; *Secretary*, GEORGE W. VARY, Bethlehem Steel Company, Bethlehem, Pa.

October 3, 1928

R. E. McEWEN, Chairman

Employees' Service Division, Western Electric Company
Chicago

The first session of the Employees' Benefit Associations Section at the Seventeenth Annual Safety Congress was called to order at two o'clock by the chairman, R. E. McEwen, Western Electric Company, Chicago, Ill.

CHAIRMAN McEWEN: I think that there is enough business before this meeting to take the whole afternoon without any lengthy remarks from one who has been styled "chairman." Those who have printed the program have given me the responsibility of discussing the past, the present, and the future of the E. B. A.

The past of the Association is somewhat brief, the first meeting being held in 1916. The reason for its being grew out of the fact that each year at the National Safety Council there were found a large group of men interested in benefit fund matters, and they were always getting together and discussing their mutual problems. From that nucleus the Council decided it would be advisable to set up a

separate section where they might get together and exchange experiences. I have recently reviewed the programs of the various sessions held since the organization of the section.

The early meetings were largely given up to a discussion of the mechanics of benefit fund associations. Discussion was had on such subjects as, "How much shall the member in the benefit association contribute?" Other matters of mutual advantage were much discussed. I think we all agree that we should adopt some broader policy than the mere mechanics of a benefit fund association. There is a wider field here for the benefit association. We are gradually growing away from the theory that the National Safety Council should do the work of accident prevention and the Benefit Fund should pay the bill. We have found that we are a great force, not only in meeting benefit requirements, but also in disability prevention.

With that idea uppermost in our minds, this year we have drafted the first section of our program along the lines of health protection. We feel that here is a big field which we can work very much to the benefit of the members of the association and to the industry in which they operate.

As previously stated we ought not to get away from doing all we can to improve the mechanics of the benefit fund, but I think we can do something more in the prevention field, and my study of the programs over past years leads me to this conclusion—that we have been doing a rather hit or miss job in this section. The programs differ, covering certain subjects many of us are interested in, at the same time we have never seemed to have a definite forward-looking purpose, or object, toward which to work.

As chairman of the Association I wish to offer the suggestion that we adopt some means in this section to run through our meetings and our activities, some line of endeavor, some line that will hook-up the loose ends and all to the purpose of having some definite object in view in years to come. Perhaps, one of the most effective means of doing that would be to enlarge the duties of our program committee.

It is a difficult thing for a program committee to be appointed here today with little or no knowledge of the activities of the section, and draft a good program for the succeeding year. The men may not know the talent we have present in the meeting, or the far reaching objects of the association; and it seems to me if our chairman would appoint one new member and allow two of the old members to stay on the committee for another year, we would then establish a line of connection which would help us to reach a more definite result. I would be glad to know the sentiment of this meeting along that line. I don't know of a better time to ask about that than right now. Has anyone anything to say, or any suggestion to offer? I would be glad to hear from some of the old line men.

DR. OTTO P. GEIER (Cincinnati Milling Machine Company, Cincinnati, Ohio): I move that it is the sense of this meeting that your suggestion be followed now and that the officers be instructed to that end.

CHAIRMAN McEWEN: If there is no objection we will appoint one member to serve for three years, one for two years, and one for one year.

I have talked about the past of the association; the present is here with us. Mr. Vary, who has very efficiently acted as secretary this year, is going to say a few words about the future of the organization before our program officially begins.

GEORGE W. VARY (Bethlehem Steel Company, Bethlehem, Pa.): As I see it, the function of the Relief Association is more than to collect contributions and to pay benefits. It should also function in such a way as to prevent sickness.

The first step in this direction, in my opinion, is to compile uniform statistics

so that proper comparisons can be made, not only in industries of a like character but also in industry as a whole.

When the Bethlehem Relief Plan was inaugurated in 1926 all reports were formulated with the view that the data obtained would be of such a nature as to coincide with the reports of the United States Public Health Service following the Manual of the International List of Causes of Death.

It seems to me that with this kind of information available, in conjunction with periodic physical examination, a step in the right direction can be taken to reduce the amount of lost time due to sickness.

The problem in industry today is to get the maximum effectiveness and efficiency out of the worker and it is to the benefit of the employee as well as the company that an effort be made to reduce the lost time due to sickness and accidents.

When you consider that the lost time due to sickness is six to eight times that from accidents, and that the death rate from sickness is at least ten times that from accidents, it is obvious that sickness prevention is the larger problem.

I recommend to this meeting that the chairman be authorized to appoint a committee to submit to the members of this section a uniform method of reporting and tabulating by causes the lost time and deaths due to sickness.

CHAIRMAN McEWEN: Mr. Vary has suggested some sort of an organization which can carry on this statistical work. I wonder if that committee might not function in some other respects. I think everyone who has ever served as an officer of this group has found that during the year a great many inquiries are made as to the method of building and operating benefit funds. It is hardly fair that the chairman should assume all the responsibility of answering all questions of the group; it seems to me that in connection with this committee's work, we can appoint, not a statistical committee alone, but a service committee that will function in both respects, compiling the statistics as suggested, taking care of the inquiries that are presented to the section, and gathering the best data available to answer those inquiries and assume the responsibility of giving the Section's opinion on these matters. I think that would be better done by a committee than by an individual.

So we are again faced with the proposition of having some sort of a "Service Committee" to function during the year under the direction of the chairman. I believe that Dr. Sappington, who is head of the Health Service Division of the Council, should be added as ex officio member.

As I have previously stated, our program is majored today on the subject of health. I am going to take this occasion to present Mr. F. W. Willard, Personnel Director of the Western Electric Company, New York City.

Some Thoughts on a Program of Health Education for Industrial Workers

By F. W. WILLARD

Personnel Director, Western Electric Company, Inc., New York City

It is well within the memory of many of us that a responsible executive of a private industry proposing to spend some of the corporate funds for the education of the industry's employees in the rules of health and the prevention of disease would have been examined by an alienist. Yet at that very time influences in industrial management were preparing the foundation upon which today private corporate funds are being expended for that very purpose without specific and concrete proof that the expenditure of those funds will certainly bring profit to the industry. Yet no executive or group of executives who have set their faces

definitely toward this goal have serious doubts in their minds concerning the ultimate profit to be derived by the corporation.

There must be some background in the experience of present-day executives which supports this confidence. It is my guess that industry's experience of the last twenty years in the protection of employees from bodily injury, and education in habits of safety is the support. There are of course other compelling reasons for the development of health education in industry, but I believe that the profits derived from reduction of industrial accidents are the most persuasive.

With few notable exceptions, the preceding generation of industrial leaders were reluctantly interested in the provision of safe tools and safe working environment for their employees. I think that speaking for industry as a whole, it is well to admit frankly that social pressure through agencies of government compelled in the first instance the attention of industrial executives to the need for accident elimination. Even then, not a few industrial executives looked upon the problem as an expense forced upon them by unjust legislation.

A few years of experience, however, indicated to them that this thing which they detested as an encroachment upon their individual liberties by government was actually bringing new profits to the industry. Today no intelligent executive will spare any expenditure necessary to prevent an industrial accident.

There is not available complete statistics on industrial accident experience during the past two decades. Such as are available indicate that while there has been an increase in trend of accident frequency there has probably been a substantial over-all decrease in accident severity.

If, however, we study those industries which have kept records during that period and whose managements have during that period made more or less consistent and continuous effort to reduce accidents, we find very substantial improvements. Probably the best records available for any one industry as a whole are those of the Interstate Commerce Commission on the experience of the railroads of the country. These indicate a substantial reduction in severity and some reduction in frequency up to the beginning of the World War.

The disorganization of the war resulted in a serious relapse, particularly with respect to severity but since 1920 the commission's records indicate a severity and frequency rate distinctly better than the best years preceding 1914.

A study of individual industries reported by the American Engineering Council shows very distinctly the substantial results obtained where definite and aggressive safety campaigns were conducted.

The important characteristic of the experience of industry in its successful efforts to reduce industrial hazards is in my judgment that mechanical protection of the worker proved in and of itself to be only a partial solution of the accident hazard problem, and by no means a major part. Quite generally in the earlier campaigns for reduction of accidents, expenditures by industry were directed to the modification of plant equipment to make it impossible for the workmen to be injured. The result of this effort and expenditure was unquestionably profitable, because it removed from a rapidly mechanizing industry some of the exposure to the most distressing and seriously disabling types of injury.

Nearly thirty years ago my first employment in industry was on one of the great railroad systems of the country, where I came in personal contact with a generation of older railway train service employees who had not labored under the protection of the automatic coupler and the air brake. I recall very vividly the distressingly large number of those men who bore the scars of battle with the hand coupler. The train service man in that generation who had all his fingers was the lucky one. Rare indeed today is the train service man who hasn't all his fingers.

After a few years of effort on the part of industrial management to reduce the mechanical hazards by improvement of their equipment, discovery was made that there was something lacking in this effort. While severity of accidents was declin-

ing, the frequency did not seem to follow. In fact in some industries which had gone to extremes in mechanical protection, the frequency rate of accidents among their employees actually went up.

Then it was that the campaign for education of all the people began. The results of this campaign of education, particularly to the benefit of factory employees and to the profit of factory managements, have already gone beyond the most optimistic estimates. It is this experience in my judgment that is impelling forward-looking executives today to tackle the problem of education of all industrial workers, in both management and employee groups, in the simple and proved rule: of the preservation of human health.

Absenteeism on account of sickness disability among industrial employees is estimated to average seven days* per capita per year. The direct loss in dollars involved in the payment of wages or its equivalent in disability benefits amounts to \$100,000,000** per year; and the indirect loss, which of course can only be roughly estimated, is placed by another authority at \$2,250,000,000* per year in the United States. This does not take into account the indirect loss to industry by lowered production due to lowered physical vitality, and interrupted production due to interruption of the productive work of the individual.

This is a big pool of potential profit to industry, but an ocean of potential happiness and prosperity to society. Like the accident prevention project, it offers to the managements of private industry a profit incentive which is awakening the consciousness of this generation of industrial managers to the necessity of observing all of their social obligations if they are to build a permanent industrial structure.

Although my subject relates specifically to the health problem in industry, I cannot omit to acknowledge the social agencies which have in the past quarter century contributed so effectively to the solution of the problems of public health. Without the constructive work of these agencies, industrial managers today out of current income could not hope effectively to carry on a program of health education. We undertake to teach to industrial workers the simple and accepted rules of health preservation and disease prevention with confidence because these other agencies have placed in our hands proved, scientific facts, many of which twenty-five years ago were undiscovered. In fact it is more than probable that effective health education could not be carried on today without this new background of knowledge.

First among these agencies is the medical profession, supported in no little measure by the industrial profits of a generation past. They have diligently and with admirable social consciousness applied the methods and the discoveries of physical science to their art, until today they are rapidly bringing the cure and prevention of human diseases into the laboratory of exact understanding.

Beginning with the elimination of smallpox as the great scourge of civilized peoples, the means of absolute prevention of yellow fever, typhus, diphtheria and typhoid fever have been scientifically established and proved. Tuberculosis among the civilized peoples is on the rout. Treatment of children's diseases has been so far developed and infant mortality so substantially lowered that the average expectation of life has been materially increased. The average span of life in New York City in 1880 was forty years; in 1925 it was fifty-five years. The death rate in New York City in 1875 was 28.3 per thousand population and in 1925 it was 11.5 per thousand.

The people at large are being progressively indoctrinated with the proved results of medical research through municipal, state and federal public health agencies. Nevertheless, it is estimated that the total expenditure of public funds for this

* Louis I. Dublin, Statistician, Metropolitan Life Insurance Company in "Health and Wealth."
** Estimate based on average wage of \$4 per day—J. D. Hackett in "Health Maintenance and Industry."

work is less than fifty cents per capita annually. It is further estimated that an expenditure of five times this amount annually would further reduce the death rate, and increase the expectation of life from five to seven years; but it is also estimated that the American people are spending a billion dollars a year in some form of medical service, principally curative rather than preventive. Probably 2 per cent of the population of the United States are at all times so ill as to require some sort of medical curative service.

Along with the public agencies for health education, the public press is rendering useful service in its daily talks on disease prevention and cure, and its service of answering the questions of readers relative thereto. It has still a large potential field for operation in public health education, as well as in the protection of the public through the censorship of its advertising. There is growing an insidious fear psychology in the advertising of certain merchandise useful or necessary to the health of the individual. In some respects it is not less harmful than the brazen advertising of the patent medicine nostrums of more than two decades ago. The press cooperated in the elimination of such advertising at that time. They can do much to redirect present trends.

A fourth important public agency is the American Red Cross. Their work in connection with education for the prevention and cure of tuberculosis is well-known. It has probably been one of the most effective agencies in the education of the people resulting in a marked decline in the incidence of that disease. Its nation-wide educational campaign in first aid, both in accident and sickness, is beginning to show tangible results.

The medical profession, through its extensive endowments for research, is tackling vigorously those dread diseases of middle age, particularly cancer and heart disease, which, apparently because of the extension of life expectation due to the reduction of infant and youth diseases, has been increasing in incidence relatively.

Viewed in the light of all these developments, which have demonstrated their usefulness in the last quarter century, it is not surprising that intelligent stewards of industry should take advantage of the potentialities of their rapidly improving relations with their employee groups to augment the process of public education in health principles, having obviously a direct object in improving the profits of the industry and consolidating the confidence of the community in industry as a constructive social instrumentality.

How is it being done? First, progressive managements are pushing their efforts to complete the job of physical protection of employees against health hazards in their working environment. No inconsiderable number of employers have gone a long way on this road, but there still remains much more to be done than originally anticipated. It isn't sufficient to provide pure drinking water, adequate lighting and ventilation, and sanitary buildings. Each and every manufacturing process needs to be studied from the viewpoint of its effect upon the health of the worker. For example, the study of stools to correct bad posture; the study of fatigue and nourishment; the elimination of all sorts of contaminations of factory atmosphere, whether they be gases, or solids in the form of dust suspensions, are vitally essential to the foundation of an effective program of health education. An employer's good faith is quickly open to suspicion if he attempts to teach his employees the principles of health preservation and yet asks some of them to perform their daily tasks in an environment which is plainly injurious to health.

Along with the safety movement of fifteen and twenty years ago, the grosser of these industrial conditions were vigorously attacked, both by public and private agencies. The National Safety Council presents an admirable record of accomplishment in this phase of prevention. But our rapidly developing methods of manufacturing are presenting new problems every day, and the progressive manager

cannot safely overlook the hazards to workers' health which may be involved in these new methods.

The time to prevent the introduction of any processes injurious to the health of the workers is during the development of the process, and the engineering forces of progressive manufacturers today are quite properly considering this as an important part of their process development. However, the engineer cannot do this alone; management must provide for his service adequate medical supervision, with proper equipment and facilities.

With this medical supervision, physical examinations as a condition of employment have become essential. As a service to employees who are awakened from their traditional fatalism, periodic physical examination of the individual is an important step in this industrial program.

What is perhaps of most importance, particularly to industries who are beginning to attack this problem, is an effective indoctrinating of the responsible supervisory forces with the reasons for, and advantages of health education. The supervisors must have the principles of health preservation well learned and effectively practiced upon themselves, if they are to wield the necessary influence upon the people entrusted to their supervision. This education of the supervisors is no small task. Presumably, the fact of selection of a man to supervise the work of others indicates a higher level of intelligence for the individual. Undoubtedly this is true with respect to the personal and technical qualifications of the individual, but it does not follow that, with respect to the problem of individual health, the supervisor is necessarily more intelligent than the supervised. In fact there is some evidence to indicate that he is not. Some of the most intelligent people are the most flagrant violators of the simple rules of health, because of their heritage of ignorance and fatalism.

This fact makes the education of the supervisory force in health principles an essential preliminary to a general health education program. In an organization where the management and the general forces have effected harmonious working relations; where mutual confidence and cooperation generally rule, the personal influence, through personal habits, practices and conduct of the supervisory employees is the most powerful instrumentality in the education of the general forces. A supervisor who has the respect of his associates under his supervision can by his own habits and practices nullify the efforts of the management in a program of education of this kind.

These are most commonplace remarks; it borders on offense to your intelligence to mention them, but the principles are so essential to an effective accomplishment of any program of education that they cannot be omitted in a discussion of this kind.

Another important instrumentality in this project is the maintenance of some sort of a sickness benefit plan, either mutual or non-contributory, as the conditions of the industry may seem to justify, so as to help lift the burden of worry from the individual when he is disabled on account of sickness.

It goes without saying that with the proper medical supervision, physical examination of applicants, periodic physical examinations of employees, and training and indoctrinating of the supervisors, an adequate system of records of experience is necessary in order to be in a position ultimately to determine sources and causes of illness, and to enable management effectively to measure results as their work proceeds.

We stand in the position today, as far as experience in health education among industrial workers is concerned, of not being able to present a concrete statement of experience upon which to predict the probable profits to be expected from the expenditures in health education; but we cannot continue these expenditures without at some time taking a reckoning on the books. Therefore an adequate system of records must be built up with the program. Causes and effects are so

easily confused in studies of human health that even with the most meticulous accuracy of record, we cannot always be sure of correct conclusions. As we gain more experience in the carrying out of this program, we shall undoubtedly find other essential tasks of which we are now ignorant, just as we found that the mechanical protection against accident was not the whole answer to accident prevention.

We are finding that we as a people do not know very much about effective teaching. The teaching of health principles certainly is not easier than teaching the classical subjects in our formal educational institutions. Precept in the written and the spoken word is rapidly going out of use as a teaching agency. Practice and example are looming large. The conference method is rapidly gaining ground, but the most effective teaching will come through the realization by the individual of the personal benefits which he has derived, just as we have found in our program of thrift education that the accomplishment of individuals in the practice of thrift principles has become the most effective propaganda in the education of the others. If we are to receive the returns which we confidently expect, management must give a lot of hard work and study to their methods of teaching.

What then may industrial employers expect to receive for their money expenditures and their effort in the education of the general forces of employees in the principles of health preservation?

We confidently expect an increase in average productive efficiency. This can be expected directly to contribute to reduction of unit costs of production.

We can also reasonably expect a reduction in our present current expenditures of wages and salaries for absenteeism on account of sickness disability, whether through the payroll or the benefit association. These will be returns of direct money profits to the industry.

Indirectly the reduction of sickness absenteeism will substantially supplement the results of thrift education and further the effort toward making each employee economically independent.

We may expect a return in the form of increased length of service of competent employees on whom expenditures for specific training in the business constitute a part of the industry's investment.

Improvements in morale which are incidental to these returns will be reflected in the industry's reputation in the community in which it operates. This reputation is so essential to the renewal of inevitable personnel losses from the better elements of the community, that its importance can at no time be under-estimated.

It is hazardous to predict what money return may be expected. Certainly I could not predict it for the industry with which I happen to be connected; but viewing the estimated losses which industry now carries on account of sickness disability, and the losses which the public carries on the same account, it is not unreasonable that with thorough and effective health education through the principal industries of the United States, it might return to those industries in the next two decades a saving of half of the present estimated losses.

The social returns to the public at large will be greater. Such effects on the entire social structure cannot be predicted in definitive terms.

CHAIRMAN McEWEN: We certainly thank you for your fine paper, but we are not going to excuse you. A little later we may have some questions to ask you; but at present we have a matter of business on hand which is the election of new officers and we will hear from the Nominating Committee on that subject.

The chairman of the Nominating Committee has given me this report to present in which it is offered to this section that we elect as our officers for the next year:

Mr. George W. Vary, as Chairman.

Vice-Chairman, Dr. Otto P. Geier.

Secretary, Mr. J. W. Riddell.

If there is no objection the nominations will stand as read.

Now since Dr. Geier is slated to be the next vice-chairman of the Association I think that it would be a good idea if we found out what sort of a man he is before we let him take it. We have a wonderful chance to discover this for Dr. Geier is now going to give us his paper and I am sure we will all be greatly interested in what he is going to say to us.

Sickness Insurance Through Benefit Plans vs. State Insurance

By DR. OTTO P. GEIER

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In order that we may have a fairly clear concept of compulsory sickness insurance, let me briefly review the results of the International Labor Conference on compulsory sickness insurance, held in Geneva in 1927. (*International Labor Review*, December, 1927.)

First, however, let us interpolate the fact that compulsory sickness insurance for the industrial worker was established by Bismarck in Germany in 1883; in 1885 the commerce workers were added to this insurance plan. The next year the agricultural workers were added.

In the years 1888 and 1891 Austria and Hungary established a system, Norway in 1909, Great Britain in 1911, Roumania and Russia in 1912, Czecho-Slovakia in 1919, Poland in 1920, Japan and Chile in 1922, Bulgaria and Italy in 1924. France, after a discussion of 4 years, is about to establish compulsory insurance against sickness, invalidity, old age and death. Denmark and Switzerland each enjoys voluntary systems of insurance wherein a greater percentage of the workers are covered than in the compulsory schemes of the other European states.

Germany, the oldest country in point of experience, has 32 per cent of the total population insured, but 62 per cent of the "occupied" or working population. In England 35 per cent of the total population is insured, but 77 per cent of the "occupied population" is in the fund.

The 1927 International Labor Conference reached the following agreements: That the waiting period shall be three days; that the benefits shall extend for 26 weeks. (In this conference the workers' representatives insisted that the benefits shall begin the first day.) It was also determined that agricultural workers shall be included in any scheme; that benefits shall include venereal disease, illness occurring from wilful misconduct, brawls, etc.

It was further agreed that the general tendency shows that "the function of compensation for illness was gradually giving way to restoration." Another trend in the discussion was that "workers' families should be included in the medical benefits."

It was recognized by the conference that the organization of the medical service raises many difficult problems, such as—Who is to organize the same, the sickness fund or some outside agency? Shall the free choice of doctors be allowed the insured? Shall the physicians work on a fixed salary, on a fee for every person insured, or for a fee for every sick person, or on a fee based on actual attendance? The conference did not consider it expedient to draw detailed regulations for the organization of the medical service. This is undoubtedly one of the bug-bears, or the weak spot, of any compulsory sickness insurance plan.

Likewise the conference could not reach a conclusion as to how costs are to be borne, i.e., what per cent by the insured?—by the employer?—by the state? It did recognize the necessity of establishing courts or tribunals for appeal by the

insured against the decision of the management of the fund. It also recognized the impossibility of organizing medical service in certain rural districts. The conference could not agree on what the minimum cash benefits should be. The report closed with a statement that "The conference is evidence of striking international support of social insurance." To us it will appear striking that although the experience of some of these states covered a period from 17 to 45 years they were unwilling to commit themselves to so many of the strikingly important fundamental working arrangements of their sickness insurance plans.

We should also be interested in the extensive discussion of this subject by Andreas Grieser, director of the Federal Ministry of Labor, of Berlin, appearing in the *International Labor Review* of June, 1927, in which he claims that "*social insurance makes for the creation of a new productive capacity*," in that it "*maintains a sick person at his standard of living*." "Restoration," says he, "rather than compensation is the principal function of social insurance." "It should provide benefits in kind, medical service, drugs, hospital service, specialists, dentists, maternity and prenatal care; care for the convalescents and medical aid to the family." Again he says "Sickness insurance has become the principal instrument of the health policy for the masses." He further states—"The idea of the responsibility of the employer that holds in industrial accident insurance does not afford a sufficient basis for the employer to share in the cost of illness."

Mr. Grieser then gives certain supporting data for Germany's experience, stating that in 1924 benefits consumed 32 per cent, medical service 21 per cent, hospitalization 13 per cent, drugs and appliances 11 per cent, and administration 7 per cent, of the fund's expenditures. He adds that since 1885, benefits have tripled, medical service has increased seven fold, hospital service six fold, along with other assistance and convalescence. It appears that 10 per cent to 12 per cent of the insured become entitled to invalidity insurance, after having exhausted their 26 weeks of benefits. He adds that accidents occur to 60 out of every 1,000 workers per year, and that one in 10 of these lose time and draw benefits.

Mr. Grieser further states "Experience has shown that for every 100 workers insured, 45 to 50 cases of illness result and that these illnesses average 24 days lost time from work. That is, every worker is ill on the average every 2 years and loses 24 days."

Assuming that Mr. Grieser's figures are based on 300 working days, it seems that they have an average sickness in Germany today of 4 per cent (12 days in a year), whereas the most active proponents of social insurance in this country have never claimed more than 3 per cent absence in this country. The industry with which I am associated has an average sickness rate of 1.8. My former associate, Dr. Ferguson, by introducing medical supervision in a considerably larger group than ours reduced the absence from sickness from 4.2 to 1.5 per cent. Whereas Mr. Grieser claims that 50 per cent of the insured suffer illness lasting on the average 24 days, the figures in our establishment and others indicate that but 13 per cent of the workers are affected by illness in the course of a year, and that their average lost time is 26.31 days.

In Germany 71 per cent of the insured belong to territorial funds, 24 per cent to trade union funds, 5 per cent to mutual aid funds; in England 46½ per cent of the insured belong to friendly societies, 42 per cent to industrial assurance approved societies, 9.9 per cent to trade unions, and .8 per cent to employers' provident funds.

Mr. Grieser explains this division of the insured by stating that when compulsory insurance is introduced, it comes into being by compromise and that certain existing institutions are entrusted to carry out the provisions of the compulsory sickness insurance plan in addition to establishing state funds for those not so covered. He concludes with this comprehensive statement: "Compulsory sickness insurance as a creator of security, health, well being, and productive capacity and

as an instrument of education, is an element both important and necessary in the proper economic and social organization of communities."

The foregoing abstracts indicate an almost unanimous opinion in Europe of the advisability of such insurance, Denmark and Switzerland standing alone in Europe for the voluntary insurance system.

One cannot but give heed to European history and experience. Many of our well-meaning economists and social workers however have been so influenced by the trend of opinion that they are enthusiastic propagandists for the introduction of social insurance in this country.

I wonder whether these afore-mentioned propagandists have ever seriously analyzed the forces that are at work in this country on health plans different from the European system, which are tending to secure perhaps not as wide spread a cash benefit to the sick, but which are evidently going away beyond the European system in creating "*security, health, well being and productive capacity*" including the "instrument of education." Putting aside the question of cash benefits, it would be interesting to compare the per capita expenditures on medical service, hospitalization, drugs and appliances in this country to similar expenditures for the insured under the compulsory scheme. For finally, the fundamental purpose of any health promotion scheme should be to secure to the individual the maximum amount of remedial measures—medical service, hospitalization, etc. From a recent study made by Homer Folks of New York, we note that \$2,364,925,396 are here spent annually for health, hospital and medical care, which means that the per capita expenditure for these purposes in the United States is over \$200.00. To this must be added millions of dollars that are being expended by insurance companies in the care and prevention of illness, untold sums by industries in the protection of the worker against disease and accident, unknown sums by the individual in his effort to protect his health. Who is there today who can say what percentage of our population is already covered by sickness insurance through fraternal organizations, insurance companies, lodges, and the benefit societies connected with industry?

What we can talk about with a fair certainty is the general health level of the average worker in this country and to note whether it does not bear most favorable comparison with Germany, for instance, which has had compulsory sickness insurance for nearly 40 years. The real measure of a social system is its results. According to the facts already quoted, we enjoy one-third less lost time from illness than they do in Germany. Is there not perhaps a fundamental factor at work in our voluntary system which is more productive of positive health and well-being than that which comes out of the compulsory systems abroad?

The proponents of constructive health programs in this country, as no where else, have stressed the value of preventive medicine. Those abroad have leaned heavily upon the dole, or cash benefit side of the insurance system. It is most evident in our experience with workmen's compensation acts, that it is almost impossible, once having established a cash benefit scheme for those injured, to have any considerable attention paid to the prevention of accidents by the state. After 16 years of activity on the part of the workmen's compensation act in Ohio, with an annual expenditure of \$16,000,000.00 (one third of which goes to medical and hospital service) it has finally been possible to secure the expenditure of 1 per cent of the annual fund for preventive safety work. You can readily make a fine sob story to secure the establishment of a fund to pay injured workers for being injured, but you can make very little headway in securing state controlled funds for the prevention of deaths, dismemberment, widowhood, orphanhood, which should finally be our real consideration.

From the experience of European nations one can see how painfully slow has been the progress of securing money from the insurance funds to prevent disease, and how difficult it apparently is, under state-wide benefit funds, to compel any

feeling of personal responsibility on the part of the insured towards keeping well. Of the compulsory insurance plans found abroad the one in the Canton of Basle, Switzerland, where only the most extensive medical surgical hospital pre-natal service is extended with no cash benefits has its best appeal to me.

Let us refer once more to the concluding paragraph of Mr. Grieser's article on compulsory insurance, where he holds that this social insurance is "*a creator of security, health, well-being, and productive capacity.*" In making a comparison between these factors of the average European as against the same factors in the average American, can we not say with full assurance that we have more security, health, well-being and productive capacity in the average American citizen than obtain in the citizens of the European nations? If he refers to financial security, we need not argue that point. His own figures show that the German citizen is not as healthy.

What about "well-being and productive capacity"? Let us take the testimony from three professors of Engineering and Social Economics from one of the largest universities in Germany, who recently visited me. They are in this country on a three months study-tour, being sent here by the German government. One of these gentlemen made a four months study of industrial, social and economic conditions in this country four years ago, and it is because of what he reported that the German government sent these three this year. Here is what he said in effect: "If Germany wishes to reconstruct herself economically and socially, she must adopt the methods of management, and the methods of industrial relations of America. Failure to do so will mean her inability to cope with the competition of the United States." These gentlemen were deeply impressed with the "feeling of security, the health and the well-being and the productive capacity" of the average American workmen. They stressed the happiness of our workers compared to theirs.

Let us take the testimony of another of this endless succession of visitors from abroad who are trying to sense what America is doing to make her so productive, to give such a generally high level of health and well-being, that affords the average workman such a high standard of living compared to theirs. This man was the directing head of all social effort in his state—workmen's compensation for accidents, sickness insurance, health and hygiene, and conciliation in labor disputes. Among other things, he said our 8-hour law is not a law for the limitation of labor. It is a health measure. "Our workers earn as much in a day as your men earn in an hour. Our men cannot gain sufficient strength from the food they can afford to buy to be strong enough to work more than 8 hours." "What need have we," I asked him, "for compulsory insurance?" "None," he quickly answered; "don't ever make the fatal mistake of introducing it. It is out of harmony with the American system of individualism, initiative, independence. Hold fast to what you have. That has made you great and strong."

I can understand how in these European countries and in Japan and China, that a dole system by any name should be absolutely necessary. Let us think of the girl operator in the silk industry in Japan, who averages 38 cents a day, who works 7 days a week, and who has but 2 off days a month. Any system, under any name, that will come to the assistance of this girl when she is sick should be welcomed, and is a social necessity.

Nothing that I have said should lead anyone to believe that I am personally against any intelligent plan that distributes the cost of illness particularly to these costs. We are far on our way in this country to do it, and yet it devolves upon more employers to recognize the necessity of establishing beneficial funds within their organization, to be used however chiefly for raising the standards of health, to act as an "instrument of education"—to teach the value of preventive medicine, physical examination, to wean the worker away from the use of patent medicines, the advertising quack, the advertising dentist, and other professional fakirs. The

money so wasted by the American people represents the tidy sum of about \$120,000,000.

I recognize fully the millions—yes, billions—of annual waste in this country from ill-health, but I see no hope of appreciably reducing that waste through compulsory insurance. The same creative energy, the same initiative, the spirit of adventure, the willingness to expend huge sums, the extreme individualism that has made American industry dominant throughout the world, should not be ham-strung by compulsory legislative enactments in imitation of poor Europe. This same American spirit should be led to see the enormous economic accomplishments possible within the field of preventive medical service. Do this, and our country will be setting standards of longevity, of vital working capacity, of productiveness, of health and well-being, happiness and contentment, such as the world has never known.

That great American, Herbert Hoover was the first great Federal officer who summarized for industry and the country at large our extravagant wastefulness of human life. Many others have contributed to this discussion. No group of men have such a large responsibility towards the creation of a public sentiment in favor of the more general adoption by industry of more intensive health work, than this group assembled here today. You have no right to be satisfied with so conducting your benefit societies that the members thereof secure only cash returns in case of illness. It is your job, specifically, to develop health services within your organizations by the employment of medical, dental X-ray and diagnostic services, to the end that your members may be forced to endure the least possible number of days of illness and suffering. Instead of insurance they most need *assurance* against illness to the end that they may produce more, earn more, live more happily and die less early.

Ours is the duty not to allow ourselves to engage in controversy with those who would apply mis-fit European social systems to us. Ours is to work, think, create, energize our fellow workers, our managements, our public health officials, our private organizations, to an extensive study of life at its best, abundant health, pleasure in work, which means increased earning capacity, which means well-being and productive capacity, which means readiness to accept "education," all of which, summed up, brings security.

This is not jingoism or a "spread-eagle" speech. I have travelled sufficiently in Europe, studying the health of communities, the safety of the worker, his living conditions—to know that they have much to learn, much to attain. The word "sanitation" has found its fullest meaning on this side of the water. They are still ladling out milk on the streets of London, 20 years after such filthy habits have been prohibited in my home city. The dogs in Belgium and Holland are still dragging the milk cans through the streets. In some places in Italy the milk goats are still making their house to house deliveries.

Let us be a little careful how we overload our state governments with new duties. They are making a pretty poor job of what they are doing now. The State and municipal governments are almost the worst thing we do in America and until that time comes when our statecraft is responsible, when its efficiency gets on a par with private organization, we had better hesitate to choke down its throat any more indigestibles.

I hope that the American Association for Labor Legislation, and other proponents for social insurance, will keep up an almost irresistible demand for social insurance, for they thereby will furnish good reason why the thinking executive should be constantly at work, elaborating and perfecting health machinery within his organization, as well as that of the community. Next it becomes the duty of every upstanding, intelligent person, who has any appreciation of the enormous economic waste chargeable to ill-health, to so conscientiously study the health measures that we have on hand, that we may have an awakened public conscience.

That the interest of the medical and allied professions may be secured toward working out sound social economic schemes, all to the end that the average man may have accessible to him the best that the medical sciences have provided. The value of positive health is immeasurable. Its securement is worth our country's best effort. It is within us not to follow, but to lead the world in new health standards.

CHAIRMAN MCEWEN: We have heard from Mr. Willard some of the advantages of a health program; we have heard from Dr. Geier some of the disadvantages of state insurance, they both point in the same direction. We should do more in our own organization to increase the number of members under the benefit fund protection and save the health of those people.

It is our particular privilege today to have Mr. Harold A. Ley, the President of the Life Extension Institute of New York City and he is going to offer a remedy for our problem—Mr. Ley.

Using Benefit Associations for Better Cooperation in Safety, Health and Other Employee Activities

By **HAROLD A. LEY**

President, Life Extension Institute, New York City

The tendency of state legislation is to increase the weekly compensation to the injured workman and also to broaden the laws to include occupational diseases. Both these suggestions are in the right direction; but as you include them you are confronted with the simple fact that it is impossible to differentiate between occupational diseases and ordinary diseases. For instance, hernia certainly isn't an occupational disease; still, when a man with a hernia lifts a heavy box and suffers from strangulation he claims compensation for that hernia—and gets it. The same is true of heart disease, vertigo, infections, and other ailments. Clear up these conditions and you have fewer accidents.

The next step will be legislation compelling employers to pay for lost time due to any kind of sickness.

A careful scientific study by the Life Extension Institute brought out the fact (since confirmed by studies of the United States Public Health Service) that 42,000,000 gainfully employed lose 350,000,000 days from illness disabilities and non-occupational accidents annually. At present there is seven to nine times as much time lost through sickness as through accidents.

This brings us up to the problem as to what steps industry can take to protect itself from these impaired risks. This protection is also required for consumers, who, in the long run, have to meet increased industrial costs in the prices they pay for finished merchandise. If industry doesn't work out this problem in a manner satisfactory to labor, the politicians will settle it through state legislation, with all its accompanying evils.

When the time comes that workmen are paid for lost time while sick it is vital that they be interested in the net cost of this sickness; because it is much easier to put in an unwarranted claim for sickness than it is for an accident. Unfortunately, there are many employees who would rather loaf on two-thirds pay than work for full pay. No one objects to a man's receiving whatever is just for a legitimate claim, but no one is in favor of paying employees for loafing when they should be at work. If the employees are interested in the net cost they will make it their business to stop malingering and false claims.

The report made by the Life Extension Institute to the Hoover Committee on the Elimination of Waste in Industry, brought out certain facts in regard to health conditions in industry, which have since been amply confirmed.

It was there stated that the annual economic loss in this country from preventable diseases and death is over \$3,000,000,000; and that \$1,800,000,000 of this loss is among the gainfully employed.

Twenty-five millions in the working classes have defective vision requiring correction.

There are more than one million with some form of tuberculosis.

There are more than eight million with flat feet.

There are more than six million with organic diseases resulting mostly from infection.

There are more than one million five hundred thousand with venereal infection.

Five hundred thousand working people die annually.

At least one-half of this death loss and disability rate is preventable and postponable by proper medical supervision, periodic medical examination, health education and community hygiene. In other words, approximately one billion dollars could be saved in industry every year by improving the health of the working man. When consideration is taken of what this loss means when translated into misery and suffering—the bulk of which is the result of ignorance and thoughtlessness—it is apparent that there is a big opportunity for service in preventive work. What is the answer? The periodic health examination!

The Metropolitan Life publishes the statement that there has been a 50 per cent reduction in mortality among their policyholders examined between the ages of 50 and 60, and 18 per cent on the entire group examined. They claim that this represents a profit of two dollars for every dollar they have spent.

The Guardian Life reports 23 per cent reduction in mortality among policyholders examined by the Life Extension Institute.

This is cold-blooded testimony based on more than ten years experience given by insurance companies which have the best medical and actuarial advisers that money can engage.

Improving the health of the working man is a problem that deserves the consideration of everybody interested in national affairs; but though it is a national problem, it is also by its very nature a most personal problem.

Every employer should be interested in the health of his employees because he is in business to make money. The amount of money he makes depends on the productivity of his employees, and their productivity depends on their health and their attitude toward their employer. No employer ever made any money out of a sick man or a grouch.

What is the use of spending \$100 a year on a machine to keep it in good condition and then assigning a man to run it who can get only 50 percent of its efficiency because of his condition? Unlimited amounts have been spent for inspecting factories, machines, boilers, and automobiles and keeping them as nearly 100 per cent perfect as possible; while the men who run the machines have been only 50, 60 or 70 per cent efficient. What good is the 100 per cent perfect machine if the man who is supposed to operate it is at home sick? The employer not only loses money on this man but he may be losing money on a dozen other men whose work is affected by the absence of the sick man.

After the employer has done everything he can to reduce sickness absence and abolish malingering there is still much that can be accomplished by enlisting the interest and cooperation of the employees.

Anything that will improve the health of the employees and, at the same time, increase their good will toward the firm is something for which every employer should be glad to pay something, especially if he can be assured that he will get back two dollars for every dollar he spends. I claim he can afford to pay one and one-half per cent of his payroll if it will result in all of his people taking an interest in improving not only their own health but the health of every other

employee. An employer should contribute to such a fund for the same reason that leads him to make any profitable investment.

Take a payroll of \$1,000,000 a year on a thousand men. One and one-half per cent equals \$15,000. Isn't it reasonable to expect that a thousand men really interested in improving their health will increase their efficiency enough to cut that payroll \$15,000 especially if the request to contribute this amount comes from the employees under an agreement that they are going to contribute a like amount? Any employer who is asked by his employees to join them in paying for a thing on a fifty-fifty basis is overlooking a big opportunity if he doesn't join with them, even if he cannot see any direct benefit for himself from what they want. On the other hand, if he *can* see where he can make more money by agreeing to join with them, and then doesn't do it, he ought to have a thorough mental examination. If he does agree, he ought to tell his people he is doing it merely because he can see where he can make more money, I'll defy any agitator to make trouble for the employer on account of that statement. An employer has often given the agitators the very ammunition they needed when he has come out some morning and told his people he has decided to *give* them something. No matter what he had decided to give them, every one of them said to himself (even if he didn't tell his boss): "If he has any money to give away why doesn't he put it in our pay envelopes?" They want and are entitled to every cent the employer has to spend on them. I know of no "God given right" that entitles an employer to decide what his employees want. If there is any doubt in your mind as to whether your employees want a thing, ask them to help pay for it and make it optional whether they do or not. That is the acid test. Think of the millions spent by well-meaning employers in the last 20 years, that not only could have been saved but probably did more harm than good.

Above everything else, it is the great hope and great desire of all of us to continue to live. It is not mere extra years of life that we want but extra years of health, extra years of working power and usefulness. The employee's health is his greatest asset.

In order to improve the health of the working man it is necessary, first, to find out what condition he is in and how he lives; and then, to instruct him as to what medical treatment he should receive to improve his physical condition and what he can do himself in correcting the errors in diet and hygiene which in many cases are directly responsible for ill health. This all necessitates, first, a complete physical examination; but most work of this kind has failed because the average man thinks himself perfectly well and, therefore, not in need of an examination.

"An examination," he says, "is all right for Bill who has tuberculosis or John who has heart disease, but why should I take one when I've never been sick and haven't an ache or pain?"

The trouble is that most people measure their health by pain, and pain is a very poor yard-stick to depend on. There is no pain in the early stages of tuberculosis, Bright's disease, heart disease, cancer, or anemia. If you wait until the pain period arrives it may be too late to do anything. The only way to detect these troubles in the early stages is by a complete physical examination, and the problem is: How can you get the employees to submit to annual examinations and also to be anxious to take steps to correct the impairments that are found?

Simply taking an examination never did anyone any good. If it does not result in the individual's doing something to correct his faulty living habits or his physical impairments the time and money have been wasted.

Any self-respecting man resents being told how he must live. He is perfectly willing to learn what is the best way to live but he wants and insists on the right to decide for himself what living habits he will adopt. That is why it is almost obligatory—if we are to get anywhere in this health work—to have the

cordial interest of the employee himself in any plan that has for its object, the changing of his living habits. There is a way to get employees to take a real interest in this problem; and that is through a mutual benefit association (controlled entirely by the employees) which gives adequate sickness and death benefits and a periodic health examination; the cost of these benefits to be borne jointly by employer and employees.

Now let us see if it will be possible to interest the employee in paying one and one-half per cent of his wages into a mutual benefit association provided his membership entitles him to:

1. Life Insurance equalling one and one-half times his annual salary, payable in case of death or total disability. (No insurance to amount to over \$10,000.)
2. Two-thirds pay for 26 weeks in case of sickness or accidents not covered by the Workmen's Compensation Laws.
3. Annual physical examination.

Every employee wants to make as much money as he can and he also wants to provide for himself and his family in case of sickness and death.

Under this plan he receives at extremely low cost (through the co-operation of the employer) life insurance protection for his family in case of death, and adequate protection for time lost on account of sickness or non-occupational accidents.

Experience has shown that the older employees having dependents are interested in life insurance and health insurance while the younger ones are interested simply in health insurance. The older employees (who are incidentally the most influential) get the benefit of cheap insurance under a group policy; as the rate is dependent on the average age. This, of course, makes them boosters for the plan, and when they are told that it is necessary to have 75 per cent of the employees before they can get a group policy, they go out and use all their influence to induce the younger employees to join.

Take a man 40 years old earning \$2,000 a year. His dues would equal one and one-half per cent or \$30 a year. He would receive \$3,000 of life insurance in case of death or total disability and two-thirds pay, or \$26 a week, for 26 weeks in case of sickness. Think of what it would mean to this country if every employee received two-thirds pay when sick.

While these insurance features are a great help in relieving the employees of some of the worries and anxieties that come with sickness, the examination feature is also extremely important. The employer can very properly agree to contribute his share toward the plan provided the employees will agree to insist that every person who joins the mutual benefit association take a physical examination every year.

That is the only condition he needs to insist on, but that is important; otherwise, they won't take the examination because, as I said, they don't think they need it. When they have had an examination they find out for the first time in their lives their true condition. This is of advantage to the employee as well as to the firm because the workman's wages are directly influenced by his physical condition.

Give these men the opportunity to have their physical impairments pointed out to them under the right conditions and they will welcome the chance, but if they think the information disclosed by the examination is going to be on record or will be used against them in any way, they simply refuse to take the examinations. If they are convinced that this information is treated confidentially, all opposition disappears. That is why it is so important that all this medical work be handled directly by the mutual benefit association and not by the employer.

This does not mean that the employer should not introduce the examining of new employees; for I believe he should, not only for his own protection but for the protection of the mutual benefit association. If a company has a generous benefit plan in operation, it does not want to leave the door wide open for every

sick person in town to come in and be taken care of at the expense of the company and its employees. But don't think you have done very much when you have examined a man looking for a job. The diseases discovered then are often only those that are so far advanced that they can be detected without any help from the individual. A man doesn't volunteer any information about himself if it is going to prevent him from getting a job. When the member of the mutual benefit association comes up for an examination the purpose of which is to prolong his life, however, he will tell the doctor all the things he suspects about himself as well as all he knows. Every doctor doing this work will agree that he needs all the information available from all sources to do a good job and it is impossible to do a good job without 100 per cent cooperation of the person being examined.

Neither do I mean that the company should not have a medical department of its own to treat accidents and sickness arising in the plant. A mutual benefit association such as I have described will increase the work of such a medical department tremendously.

If you are going to have a mutual benefit association of this kind it is very important that everyone in the organization should join. I am speaking now especially of the most important members of the organization. If these people, who are generally paid full wages when sick, have to look to the mutual benefit association for two-thirds of their wages and to the company for the other third, they will take an interest in seeing that the mutual benefit association is properly run. Many mutual benefit associations have such inadequate benefits that no one is particularly interested in seeing that they are conducted along the proper lines.

It is proper for the company to make a marked distinction between those who join the association and those who do not when it comes to deciding what it will do in the case of sickness. Some companies pay the man who does not join one week's salary when he is sick and then stop, regardless of his position. These companies feel that they have done their duty when they have made it possible for every person to be protected in case of sickness or death at a small expense. It is optional for each person to join the association. When he decides not to join, then the companies feel that they are relieved of all responsibility. As a result, very few employees fail to join.

A mutual benefit association such as I have described lays the foundation for an interest in preventive work. You have employer and employees working together for a common purpose.

When it comes to deciding what a physical examination should consist of you have a problem that is very little understood. Just how far each individual association will go in giving its older and more responsible members a more thorough examination depends on how much the company is willing to do toward paying the additional expense. Fifteen years' experience has taught the Life Extension Institute that the minimum examination should take an hour and be just as thorough as a doctor trained in this particular kind of medical work can make it with the instruments that he can carry around with him, but after he has done as good a job as possible there is much additional work to be done by the laboratory, X-ray, electrocardiograph, etc. A moment's thought will convince anyone that the superintendent of a plant earning \$30,000 a year should have a more thorough examination than the office boy earning \$500. There are plenty of office boys, but superintendents and other important men in the organization simply cannot be replaced and it is worth almost anything to the company to keep these men in good shape for as many years as possible.

If the employer tells the association that he is willing to pay his contribution into their treasury and that they can pay the cost of the life insurance, sickness insurance, and examinations and can have whatever is left over at the end of

the year, he at once interests all the members in the health of each member. They can then do things that no employer can do. If every time one of their members is out sick they have to dig down into their treasury for his wages, they soon become interested in seeing that everything possible is done to get him back on the job and they then see if they can induce the individual to do the things he should do, so that he won't be out again in a short time with the same trouble and costing them more money. This is just what the employer wants, because he cannot make any money out of a man except when he is on his job working to the best of his ability.

The three per cent contributed by the company and the employees will not only be sufficient to pay for the benefits I have described but will leave a saving of 20 to 40 per cent, if the association is properly run. If this saving is left to accumulate in the treasury of the association and is used by the members to help take care of the thousand and one things that come up in every organization during the year that are not covered by the regular benefits, it is a very valuable adjunct in solving a lot of problems that are not paid for by the company. The company would rather pay in many cases (even though it does not feel morally obligated) than have the employees feel that the firm is "stingy."

The following cases which occurred in my own construction company illustrate this point:

The president of the association came to me one day and told me he thought the association had saved the life of one of our men. It seems that this man had double pneumonia and his wife and baby both had influenza. He had spent all his money and needed additional medical and nursing assistance. The officers of the association called the executive committee together and voted to spend \$200 on this case. Then they made it their business to go out and get the additional help needed. They were gratified when the man was on the road to recovery to have the doctors tell them that if it had not been for this additional assistance the man never would have lived. He was so grateful that he said that as soon as he was "back on his feet" he was going to pay back in \$5 instalments the money they had spent. This had all been done without the knowledge of any of the officers of the company and was all over before we knew about it. Needless to say, we were very much pleased.

This case occurred a few months after the association was formed, and several of the clerks who had not joined up to that time signified a desire to join when they heard about this case.

One of our men in Virginia was in a bad way. He had been losing flesh very rapidly and both he and his wife were very much worried. I sent word to have him come to New York and have a thorough examination.

He was at the Life Extension Institute for four or five days, having a physical examination with all kinds of X-ray tests. His trouble was diagnosed as ulcer of the stomach. He was told what to do and two weeks later I received a letter from him telling me how much better he was feeling and enclosing the bill for the X-ray examinations he had received while in New York. (Membership in the association entitled him to a complete physical examination, but not to these extra tests.) He stated that he had been under a great deal of expense and wondered whether Fred T. Ley & Company would pay this bill. I wrote him and told him that the association had funds in its treasury for just such things and referred his letter to the association.

The president of the association told me he didn't think the association should pay this bill, as he felt the man himself was well able to pay it. He was drawing a good salary and had only his wife and himself to support. I said that it was a matter for the association to decide. The president sent the member a letter asking him certain pertinent questions in regard to his financial condition and stating that before the association could pay this bill the answers to these ques-

tions would have to be considered by the executive committee. The member replied: "If you fellows expect me to answer all these questions, I'll pay the bill myself." If it hadn't been for the association, the firm would have paid the bill.

In the third case two men on a job in Worcester had been found with hernias and the doctor recommended operations in both cases. The men agreed to go to the hospital together and have the operations performed at the same time. One was a foreman and the other a superintendent. The foreman had joined the association, but the superintendent had not.

The president of the association came to me one day and said he had received word from the superintendent that he had wanted to join the association but that the executive committee had turned him down. I asked him why they had taken such action and he said that the superintendent had had a chance to join the association, but hadn't done so. They sent word to him that they would be glad to have him join after he came out of the hospital. They could see no reason why he should draw five or six weeks' compensation (and in that way reduce their dividend).

The most striking example I can give is the case of one of our vice presidents who died.

Five years previous to his death he had had an examination. His blood pressure was found to be 155 and there was a marked trace of albumin in the urine. He was a young man 36 years old, weighing about 150 pounds. He was an important man in the organization and the firm could not very well insist on his taking an annual examination. He didn't take another examination for five years and during that period he rather ridiculed the idea of other men being examined. At the end of five years he was feeling bad and decided he would be examined. The examiner found him to be in a serious condition; his urine was full of sugar and his blood pressure was over 200. He was willing to do anything then to regain his health; but it was too late. Four months later he was buried.

His death cost the insurance company carrying the risk \$5,000, and spoiled the association's chances of earning a dividend that year. On the day after his funeral the executive committee of the mutual benefit association held a meeting and voted that in the future every member of their association would be obliged to take an examination annually or forfeit his membership. They felt that this death was unnecessary and that if this man had had yearly examinations he would never have allowed himself to get into such a serious condition. This vote of the executive committee was resented by some of the members but the committee stood firm.

One of the members who objected, finally decided that he would rather take an examination than lose the insurance benefits. He thought he was suffering from a little bronchial trouble at the time but on taking an examination at the Life Extension Institute he was advised to go home and go to bed as his temperature was over 103. Under the rules of the association a member had to visit this man within four days. He came back from the visit and told the executive committee that they had better do something and do it quickly or they would have another death, as this man had failed very rapidly in the four days he had been home and his family did not seem to know what was the matter with him. The executive committee called one of the best diagnosticians in New York City. He diagnosed the trouble as sleeping sickness and told the family he didn't think the doctor who had been treating the man knew what the trouble was, because the treatment he had been giving was the worst thing in the world for the patient. The diagnostician gave the family the names of four doctors, any one of whom, he said, was competent to handle the case. They changed doctors and in three weeks he was back at the office and, with tears in his eyes, was telling the fellows that they had saved his life.

We believe that all these results have been obtained simply because we have a plan that is working along the right lines.

CHAIRMAN MCEWEN: I am sure we owe a great deal in thanks to Mr. Ley for his fine presentation of an interesting subject. Now we must have some discussion on these various subjects and I am going to begin by asking Mr. Ashe if he will not start a little discussion on the latter paper.

S. W. ASHE (Pittsfield, Mass.): I think, first of all, we ought to congratulate the officers this year on the very able papers that they had presented and I know that if this afternoon's session is any indication of what you are going to get during the next year, you are going to get a great deal that is worth while.

I am always glad to hear Dr. Geier; he always gives you a real good story. And when it comes to the last speaker, Mr. Ley, I think you are very fortunate because there is no one who has made more of a study of the benefit idea and matters of physical fitness than he.

I believe that many of us who have been handling the Mutual Benefit Fund Associations for years do not realize their possibilities. If you can get the men interested in an organization like this it cannot only help you in everything you want to do, but it is a great stabilizer in regard to labor. That has been our experience; and in order to get that you have got to frame your own association in such a way that you can watch the finances, because the employees have got to practically run the concern.

The important thing is to get the men interested, to have them hold their own meetings and bring up their own problems. It is remarkable what you can do if you get it functioning right. I know of no organization that can put the thing over the way the Benefit Fund Association can. I am glad that Mr. Ley has investigated the idea of this fifty-fifty proposition.

A good many years ago our manager, who is now a vice-president, conceived the idea that if the employees wanted to do anything badly enough they would pay half, if the company would pay the other half. There are any number of things employees want to do that will involve the expenditure of money. You may wonder how many really want to do this, but enough usually do or they could not raise half the money to do it. If you make them realize that they want the thing badly enough they will be willing to help in financing it, if you show that you are ready to lend your cooperation. The same thing might be said of insurance.

Mr. Ley has worked out a very complete plan, which is the result of years of patient study, and what I like about it is that it is simple; but the statistics are very nearly right. He has gotten hold of statistics that really mean something. If you are going to formulate a plan of this sort, which will stand the test of unusual situations, you have got to have it based on real concrete experience; such as the way big insurance companies decide how much they are going to charge you. That is built up from experience and one of the difficulties with our associations is that we have not kept accurate statistics.

In our particular plant the cost of taking out insurance is paid by the company and the employees pay the sickness costs.

CHAIRMAN MCEWEN: There is a lot to be thought of and talked about in this meeting and I am sure there are some impatient people who have something on their mind they want to get off. Let's have some questions.

R. P. SAMUELS (United States Finishing Company, Providence, Rhode Island): I am interested to know what type of doctor—I mean by type, a surgeon or so called medical man—is preferable in connection with a health program outside of the plant and in the home where the Mutual Benefit Fund sees fit to act?

DR. GEIER: I think a physician is better than a surgeon for the reason that you have the need for a more socially minded factor which you find in the physician.

The medical type of man would be better outside the plant for the surgeon is more specialized, and is not liable to afford the best contact. Of course there are some exceptions, but in the main that holds true, and I believe it will work out to the best advantage.

CHAIRMAN MCEWEN: That has been my experience.

DR. E. C. McCULLOCK (Procter and Gamble, Staten Island, N. Y.): I think this question of sickness insurance is the biggest question before the American people at the present time. It is a question we ought to think about and decide how we are going to deal with it.

The accident insurance compensation was a big thing and has been pretty satisfactorily handled, on the whole. In accident work we have some objective since there is a physical evidence of injury that helps to decide. In sickness this is often lacking and we are depending on outside symptoms of the patient. Whether or not a man is able to work is a question that comes up hundreds of times and we have to decide it. Very often the doctors differ as to whether a man is able to work or not. Very frequently the company's doctor will take the stand that the man is able to work and he goes to his family doctor and brings back a certificate that he is unable to work. My company usually sustains me, but this is a proposition that has got to be reckoned with. Our Benefit Association requires a certificate from some doctor before the man draws his benefit.

There are artificial methods of keeping down the sick list. A doctor can make up his mind that when a Benefit Fund man comes in that he is going to make him keep on working. I know of a physician in the army that ordered a man on duty who had a broken leg. You can do the same thing with lost time accidents, but surely many of the men would be better off home than on the job.

The trouble with most of these associations is that they were originally framed without any regard at all for the family doctor's point of view. The family doctor is expected to treat the injured at home and is expected to make out all the reports the company may require, and he is expected to send him back to work when he is fit to work, and he is expected to do all sorts of things; and when he has done all this the family doctor can whistle for his bill, because all the benefit money will have been used up.

In regard to the cash benefit, I think that two-thirds of a man's normal pay is sufficient. I do not favor giving a man full pay when he is off the job because of sickness or injury, for I feel that it tends to lengthen the period of sickness. Of course, I believe that sufficient money should be spent on the doctor, but I believe that two-thirds of the man's pay is enough from the benefit.

There is the question, also, of what is to be done with the people who are subject to certain diseases. I had one man tell me he was liable to have fits. He could not get a job anywhere and he had a wife and children. These people are deserving of statutory aid and there is a lot of good work they could do, but it is better to have them in an environment that is arranged for them.

MR. JOHNSON (The Hoover Company): I presume that all here are interested in insurance and I was wondering if we could find out how many had their insurance for their employees paid by the company, and how many had the workers contribute?

CHAIRMAN MCEWEN: I think we could find that out. How many here have Benefit Associations, of one kind or another?

(About twenty-five raised their hands.)

CHAIRMAN MCEWEN: How many of those associations are carried on entirely by the employees?

(About twelve raised their hands.)

CHAIRMAN MCEWEN: Now the question is how many work on a fifty-fifty basis, where the employer contributes a portion. How many have that?

(About twelve raised their hands.)

CHAIRMAN McEWEN: There is still the question of how many of these are carried on entirely by the employer?

(About four raised their hands.)

CHAIRMAN McEWEN: That gives a fair idea of the situation. Now, is there any further discussion, or questions?

J. P. JACKSON (New York Edison Company): I was over in the Executive Meeting and I heard the statement made that there was something like one billion dollars a year lost through accidents. The figures for accidents are really astounding, but the figures for sickness are just as large. As soon as a man begins to get sick he can only do a quarter of a man's work and the company



is going to lose real money. I think the lesson Mr. Ley has given us is one which we all ought to follow.

CHAIRMAN McEWEN: I think we all appreciate the problem.

MR. McCULLOCK: I believe that a large amount of the insurance placed by the Benefit Associations has been taken over by the insurance companies. Now I have no fault to find with the insurance program and Mr. Ley's paper suggests that all small companies of underwriters are analyzing the situation. It is hard for me to understand why a great corporation like the General Motors would let an insurance company handle all the business of the mortality, etc., rather than doing it themselves. According to the program as outlined I believe that sickness insurance is a major part of it and even though this entails much risk, it is a risk that has to be taken.

DR. GEIER: In my paper I spoke of the fact that the company had the right to run its own business and decide whether it would pass this over to a corporation on the outside. I can consider nothing more dangerous to our Benefit Fund Associations, for the outside company will be running the business the employees

are supposed to be running. You lose many of the bonds of sympathy that would be brought into play with the employer. I hope I am not misunderstood and you think I am taking any exception to insurance companies. We owe them a great deal because they have helped many to spread their loss. But when we are faced in the near future, as we are bound to be faced, with problems of compulsion, the only hope we have of staying the hands of the politicians is to show that industrial management has looked ahead far enough so that they have sufficient power to run these sickness and other benefits alone, and not have to call in outside aid and admit they know nothing about it. I think it is pretty apparent that the fellow who takes out insurance is going to be careful. I believe that in the motor car industry insurance is going to be compulsory, but I hope we in industry are going to learn how to handle our affairs without any aid and we can say that we know how to run our business, and we will be intelligent enough to see that we afford protection.

ADJOURNMENT

October 4, 1928

R. E. McEWEN, Chairman

**Employees' Service Division, Western Electric Company
Chicago**

The second session was called to order at 9:30 by the chairman, Mr. R. E. McEwen.

CHAIRMAN McEWEN: The meeting will come to order. We have a very long program this morning and I think there will be a lot of discussion, so I will at once call upon Mr. Grant, who has come all the way from Los Angeles. He is with the Union Oil Company and will tell us something about his views on the Benefit Fund.

Hospital and Surgical Benefits As a Part of Relief Plans

By W. S. GRANT

Assistant Manager Insurance & Personnel, Union Oil Company of California

The past few years have brought about many radical changes in the industrial world—industry demanding more from employees, and in turn employees requiring and receiving more attention than ever before from industrial management. Savings plans, welfare funds, athletic and social programs, etc., have been arranged for employees' betterment, both physically and financially. Directors of industry have long realized the necessity of competent help, if operation and production are to be efficiently handled, and with this in view one of the most important developments in recent years has been the establishment of proper hospital, medical and surgical treatment for employees.

We speak of efficiency in man power. Regardless of our positions in industry, we have all at times turned this problem over in our minds, and when selecting an employee, education, previous experience, age, appearance, physical condition, etc., are taken into consideration. Too much stress cannot be placed upon "physical condition." If a man is not physically sound, it is unreasonable to expect complete efficiency from his efforts—it is only natural to expect that his efficiency will be affected in accordance with the degree of physical impairment.

This deficiency might appear in many forms, the most prevalent being carelessness—causing the breaking down of mechanical equipment and resulting in many injuries, not only to the one physically below normal but to co-workers as well. Statistics show that certain employees are continually having accidents. A further analyzation will often prove the cause to be really physical, a condition of which possibly the individual is not aware and not noticeable to his co-workers, but which would have been discovered had the employee been required to pass a physical examination.

A man to be mentally alert must be physically sound in every respect. If not, there are times when his efficiency will be materially impaired.

Much stress is laid upon the purchase of high grade mechanical equipment—great care being taken in the selection and installation—while in selecting the men to operate this machinery often not much attention is paid to the physical condition of the applicant; and it is probable that the first one who seems to have the rudimentary intelligence necessary to keep the machinery in operation is employed. It is not possible for a piece of mechanical equipment to operate to its maximum capacity unless the operator is efficient both physically and

mentally. It is reasonable to expect that one who is physically fit produces more than one who is physically impaired, and in order to get the maximum production out of a piece of perfect mechanical equipment it is essential that the operator should be, as nearly as possible, in as perfect running order as the machine he is to operate.

Nearly all of our states require medical and surgical attention and hospitalization to be given an employee in the case of injury. The management of our company heartily agrees and goes a step further: not only is that given which is required by the state (we carry our own compensation liability) but care is taken to select the best specialists in all lines of the medical profession to rehabilitate our injured employees. The initial cost, of course, is higher when specialists are consulted, but, from the standpoint of efficiency of the employee, it is much more satisfactory to pay the surgeon for a perfect result than to pay the injured employee for permanent disability which will never allow him to function up to his usual maximum capacity.

Industrial accident commissions are demanding more of industry than ever before, and the burden is placed on us of restoring injured employees to perfect condition, regardless of what disabilities were present when the injury occurred. For instance, we frequently find it necessary to extract abscessed teeth and clear up other infections before the injured can be pronounced as physically fit for work. In such cases the value of continued attention to employees' physical condition is forcibly brought home, it being obvious that in case of injury the rapidity and completeness of recovery would depend to a great extent on the employee's general health.

In many cases the efficient handling of "Human" repair work will produce complete recovery, whereas if handled by a general physician partial disability might remain, and the increased cost of competent surgical attention in effecting a complete recovery would be more than offset by the liberal award of compensation for permanent disability usually allowed in such cases by the state authorities. The employee who realizes that he has been given the best medical attention available naturally has a kindly reaction toward his employer and his loyalty to the corporation is thereby considerably augmented; on the other hand, if an employee meets with a serious accident and through inefficient medical attention carries with him a permanent disability for the rest of his life, his loyalty and efficiency are both impaired. His employer feels morally obligated to make a place for him on the payroll and, in addition to paying for inefficiency, has a disgruntled employee.

If such procedure is beneficial and essential in the case of accidents while "on duty," it is only reasonable to believe that like procedure should be equally beneficial in "off duty" accidents, as well as all forms of physical disabilities involving the employee's efficiency. Our company and probably all other large industrial concerns spend many thousands of dollars in the upkeep and maintenance of their mechanical equipment in order to secure maximum production. How much more important it should be to industry to keep the human machinery in perfect running order through periodical inspection by capable human mechanics and have repairs made when necessary. When a piece of equipment gets beyond repair it is placed on the scrap heap, and, unfortunately, this system has been followed to a certain extent by some industrial concerns with their man power.

All leading industries of the nation at the present time are coming more and more to realize that with an employee they have a more or less permanent investment and are taking the necessary steps to keep the human machine in proper working order until such time as the employee through the natural course of events becomes too old to perform his duties efficiently, when he is placed

on a pension sufficient to keep him in comfort for the rest of his life. Our company has had in effect since October 1, 1915, what is known as the Employees' Benefit Fund. All employees are eligible for membership, which is compulsory, upon the completion of one year's service, at a cost of \$1.00 per month. This contribution assures them medical, surgical and hospital attention for any one illness or accident off duty up to \$250, and in the case of death provides insurance for their beneficiaries ranging from \$500 to \$2,000, based on length of service of the employee. These life insurance benefits are payable in event of death from any cause and are in addition to any death benefits payable under the workmen's compensation law of the various states. Should the cost of medical attention in any one case exceed \$250, the excess is taken care of by the company and charged to the employee's account, allowing repayment by monthly payroll deductions, or by direct payment, if desired. If it so happens that the employee dies, the over-expenditure is covered by the insurance money paid the beneficiary. Since the inception of this fund the company has collected from the employees \$845,593.85 and has paid out for medical, surgical and hospital care \$1,074,126.46, plus \$525,582.20 insurance, a net cost to the company of \$754,114.81.

However, the increase in efficiency and morale of the organization has repaid the company many times over, and this asset, although intangible, does, we feel, justify the large expense involved.

In most cases where benefit plans have been inaugurated it has also been found necessary to have all employees pass a physical examination as a condition of employment. Many industrial concerns have adopted a plan of yearly physical examinations—a general examination for the average employee and a more thorough physical examination for the officials of the company, in whom, of course, the organization has a much greater investment. The cost of such examination is usually absorbed by the concern itself. Severe illness, loss of time from active duty, is often prevented by adopting this policy and securing corrective treatment before the disabilities become serious. The average man takes for granted that he is well and pays but little attention to his physical condition. As we grow older these so-called minor ailments become more and more difficult to eliminate, often becoming serious before we are aware of their existence. After a few years' service an industrial concern has a vital interest in an employee—labor turnover costs are high. The higher the position affected the greater the loss to the company.

The selection of doctors seems to be a great problem at first, and in reality it is a problem. However, it is one that can be solved satisfactorily, like any other problem that is of vital importance to an average group of men. Years of experience have proven that it is not the best policy to allow the selection of medical attention to remain in the hands of the employee.

Often in the case of sickness the family physician is called in, he in all probability being fairly well posted on general medical procedure, but very likely incapable of making other than a general diagnosis, often not willing to admit his own limitations. Therefore, the best results are naturally not secured. The patient in time realizes this and goes out shopping for new medical advice, obtaining this from a neighbor or a co-worker, and usually being given the information by the latter that his family doctor had attended a member of his family or a friend very efficiently. Irrespective of the fact that the ailments in both cases were entirely different, the advice is heartily accepted, a change of doctors brought about and the same procedure gone through again.

Many such cases were brought to our attention previous to the adoption of our present medical plan. Often an employee seeking medical attention for himself, before obtaining the desired results, had called in several doctors on

a comparatively simple case. Had the correct diagnosis been made and treatment given at the inception of the illness the patient would have recovered and been able to return to work in a much shorter time, the cost accordingly being a great deal less. It can be easily seen that if it can be so arranged to have medical and surgical attention directed by a competent head—one who is interested both in the industry as well as the employee—more satisfactory results would naturally follow.

We have at the head of our medical panel nationally known surgeons and physicians. It was thought at first that these men would not be willing to participate in our medical program. However, when the case was placed clearly before them they were only too glad to comply with our request. The fact was pointed out that in our industry at least the medical profession was receiving very unfavorable criticism, inferior work being performed in many instances resulting in loss of life or permanent disfigurement.

Naturally those highest in the profession resented this attitude and, when it was brought to their attention, were glad to assist in rectifying it. This they have accomplished to the betterment of their profession, to our employees individually and to our standing as an organization.

To further assure ourselves of competent medical service throughout all districts where we operate our chief surgical advisor and chief medical advisor have personally suggested and passed on all doctors before they were placed on our medical panel. The cooperation thus secured has been of inestimable value.

All of these doctors are very well satisfied with their connection with us and are only too pleased to perform the duties required of them. It was pointed out when placing them on our panel that during their general practice approximately 50 per cent of their work was charity, either from necessity or from inability to collect from their patients. It was upon this basis that our fee schedule was arranged, our argument being that all services authorized by our company would be chargeable to us and would be paid immediately upon receipt of bill. Further, if the expense of the treatment exceeded that which we allow our employees, the overexpenditure would be absorbed by our organization as heretofore outlined (we taking the responsibility of collecting from the employee), the physician taking no risk whatever. This program has been heartily accepted, and upon that basis we are operating today.

Medical and surgical men are rapidly becoming interested in industrial medicine and surgery. A short time ago it would probably have been considered unprofessional for a physician to become openly connected with an industrial concern, but now they find that such affiliations are a good advertisement for them and in addition greatly enlarge their clientele through contact with the various employees. For this reason even the highest in the medical profession gladly accept a place on our panel.

To sum up, there is no doubt from the experience of our company but that medical, surgical and hospital benefits should be a part of all relief plans. Such a medical plan as ours makes available to the employee first class treatment at a nominal cost, whereas similar treatment, if it had to be arranged for privately, could not ordinarily be obtained, due to the amount of expense involved. This is a day of cooperation and efficiency, and such an arrangement is just one more step towards complete harmony in industry.

CHAIRMAN McEWEN: I would like to know a little more about the mechanics of selecting these doctors. Do you select medical men from a panel you keep, or do your employees select anyone from the panel you furnish.

MR. GRANT: We furnish the panel man. We do not allow them to go to anyone who is not on the list.

J. W. MYERS (Standard Oil Company of New Jersey): Do you allow the employee to select the type of hospital service? Can he go in a private ward?

MR. GRANT: No, we select the hospital.

MR. MYERS: I was wondering how you managed to control that, and how you avoid having very expensive treatment?

MR. GRANT: We found it necessary to control the situation and made them attend a doctor who was in the panel.

MR. MYERS: What is the ratio of your medical cost to your compensation paid on account of sickness and not on industrial accidents?

MR. GRANT: Apparently you are running in the hole when you work this along this basis, and the ratio is not exactly easy to determine. I believe we use about sixty cents out of a dollar for insurance and that leaves forty cents for medical care. We are going in the hole but we feel it is worth it.

CHAIRMAN McEWEN: I am going to rather hurry through the formal program and leave time for more detailed discussion at the end.

We have Dr. Ferguson of the Shelby Shoe Company, Portsmouth, Ohio, here and he is going to tell us what he thinks about giving assistance to members whose Benefit Fund allowance is exhausted.

What Further Assistance, if Any, Should Be Given to Disabled Members Who Have Exhausted Their Benefits, and What Is a Fair Measure of Disability Qualifying for Benefits?

By C. L. FERGUSON, M. D.

Personnel Director, Selby Shoe Co., Portsmouth, Ohio

The question of additional help, after all benefits have been paid, is a problem which inevitably confronts everyone dealing with long disabled members of Employees' Benefit Associations. This is especially true when benefits terminate at a fifteen, twenty-six or fifty-two weeks period.

Beyond all doubt, members who have exhausted their benefits should be given all of the assistance we can secure for them, and this can be done in many different ways. But, I do believe that an extension of financial aid should not be offered by the Benefit Association unless there are provisions for such in the constitution.

Many times a committee representing the Association becomes very liberal-minded. It will propose the granting of large donations to some particularly deserving cases, but they seem to forget that there are others just as deserving and that there will be many more in the future. I firmly believe in making no exceptions. I more firmly believe in the strict adherence to the constitution, and most strenuously in cases of exhausted compensation. If further financial assistance is granted, it should originate from some other source.

In some long protracted cases, the strained financial condition of the family is very pronounced. The welfare of the sick member is not the only one involved. Our sympathy goes out to the worried wife and to the undernourished little children. We are our brother's keeper. We cannot let people endure hardship and suffering simply because of exhausted benefits. In outstanding cases of this sort, the company is always willing to give assistance. I have known cases when the company has matched or doubled donations of fifty, one hundred or two hundred dollars collected by interested co-workers. Money is often loaned without

interest to the disabled employee. A mutual arrangement is made whereby he can pay this back at a specified weekly amount when he is able to return.

In these days of group insurance, it is a common occurrence for the loan to be secured through the life insurance. In cases where proven permanent, total disability exists, the insurance company through its disability feature, will pay the principal in a lump sum or in monthly installments.

In securing assistance for unfortunate Benefit Association members, one should not forget the various charitable organizations in the community. Their services embrace a variety of valuable activities. They give nursing care, financial assistance, work out a budget system, obtain work for one or more members of the household, probably move the family into a house of cheaper rent, secure admittance into a hospital or sanatorium for the patient, communicate with relatives who are able to help in the family's support, or get the aid of the county commissioners whose budgets contain funds for emergency cases.

I recall the case of a young man who was the victim of T. B. He refused sanatorium treatment and utilized all of his benefits. He lived with his mother who was very poor. By selling her furniture she had enough money to take her son to a little farm in the Kentucky hills. This, apparently, was a hopeless, fruitless case. Three years later the man came back, and in a far worse condition, but he had a change of heart and then wanted to enter a T. B. sanatorium. The Bureau of Community Service was notified; the T. B. nurse made an investigation and reported back to me that the boy had five brothers who could contribute five dollars a week, a sufficient amount to secure sanatorium treatment for him. Here was a problem totally solved. This meant some effort and assistance, but now the boy is recovering and is just as well satisfied as if he had a periodical income from the Benefit Association.

Just recently we had a case of a man and wife who had received all of the benefits to which they were entitled. His, he had drawn because of T. B., and she because of an operation. During a later period of the husband's disability, arrangements were made with the county commissioners to send him to a county T. B. sanatorium. Previous to leaving he said he had to have fifty dollars to pay a debt, and unless he got that paid, he would not go to the sanatorium. The company loaned him the money to pay the debt. He went to the sanatorium, stayed one day and left. Shortly after, the wife developed incipient T. B. The problem then was, what further assistance can be given to these two unfortunates whose only possession was a second-hand Ford? How can they get the proper attention and care?

An appeal was made to charitable organizations again. The problem disappeared. The wife was admitted into the Ohio State sanatorium. The husband, who is an ex-soldier, went to the Dayton Soldiers' Home and later was sent to a sanatorium in Denver. What more do they need? Nothing except suitable work when they are able to return.

Just recently I read an article about an employee who had been disabled for one year. During that time his company sent his wife his entire wages every week. When the employee was able to return to work, he was greeted by the general manager, who said, "Bill, you certainly have had a tough time, you have been a brave boy; if I can do anything more for you in the future, don't hesitate to let me know." Bill suddenly realized that he had no job. He was looking for assistance in the future; he needed and wanted work. So the securing of work is an assistance we should be ever mindful of. Place the man or woman in some kind of work just as soon as they are able to return. If they are not able to do their regular work, place them at something suitable if possible.

Since we are interested in the type of assistance we can give after the benefits are exhausted let us consider, before closing this discussion, what assistance the Benefit Association should be giving during convalescence in order to eliminate to a minimum, cases which cover long periods of time.

I would like to suggest to those who do not have this provision incorporated in their constitutions, that the Benefit Association pay for diagnostic facilities when necessary and when ordered by the medical director. In other words, make it possible for the family physician and the disabled member to get X-ray, laboratory or consultation service. In many instances the writer can recall the beneficial results derived from the expenditure of five, ten or fifteen dollars during the first few weeks of disability. For example: Is this a case of bronchitis or T. B? Has the cause of that rheumatic case been discovered? Is the cause of this woman's nervousness due to factory work, as is often stated, or is it really due to toxic goiter. Is the next case which is diagnosed as indigestion, really stomach ulcer, duodenal ulcer or cancer? Often we are confronted with the so-called nervous breakdown cases which the family physician says is due to overwork, but, after some diligent search, the teeth, tonsils, sinuses, appendix, gall bladder or some other foci of infection are found responsible. These are a few examples and many more could be given. What assistance can the Benefit Association give that is better than to provide a means of making an early definite diagnosis so that the member will get the proper treatment early. This is not a "cure-all" for every case, but it is a big factor in reducing the number of disabled employees.

What Is a Fair Measure of Disability Qualifying for Benefits?

With industry's steadily increasing desire to render "Service," and its striving for the regeneration of society, too much emphasis cannot be placed upon the ordinary virtues—justice and honesty. Every man can discern between truth and falsehood, honesty and dishonesty; and although the element of dishonesty is one of importance in the operation of a Benefit Association, I believe we are more concerned about the impartial and unprejudiced relations we have and should have toward one another.

We, upon whom is fixed the responsibility of making final decisions on cases questionable, desirable and undesirable, are ever mindful of the question, what "is" just to all concerned? Being in cooperation with and desiring to mutually benefit all parties, we keenly appreciate the necessity of fairness. To render the greatest possible amount of good with the money entrusted to us should be our uppermost desire.

With this urge constantly before us, we are continually confronted with situations which make us ask, what is a fair measure of disability qualifying for benefits? Irregularities and misunderstandings are the most prevalent factors which foster these situations. It is the case of a questionable cause of disability or questionable disability itself that present the problems.

I recall numerous cases which had legitimate beginnings and were free of suspicion, but in time they taxed one's ingenuity, tact and investigating abilities to justify compensation.

Gossip is usually the instigator of situations of this kind. One hears many remarks—"This person is trying to put something over;" "That fellow is a crook;" "She isn't sick because I saw her on the street or at a show or in an auto;" "This man isn't sick because he made the statement that work was slack and he had decided to draw benefits." Many similar remarks come to our ears, which, if accepted for truth, would keep us in a constantly unsettled state of mind.

I know nothing that will arouse question about the integrity of an employee who is as readily as a borderline disability. Evidently, it is a common practice to look upon these truly unfortunates with suspicion. This is often practiced by the foreman, floor ladies and fellow-workers, and wholly because they fail to grasp the necessity of securing all of the facts in the case.

Many times unfair accusations are made about various patients' physicians, and aims to the effect that the doctors have been bribed to write certificates per-

mitting the alleged patient to draw benefits. A misconstrued remark from the disabled employee, or a misquoted doctor's statement often arouses suspicion, and the unavoidable question arises, is that individual deserving of benefits? Let me state before I am misunderstood, that now and then there is evidence of a certain amount of malingering, and that occasionally favoritism is shown by attending physicians, but I have found the percentages to be so small that it isn't worthy of our consideration. Also, I have observed that accusations often fade into oblivion if the accusers are requested to present sufficient proof to substantiate their claims.

I learn from corresponding with the officers of your section that the following questions have been raised:

How far should one go in paying out relief benefits? Should persons who have no specific illnesses, but who are simply old and worn out be entitled to relief benefits, or should benefits be limited entirely to specific maladies under the care of a regular, licensed physician? Are hay fever patients disabled? Is the employee who is working, but who is on the verge of a so-called nervous breakdown entitled to benefits if ordered to rest? These cases seem to present difficulties to some from the very outset.

Since we are interested in concrete examples of what is a fair measure of disability qualifying for benefits, it occurs to me that it is futile to attempt to describe such cases and to render a decision. However, it does appear to be imperative that provisions for a plan be suggested whereby we can more accurately and easily decide upon questionable cases. The real problem is one of indecision, therefore the plan which will reduce unfairness to an inconsequential minimum is that which we are seeking.

This question is an interesting one, and it can be approached from many angles, but I fail to see the occasion for many complexities providing we have a workable plan. Before drawing up the rules for the constitution of a Benefit Association, it is essential to make a study of numerous Benefit Associations' plans, then try to incorporate as many of the good points in your plan as possible. In this carefully selected constitution will be found rules definitely stating the certain number of weeks for which benefits shall be paid in cases of disability, and it will also contain concise information regarding the nature and causes of disabilities for which compensation will not be paid.

We are searching for a definite means by which we can determine qualifying and disqualifying measures of disability, therefore, in lieu of this fact, who is to judge whether or not a person is disabled? There is no one better qualified than one of the medical profession; the family physician should be the first to pass on a case. If one is seriously enough disabled to draw benefits, he is in need of a physician. A report from the attending physician should be received before compensation is paid, and, thereafter, as long as the term of disability continues, a weekly report should be filled out by the physician. This report, when completely and properly filled out, will furnish information pertaining to diagnosis, prognosis, estimated date of the patient's return to work, date of last visit and whether or not the patient is carrying out instructions.

It appears to me that the person most fittingly qualified to finally decide upon these reports is a physician who is the medical director of the Benefit Association. If he is the physician for the company employing these unfortunates, and they are members of the Benefit Association, his numerous contacts and his accumulated medical records will often help in evaluating the report of the doctor in charge.

The greater majority of the industrial concerns today employ a visiting nurse. Her report is a valuable factor in determining the validity of claims, and in addition, there are often visiting committees which make thorough investigations and reports.

Therefore, the report of the family physician, that of the visiting nurse, the

committee's reports, and these along with the Medical Director's personnel information, leave a very small doubtful remainder. The question may arise—suppose the nurse and visiting committee do not agree with the family physician? There is but one conclusion, and that is an attempt to prove which is right.

There is no doubt but that a lay executive will frequently be put to a pronounced disadvantage in attempting to decide what is a fair measure of disability qualifying for benefits. We should not quibble about legitimate cases of disability, or about cases which we cannot disprove. The phase which should monopolize our concern is—do we have sufficient personnel capable of obtaining necessary information about these cases.

I most clearly realize that there are some cases of hay fever that disable their victims greatly, and these undeniably qualify for benefits. If old people are partially or totally disabled, they are deserving of compensation; where pension systems for the aged do not exist, I know of no better plan than to pay the full allowance of benefits. They deserve it. I consider it advantageous to take the man or woman on the verge of the so-called nervous breakdown off the job and pay them benefits. Most often these patients recover entirely in four to six weeks, then enjoying a change of scenery and climate. This quick recovery, however, does not lessen the degree of their disability.

The fact that a patient is not confined to his bed, home or wheel chair proves nothing.

To conduct a Benefit Association smoothly and effectually one should abide by evidence, facts, rules and make no exceptions. When one looks for exceptions and makes exceptions, there is an unbelievable amount of trouble that follows.

What is a fair measure of disability qualifying for benefits? It is a satisfactory proof of total disability.

CHAIRMAN MCEWEN: Thank you; that was very interesting. We have a lot to discuss today. The first question that has been brought up is the question of what we are going to do after the benefit has expired?

S. W. ASHE (Pittsfield, Mass): I think, judging from the discussion we had last year's session of the Mutual Benefit, that this paper offers a vital thing for our consideration. The author of the paper has been willing to go one hundred per cent, and the paper is so important that I think copies should be made and sent out to all those who are here today. What you need more than anything else are concrete and specific experiences in handling this problem.

I have always felt, and I have been handling this for a good many years, that the working out of a problem is best taken care of by the citing of examples. We have been favored with some illustrations of help given to men who were out for two and three weeks. I do not believe that is comparable to the help that should be given to a man out ten weeks. Nevertheless, you must give help at the start when it is needed.

In the development of our association at Pittsfield we did it along those lines—give help at the stage when it was most needed. It is a very difficult thing to set up an association with regular weekly benefits, to provide protection, and to take care of these cases which are at the beginning stage. We created what we called a special reserve fund. This was built on the profit from shows and carnivals. We could take a couple of thousand dollars every time and put it in this fund and it was built up that way. With the fund we take care of the man who has tuberculosis and has to go away, and we will pay it from the fund so that he can be doctored out in the air where he can have a chance to recover. We found a great number of these cases and it grew to be rather expensive and we conceived the idea that every year we would take something out of the general fund and add to it, and it was done in such a way that we did not feel it.

There are several things I would like to talk about but I will just tell you one

more thing. We had four executives during the past year who were a little run down. We took those four men and sent them out on a trip to a convalescence hospital and gave them treatment for a few months. They were all men who had become fatigued with the strain of the business. They would have all been serious cases if we had not taken care of them and put them under rigid hospital care. As it was they were all restored to normal.

I think that this idea of getting hold of a man in the early stages of his trouble is worth a lot of attention, and that is why I think it is such a valuable paper along these lines that we heard this morning. I have never heard a paper of this sort at any of our meetings before.

CHAIRMAN McEWEN: In handling that kind of a case we try to anticipate an employee's breakdown. If he is in a tubercular condition we must realize in the beginning that we are going to have to carry him for a long time. So in the very beginning you have a definite problem that ought to be thought of. Most of these disabled people can carry on a short time with their benefit, living at home and caring for themselves or possibly securing hospital attention if it is needed, but when you have to look at the future of a case there is another problem, and especially in a tubercular case.

There are charitable cases taken care of by the State and if we see that an employee is not going to complete a cure before the benefit has expired we urge him to go to a charitable institution. I think every one of us can study that sort of case with a great deal of profit. I am sure there is other discussion on this subject.

MEMBER: It appears to me that as a case approaches the twentieth or thirtieth day we should begin to look toward the future of that case because the benefit will probably be about exhausted. We should re-grade the benefit and give a little less each day; in other words, a day or two added from a waiting period would increase the life of the benefit.

CHAIRMAN McEWEN: Is there anyone else who would like to talk about this? If not we will come back to the subject later and proceed now. Our next item is on the value of statistics in preventing sickness. This subject will be discussed by Dean Brundage of the United States Public Health Service, Washington, D. C.

The Value of Uniform Statistics in Preventing Sickness

By DEAN K. BRUNDAGE

Assistant Statistician, U. S. Public Health Service

In discussing the value of uniform statistics in the work of attempting to prevent sickness among industrial employees, I should like to review very briefly some of the statistical data that have already been made available, through the cooperation of sick-benefit associations. When this has been done, we shall be in a better position to pass judgment on their value.

During the past seven years a group of about 35 employee benefit associations which now have a combined membership of about 175,000 persons have sent monthly reports of their cases and average number of members to the United States Public Health Service. We have analyzed the data contained in these reports for the purpose (a) of affording information concerning the frequency and nature of disability in sample groups of the industrially employed population, and, (b) of ascertaining the normal expectancy of sickness, especially the average rates for specific diseases, as a basis for judging whether certain causes of disability in any given group of workers were occurring at normal or excessive frequency.

These statistics have been valuable to us in our studies of the dusty trades

of other occupations suspected of causing damage to health. Without these facts there is no question that we would be seriously handicapped in our work some of the health hazards of industry. But aside from this use of the data by government research organization, of what value are the statistics to the sick-benefit associations themselves?

The Principal Causes of Disability

It is important, surely, that the officers of an industrial relief association should have a clear picture of the comparative frequency of the different diseases and conditions causing disability among their members. The diseases which affect the greatest number of persons, which most frequently necessitate disbursements for medical relief suggest the proper point of attack, for it is obvious that even a small degree of success in controlling the diseases which are most prevalent would reduce the number of payable cases far more than would result from the complete elimination of certain diseases which rarely occur.

During the six year period extending from January, 1921, to January, 1927, the reports from sick-benefit associations having a waiting period of one week showed that the respiratory diseases were responsible for many more payable cases than other disease group. About 43 per cent of all the claims during this six-year period were on account of diseases of the respiratory system.

Within the respiratory group, one disease was outstanding on account of its high prevalence. It was responsible for nearly 50 per cent of the respiratory disease claims, and for about 20 per cent of the claims for all causes. This disease, influenza or grippe which in a period relatively free from serious epidemics the disease was, nevertheless, the greatest single cause of claims for relief. Even in non-epidemic years the cost of this disease to American wage earners as a whole must reach a staggering total. The second most frequent cause of disability within the respiratory group were diseases of the pharynx and tonsils (chiefly tonsillitis). Bronchitis ranked third in frequency and pneumonia fourth.

Of the broad disease groups, the second most important from the standpoint of number of payable cases are diseases of the digestive system. Within this group the largest number of claims during the six-year period were for diseases of the stomach, and the second largest for appendicitis, the frequency of which was about the same as that of pneumonia (all forms). Diarrhea and enteritis occupied third place within the digestive group.

Another important group of cases were the non-industrial injuries which accounted for nearly 10 per cent of the claims for sickness benefits. Among the non-respiratory, non-digestive diseases the most frequent were rheumatism (acute and chronic), diseases of the nervous system.

If we add together the number of disabilities from the five most important groups, we find that they cover 48 per cent of the cases. In other words, nearly half of the claims resulted from only five different diseases or conditions. These five were: (1) influenza or grippe; (2) non-industrial accidents; (3) tonsillitis and other diseases of the tonsils and pharynx; (4) rheumatism—acute and chronic; and (5) bronchitis. It will be observed that three of the five major groups are respiratory diseases. The epidemic and infectious diseases against which health work is so largely directed caused less than 3 per cent of the cases.

The epidemic and infectious diseases which are mostly the diseases of childhood have been brought under control to a gratifying extent. It appears that our next objective in public health work might well be the prevention of those diseases to which the adult population is most susceptible.

Factors Which Affect the Rate of Sickness

In additoin to this morbidity picture which the reports from industrial relief associations have given us, they have enabled us to measure and evaluate the influence of several important factors affecting the sickness rate. One of these factors is sex. The frequency of disability lasting more than one week was found to be about 44 per cent greater among female than among male members of the reporting associations. The female rate was more than twice that of the male rate for diseases of the nervous system, diseases of the pharynx and tonsils, and appendicitis. On the other hand, females experienced only about one-half as many disabilities as men from pneumonia, rheumatism, and from lumbago and other diseases of the organs of locomotion. Hernia was reported as the cause of disability among women about one-fifth as often as among men. For most diseases, however, the female rate was higher than the male rate. The frequency of non-industrial injuries was about the same for either sex. It is apparent from these results that the larger the proportion of women in a sick-benefit association, the higher is the rate of claims to be expected.

The age distribution of the members also affects the rate of sickness. The days lost per person per year increases much more rapidly with age than does the frequency of cases. This indicates a tendency toward a gradual decrease from age 30 to about age 45 in ability to recover rapidly from disease, and a much more marked lessening of recuperative ability after age 50. The records also show that members under 25 years of age generally experience disability more frequently than those between the ages of 25 and 45.

The incidence rate of sickness was found also to vary widely from industry to industry. In general low sickness rates occurred in the heavy industries, and high sickness rates in the industries in which the work was less difficult from a physical standpoint. From this it may be assumed that workers tend to select the industries for which they are best fitted physically, the stronger, sturdier individuals going into the heavier industries such as iron and steel manufacturing, while the physically inferior tend to seek the industries which have the light, sedentary jobs. The frequency of sickness was especially low in the iron and steel industry.

A fourth factor is the effect of occupation upon health. In several instances high rates for certain diseases have suggested the possibility of occupational health hazards. The Public Health Service is now making a special study of what appears to be an important hazard to health in one of our basic industries. The reporting associations in this industry have rendered a great service to their members by helping to make possible the discovery and investigation of a situation probably involving a health hazard which might otherwise have gone unrecognized for years.

Is the Frequency of Sickness Decreasing?

With uniform statistics of sickness one can also throw light upon the question whether the industrial population is experiencing more or less sickness than in the past. For this purpose we tabulated all the cases of disability according to their duration as reported by 15 associations which sent their reports continuously throughout the last six years. The sickness curve for the three years 1922 to 1924 inclusive was compared with the curve for the three years from 1925 through 1927. In the latter period there were fewer cases lasting from 8 to 20 days than in the preceding three years, but more cases lasting 8 weeks and longer. No measurable progress therefore appears to have been made during the rather brief period 1925-27.

Essentials of Uniform Statistics of Sickness

In comparing the morbidity experience of one association with another, it is necessary, of course, that the waiting period, i. e., the number of days which must elapse before the patient begins to draw benefits, be the same. Probably a majority of industrial mutual associations in this country have a waiting period of seven calendar days, benefits beginning on the eighth consecutive day of disability. Associations with a waiting period of less than one week may be included if all the cases lasting less than eight days are omitted in the statistics, but there is no satisfactory way of including associations which have waiting periods longer than days. Theoretically they could be put into separate groups, but practically there

TABLE 1

Frequency of Different Diseases Which Caused Disability for More Than One Week Among Approximately 95,000 Male Industrial Workers in a Diversified List of Industries, 1921 to 1926 Inclusive

Number of cases, 1921-1926	Annual No. of cases per 1,000 male members	Diseases causing disability
57,554	100.6	Sickness and non-industrial accidents.....
24,549	43.1	Respiratory diseases.....
11,869	20.8	Influenza and grippe.....
3,619	6.4	Diseases of the pharynx and tonsils.....
3,238	5.7	Bronchitis.....
1,884	3.3	Pneumonia—all forms.....
837	1.5	Tuberculosis of the respiratory system.....
3,102	5.4	Other diseases of the respiratory system.....
7,701	13.5	Digestive diseases.....
2,637	4.6	Diseases of the stomach, cancer excepted.....
1,911	3.4	Appendicitis.....
1,031	1.8	Diarrhea and enteritis.....
855	1.5	Hernia.....
1,267	2.2	Other diseases of the digestive system.....
19,573	34.3	All other diseases.....
3,271	5.7	Rheumatism—acute and chronic.....
2,493	4.4	Diseases of the nervous system.....
2,232	3.9	Diseases of the circulatory system.....
2,026	3.6	Diseases of the skin.....
1,857	3.3	Lumbago and other diseases of the organs of locomotion.....
1,591	2.8	Epidemic and infectious diseases.....
1,507	2.6	Non-venereal diseases of the genito-urinary system and annexa.....
930	1.6	Diseases of the eyes and ears.....
589	1.0	Diseases of the bones and joints.....
349	.6	Cancer—all forms.....
2,728	4.6	Other non-respiratory, non-digestive diseases.....
5,531	9.7	Non-industrial accidents.....
		Number of years of life under observation 570,042

are not enough of them to warrant the collection of special sets of statistics for associations with the longer waiting periods.

The length of the benefit period, i. e., the maximum duration of payments for disability, does not affect the sickness incidence or frequency rate, but when comparisons are made of the amount of time lost or of the duration of disability, it is obvious that only those associations should be included which have the same benefit period, unless one wishes to reduce the time lost in each association to the common denominator of the association having the shortest benefit period.

Most employee benefit associations keep reliable records of sickness, but it is

TABLE 2

Relative Frequency Among Males and Females of Different Diseases Causing Disability for More Than One Week in a Group of Industrial Workers, 1921 to 1924 Inclusive

Diseases and conditions causing disability	Annual number of cases per 1,000—		Per Cent of male rate
	Males	Females	
Sickness and non-industrial accidents.....	94.8	136.4	144
Respiratory diseases.....	40.1	58.6	146
Influenza and grippe.....	16.4	20.2	110
Diseases of the pharynx and tonsils.....	5.9	15.7	266
Bronchitis.....	5.3	6.6	125
Pneumonia—all form.....	3.3	1.4	42
Tuberculosis of the respiratory system.....	1.5	1.7	113
Other diseases of the respiratory system.....	5.7	13.0	228
Digestive diseases.....	12.7	17.7	139
Diseases of the stomach, cancer excepted.....	4.2	4.4	105
Appendicitis.....	3.1	7.5	242
Diarrhea and enteritis.....	1.9	1.8	95
Hernia.....	1.5	.3	20
Other diseases of the digestive system.....	2.0	3.7	185
Non-respiratory, non-digestive diseases.....	33.2	51.2	154
Rheumatism, acute and chronic.....	5.5	3.1	56
Diseases of the nervous system.....	4.2	11.2	267
Diseases of the circulatory system.....	3.6	3.3	92
Diseases of the skin.....	3.5	3.2	91
Lumbago and other diseases of the organs of locomotion.....	3.1	1.4	45
Epidemic and infectious diseases.....	2.7	3.0	111
Non-venereal diseases of the genito-urinary system and annexa.....	2.5	4.4	176
Diseases of the eyes and ears.....	1.5	2.5	167
Diseases of the bones and joints.....	1.3	1.0	77
Cancer—all forms.....	.6	.9	150
Other non-respiratory, non-digestive diseases.....	4.7	17.2	366
[Non-industrial] accidents.....	8.8	8.9	101

Number of years of life under observation: males, 336,525; females, 39,967.

TABLE 3

Frequency of Cases of Sickness Including Non-Industrial Accidents Which Resulted in Disability for More Than One Week, and Number of Days Lost From Work on Account of Such Cases, by Age, Among Male Members of the Employees Benefit Association of a Farm Implement Company. Experience of Employees at Three Plants of the Company, 1916 to 1920 Inclusive.

Age Group	Number of years of life under observation	Number of cases	Number of days lost from work on account of those cases	Annual number of cases per 1,000 males	Annual number of days lost per person on account of these cases
Under 25	38,672	6,949	208,061	179.7	5.381
25 to 34	5,578	1,059	22,946	189.9	4.114
34 to 44	14,144	2,463	59,218	174.1	4.187
44 to 54	9,945	1,760	48,119	177.0	4.839
54 to 64	3,115	957	33,253	167.1	6.501
64 and over	2,906	710	44,545	244.3	15.329
Unknown	984	0	0	-----	-----

TABLE 4

Frequency of Cases Causing Disability for More Than One Week Among Males, by Associations Which Reported Continuously, 1921 Through 1926.

Associations arrayed according to their frequency rate of sickness		Number of years of life under observation 1921-1926	Number of cases of sickness and non-industrial accidents	Annual number of cases per 1,000 men
Total for associations which reported continuously through 1926		412,474	38,040	92.2
Association No. 1		28,269	4,897	173.2
" 2		22,030	3,306	150.1
" 3		15,048	2,055	136.6
" 4		3,649	489	134.0
" 5		2,977	391	131.3
" 6		29,494	5,003	129.0
" 7		6,394	791	123.7
" 8		7,493	751	100.2
" 9		7,742	755	97.5
" 10		62,000	5,376	86.7
" 11		20,551	1,663	80.9
" 12		6,383	494	77.4
" 13		18,041	1,368	75.8
" 14		26,984	6,469	74.4
" 15		57,525	3,290	57.2
" 16		37,895	2,142	56.5

sometimes found that there is no common basis for comparison on account of the diverse methods and practices employed in the classification of ailments causing disability. In classifying the nature of the illnesses as diagnosed by physicians, the Manual of the International List of the Causes of Death, third revision, Paris, 1920, should be used in accordance with the recommendation of the committee on industrial morbidity statistics called together in 1925 under the auspices of the National Industrial Conference Board.¹

TABLE 5

Frequency of Cases of Sickness (Including Non-Industrial Injuries), of Specified Duration in 1925-1927 Inclusive Compared With 1922-1924 Inclusive.

Experience of Male Members of 15 Sick-Benefit Associations Which Reported Their Cases to the Public Health Service Throughout Both Periods.

Duration of disability in calendar days	Annual number of cases per 1,000 men		Number of cases	
	1925 to 1927 inclusive	1922 to 1924 inclusive	1925 to 1927 inclusive	1922 to 1924 inclusive
All durations.....	96.5	98.4	17,496	15,569
8 to 13 calendar days.....	29.0	32.0	5,259	5,061
14 to 20 " ".....	20.7	21.3	3,755	3,374
21 to 27 " ".....	11.6	11.5	2,103	1,783
23 to 34 " ".....	7.2	7.4	1,312	1,173
36 to 41 " ".....	5.4	5.4	973	853
42 to 48 " ".....	4.1	4.3	751	681
49 to 55 " ".....	3.7	3.1	670	497
56 and over.....	14.8	13.6	2,673	2,147
Number of years of life under observation			181,238	158,279

For a group of associations having the same waiting and benefit periods and using the same disease classification, the requirements for current knowledge of disease prevalence are few, as indicated below:

- The average number of members each month who are entitled to benefits when sick, classified according to sex.
- The number of male and number of female cases which began during the month, classified according to a condensed list of the diseases causing disability.
- The number of days lost during the month, classified in the same way as the cases.
- The number of payable cases per 1,000 males and per 1,000 females, and the number of days lost per 1,000 from each of the diseases in the condensed list.

A monthly morbidity report containing substantially this information is in operation in all plants of the Bethlehem Steel Corporation. If more associations would prepare such reports for their own use, and forward a copy each month to the Public Health Service, we could publish more promptly the monthly analyses of sick-benefit association reports which we plan to inaugurate soon in addition to our annual review of the data.

¹The Manual of the International List of the Causes of Death, third revision, Paris, 1920, may be procured from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 70 cents per copy.

this brief discussion I hope I may have conveyed the impression that there are some glimmerings of sense in the attempt to collect uniform statistics of sickness and that the statistical method may be employed to good advantage in the study of health problems in industry. The facts of sickness are especially desired by those who hold the vision of employee sick-benefit associations of the future powerful organizations working for the prevention of disability among their members.

CHAIRMAN McEWEN: I think we were all very much interested in Dean Brunson's talk. Is there any discussion?

MR. SCHOUTY (Bethlehem Steel Corporation): Mr. Vary is the man who got interested in all this. You know, you never know where you are going unless you have a guide, and statistics are a pretty good guide. Nowhere are the hazards of sickness in abundance than in the steel industry. There must be some way of cutting down, not only the accidents, but the sickness, and I believe that the first step is the compiling of uniform statistics in all branches of industry.

we would make a more serious effort to really try to assemble the facts we need to be making a beginning. Try to see if the health problem will not be helped by the collection of statistics. See if it will not help in your own industry.

MR. JOHNSON (Hoover Company): I was just wondering if it would be in order if we suggested that each member here be sent a blank on which he could write all the necessary information; then also it could be used to put down questions that might be answered at the next meeting or possibly our Service Committee could answer them; and this would give those men who come from great distances a chance to have presented beforehand the questions that are on their minds; and in this way we would be sure of having them brought before the meeting.

CHAIRMAN McEWEN: I think I have a satisfactory answer to that, because Dean Brunson is to be chairman of this committee next year.

Now we will go on with our program and the next speaker will be Mr. Henry Jackson, of the Social Engineering Institute, New York City.

Should Pension Plans and Relief Plans Be Combined for Greater Economy and Effectiveness?

By HENRY E. JACKSON

President, Social Engineering Institute, New York City

It was a significant remark of Robert Louis Stevenson in which he said: "We are not blamed for doing wrong; we are blamed for not doing right." The difference is great. It is all the difference between plus and minus.

An employer is not to be blamed for operating a Relief Plan separate from his Pension Plan. He is to be blamed, in my judgment, for not combining it with his Pension Plan. Therefore, if I had formulated the question assigned me for discussion I would not have said, "Should pension and relief plans be combined?" but rather, "Should relief and pension plans ever be separated?"

Instead of asking, "Should a man's arm be combined with his body?" we would more properly ask "why a man's arm should never be separated from his body." The answer is that a man's arm is more useful when united to his body.

The illustration of a man and his arm to suggest my conviction that Disability Insurance and Life Insurance are organically related to a Pension Plan is that a man's arm is related to his body, and that what economic necessity has put together industrial corporations ought not to put asunder.

For the sake of clarity in this discussion let us define our terms. Sick benefits, usually covered by what is called Relief Plans, should be called Health Insurance, just as a death benefit is called Life Insurance, and which our prevention work is now beginning to make Life Insurance in fact. By a Pension Plan I do not mean a charity or dole but what I prefer to call an Economic Independence Plan based on annuities guaranteed by a reserve, an honest cooperative plan on a 50-50 basis; a plan that is contractual and supported by insurance, the employer's share of the cost regarded as a necessary operating expense and a proper charge against the depreciation of human machinery. This is quite different from the usual type of pension plan. In fact it is not a pension plan at all but something very much better and it is inexpensive.

I assume then that in regard to the three great hazards that all men face in common, death, disability and dependence in old age, our aim is to antidote these hazards with life, health and independence. I can most briefly indicate my opinion that these three programs are organically related by using a little word picture. The conception of a unified plan on the independence instead of the pension basis may be indicated as follows:

A fairly long road is winding up hill all the way. At the end of the road is a modest little cottage, with a woman standing in the doorway and a grandchild by her side. The name given to the cottage is "Economic Independence." At a turn of the road on one side is a dark clump of trees, out of which is peering a highwayman called "Death." At a turn of the road on the other side is a forbidding forest, in which is lurking another robber called "Disability." Where the road starts stands a fine type of artisan, intelligent enough to be thinking of the day after tomorrow. He is in the attitude of beginning the journey over this road. By his side and shaking the workman's hand is his employer in the attitude of giving him a fair start. He hands him a document like a passport to the journey—it may be an Independence Bond or an Insurance Policy—something to shield him from the dangers he may meet on the way. It is the workman who is taking the journey; the employer is assisting him to make its achievement possible. The suggestion is that the aim of the employer is to stimulate his employees to set their feet on a purpose road leading to a big goal and is willing not only to open the road to economic independence but also assist them to walk in it.

This conception clearly implies that the two protections against death and disability should be attached as temporary provisions to the retirement plan and discontinued when their temporary purpose has been served, that is, when the workman arrives at his desired goal.

The illustration of a workman traveling towards a reasonable degree or at least minimum degree of economic independence after a life-time of work with the cooperation of his employer makes sufficiently clear the general principle that economic and efficient reasons require a unified plan and that relief plans and pension plans naturally belong together. But the economic and moral advantage of a unified and related program may be still further exhibited by a Bill of Particulars, such as the following:

Pension Plans On Scientific Basis

1. Pension plans are, or are beginning to be, scientifically calculated on a sound actuarial basis. Relief plans are not. If the two plans were united, relief plans could more likely be put on a sound financial basis, which is a universal and vital need. Recently we analyzed the relief department of a large industrial concern. It had a balance of more than \$200,000 in its treasury. It was thought to be sound. As a matter of fact it was bankrupt with a deficit conservatively estimated to be one and a quarter million dollars. That is, if the relief department closed

business now and settled its accounts, it would require over a million dollars to meet the estimated obligations to which it is committed. If the estimate proved to be twice too high the deficit would be bad enough. Such a situation may involve a heavy loss. After a workman has contributed his dues to the Disability Fund during several years without drawing anything from it and then becomes disabled it is only a matter of paramount importance but is a moral requirement that he should have the guarantee that there is enough reserve in the fund to furnish him the promised benefits during his disability. The failure of a relief plan at this time is ethical bankruptcy.

By organizing all three benefits into a unified plan we give to each its relative importance. Of the three hazards, sickness is preventable, death may or may not be an



age, but dependence in old age is certain humiliation. Protection against dependence in old age, therefore, is the Hamlet of the play and deserves the most consideration. The other two benefits should be treated as secondary and temporary attachments to the pension plan. In organizing a relief plan it makes no difference in the world whether we put pension benefits in the first or in the second place.

If all three protections were organized into a unified program, it makes possible the suggestion that the disability protection should cover an employee's working life and his disability benefit should last until his pension benefit begins. This is as it should be. Disability from sickness or accident may occur at any time during his working life.

If we make the disability benefit cease when the pension benefit begins we naturally eliminate the distinction between temporary and permanent disability. This also is as it should be. As a matter of fact it is a distinction without

a difference. It is not possible to say what disability is temporary and what is permanent. If an employee were sick three months and recovered, his disability is temporary. If he were sick three years and recovered, his disability is likewise temporary. The only disability which properly may be pronounced permanent is death. Therefore it seems logical to treat all disability as one thing and cover it with a protection during the time when employees are exposed to the hazard, making the disability benefits cease when the pension benefit begins, at which time such protection is no longer needed.

5. Life insurance should be a provision attached to the Retirement System because life insurance and annuities are exact opposites and antidote each other. If John Doe dies you lose on the Life Insurance and gain on the annuities; if he lives you lose on the annuities and gain on the life insurance.

6. Disability protection should be attached as a provision to the pension plan, because it is the most troublesome part of the program and can be handled most effectively as part of a unified program. Life insurance is the simplest and least complicated part. Annuities while complex are not difficult to calculate; they are based on the purchase of future annuity dollars, distributed by a predetermined schedule. But disability protection involves so many local uncertain elements, that it requires a prevention program in which employee participation is enlisted to make it a financial success, and inasmuch as most pension plans in American industries are operated by employers themselves, so likewise disability or relief programs can be operated more efficiently by employers and employees cooperatively than by any outside underwriter.

7. Assuming that an industry has a large enough number of employees so that it can safely pool its own risk and safeguard itself against a catastrophic hazard, it can operate its own plan on the trustee basis and save itself a very considerable amount of money. In this case it will be a particular advantage to unify the three parts of its program setting up all three reserves as one reserve. This will greatly outtress the security and protection back of each part of the program. A poor experience in one part of the program will be covered by a surplus reserve in the other two parts.

Inasmuch as the above brief bill of particulars exhibits the obvious advantages of organizing all parts of a relief plan into a unified program, there must be some reason why such a policy has not hitherto been generally adopted. I venture to think that the chief reason is the prevailing impression that a scientific pension plan is expensive and therefore cannot be united with so called relief plans. Therefore, if the advantages of a unified program are to be made available, it is essential to correct this impression, which I regard as false. At least no employer is in position to say whether or not a scientific pension plan is expensive until he knows what his present pension cost is and almost no employer anywhere now knows what his present pension cost is.

Artemus Ward made a wise remark when he said, "It isn't the people's ignorance that makes the trouble but that they know so many things that aren't so." The greatest stumbling block in the way of sound and effective retirement systems is that employers know so many things about pensions that aren't so. For example, one of the widely held opinions which I regard as mistaken are as follows:

1. That a scientific pension plan requires a large outlay of money.
This is not the fact.
2. That the cost of such a plan increases indefinitely in the future.
This is not the fact.

That such a plan commits an employer permanently to an unknown obligation. This is not the fact.

That such a plan always means a large increased expense over his present cost. This is not the fact.

necessary to eliminate false ideas before we can adopt true ideas. We are led to demonstrate to the point of mathematical certainty that these four long accepted opinions about pensions are contrary to fact. It can be shown that the only type of plan which American industries are willing to consider "liability" as commonly understood is a myth; that the maximum cost for many years can be definitely determined and budgeted; that the actual cost that the net cost can be exhibited every thirty days.

have recently made such a demonstration for a large concern with 40,000 employees, for which we drafted a unified program such as we are discussing in this paper. The benefits provided are: A monthly retirement income on the average at one-half of an employee's wage; Life insurance coverage ranging from \$5 to \$45 per week, lasting as long as the disability lasts and ceasing only when the pension benefits begin, which is an unusual and generous provision.

annual cost to the employer for this program is: Life insurance $\frac{3}{4}$ of 1 per cent of payroll; Health insurance $\frac{4}{10}$ of 1 per cent; Pensions 1 per cent.

low cost of a scientific pension plan is so important for our discussion that I assist your memory to bear it in mind by the use of an illustration. Professor Huxley, in one of his college examinations, asked a student, "What is a lobster?" The student answered, "It is a red fish that moves backwards." To this Huxley replied, "Your answer is entirely correct except for three things; it is not a fish, it is not red, and it does not move backward." The trouble with this student was that he knew so many things that aren't so. If many employers were asked what a pension plan is they would probably answer, "It is an expensive charity that increases annually in cost." This prevailing opinion is correct, except for three things; it is not a charity, it is not expensive, and it does not increase annually.

my conviction that a permanent scientific and inexpensive solution of the pension problem is now available, so that the way is open for the unification of our protection program as recommended in this paper. I believe the "Relief" and "Pensions" should be discarded in order to eliminate the idea of charity which is distasteful to self-respecting American workmen and employers alike both to the benefactor and beneficiary. We should adopt some form as an "Economic Independence Plan," which we have persuaded one industry to adopt.

organization of such a unified program is primarily more of an engineering problem than an actuarial proposition, important as the actuarial calculation is. It is a task of social engineering, which is engineering applied to human machinery. We have organized such a unified program and coupled with it a prevention education program, then it is exhibited for what it really is, a big thing and not a little thing, a program which can be utilized as a natural channel inside the industry itself, to eliminate waste, prevent sickness and accident, enlarge production, increase profits, promote the partnership spirit, practice reciprocity. It is helpfully the most vital and creative factor in any industrial enterprise and the most expensive item on its budget. It is not only the right method but it is the right methods always pay in the long run.

CHAIRMAN McEWEN: I am sorry that we cannot discuss this, but the time is very short and we must soon adjourn. We will hear from Mr. G. F. Close, who will tell us what he thinks we should accomplish during the next year.

What Should Be the Burden of the Employees' Benefit Association Section's Program for 1929?

By GILBERT F. CLOSE

Commonwealth Steel Co., Granite City, Ill.

I suppose this question could be interpreted in two ways. First, "What subjects should be considered on the program of this Section at its meeting in 1929"—or, second, "What in general should the Employees' Benefit Association Section strive to accomplish next year." I have chosen the broader interpretation of the subject because, of course, the question as first interpreted would be no more nor less than the work of the next year's program committee.

To supplement and confirm my own ideas, I wrote to some of the officials of the National Safety Council and to some of the men who have been active in the Employees' Benefit Association Section in recent years and asked their opinions. What I shall say is based in part upon the ideas of those who have been most actively connected with the Association, and I wish to acknowledge the advice and assistance which they have given me.

I don't think we have yet come to realize fully the importance of a sane and constructive health program in industry. For many years we have been seeking to promote safety and reduce or eliminate accidents in industry, but it is only since the recent development of Employees' Benefit Associations that we have come to realize at all what a tremendous field there is in promoting the individual health of men and women in industrial life.

One company that perhaps I know more about than any other, had the experience in 1927 of having 3,361 days lost from work because of injuries to its men. During the same period, the same company, through its Benefit Association, discovered that 13,143 days had been lost on account of sickness, and this last figure doesn't include any lost time on account of illnesses which were less than seven days in length. It is, I think, very conservative to say that for every day lost on account of industrial accidents, seven or eight days are lost on account of sickness. On the basis of these comparative figures, we can all appreciate what an important problem the health of our employees is:

In my opinion, this one matter of seeking to safeguard the health of our employees should be the real burden of this Section of the National Safety Congress for next year. It is not enough for Employees' Benefit Associations to pay benefits to its members when they become sick. That is more or less of a routine matter. The real problem is to devise ways and means of conserving their health.

It has been the feeling of several men who have been active in the Employees' Benefit Association Section, that this Section has lacked continuity and that there has been very little to keep the Section and its problems before its members during the intervals between the annual meetings. In other words, a small group of men get together before the annual meeting and prepare a program which may or may not be adequate, and after the annual meeting is over, the Section goes into a state of coma, to awaken in time for another spurt before the next annual meeting.

I believe our Section would render a very much greater service if its activities could be continued throughout the year and from year to year.

It has been my fortune to be the chairman of the Employees' Publication Section for the past year, and so I am quite familiar with its activities. What success that

on has had has been due largely to the fact that we have had an excellent *Letter* from month to month, a well-written article each month on Employees' cation problems in the *National Safety News*; we have had for several years ze contest for the best publication, we have also held at least one sectional ng during the year, and in these and other ways have kept a very considerable er of editors interested and active in the work of the Section throughout ear.

n wondering whether the burden of the Employees' Benefit Association Sec- program for 1929 should not be the problem of keeping the work of the ation going throughout the year and rendering service to our various benefit ations with a more complete and varied winter program.

now, for example, that the *National Safety News* would be very glad to e a page to Employees' Benefit Associations if we could secure someone of members to write such a page in which up-to-the-minute discussion of Em- s' Benefit Association problems could be presented.

ow of no better way to keep up the interest than by the establishment of the ly *News Letter*. Many sections of the council have found this a very useful o render valuable service, and if we had a medium through which our various : association officers could discuss their problems, ask questions which could wered, and present their experiences for each other's benefit, it would surely itself to be most worth while and would tend to keep the Employees' Benefit ation Section active during the whole year.

a wondering also whether it would not be feasible for this Section to hold al meetings during the winter, perhaps one in the East and one in the middle where officials of the benefit associations could get together without so much e as is involved in attending a National meeting, and hear important prob- issussed, which would help them in their work. It has been the experience Employees' Publication Section that regional meetings are very much worth f they are not overdone, because they do make it possible for a great many nen to get together for exchange of ideas, for helpful discussion, and for tions toward better work.

e could have a monthly *News Letter* to provide a channel for the exchange ormation, we as a Section, might very properly appoint several committees e studies of different problems connected with Benefit Association work. ample, we might have a committee collect and analyze data, which would e something as to methods of doing business in Employees' Benefit Associa- and the costs of doing business. Another committee might be appointed to . serious study of some one health problem, as for example, tuberculosis, means of combating this disease. Another committee might work out some ing data on the problem of the employee who is still disabled and unable to fter his benefit period has lapsed. In many associations, this is a very problem. In this connection, the problem also comes up of hospital expenses er unusual expenses which cannot be taken care of from the usual weekly . There are a thousand such questions which it would be well to consider ich would make very interesting material for a series of News Letters, ne of them might very well be published in pamphlet form like the Safe s Pamphlets of the National Safety Council.

one considers the largeness of the problems involved, one is almost tempted whether the problem of preventing sickness and conserving health in industry t as important as the problem of safety itself, and whether the Employees' Association Section should not function actively from the Headquarters of onal Safety Council more or less on a par with the safety program itself.

the work of Employees' Benefit Associations may not technically be classed y work, it is closely allied with it, and there are certainly great advantages affiliated with such a strong, well established, and progressive organization

as the National Safety Council. And the annual meeting of this Section as a unit of the National Safety Council, gives many men interested in benefit association problems, the advantage of combining attendance at this Section with meetings of other sections in which many of them are actively interested.

However, as mentioned above, there is a distinct advantage in Sectional meetings, and in this connection, it is interesting to note that Mr. Harold A. Ley, president of the Life Extension Institute, is endeavoring to bring about a National Employees' Benefit Association conference once each year. This Section might very well keep in touch with the movement and develop a spirit of cooperation between the two organizations.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Employees' Publication Section

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Committee Chairman—NOLAN, Jewel Tea Company, Chicago, Ill.
Committee Chairman—H. P. DUTTON, McGraw-Shaw Company, Chicago.
Committee Chairman—BERT F. CLOSE, Commonwealth Steel Company, Granite City, Ill.
Committee Chairman—WILKINS, General Electric Company, Schenectady, N. Y.

Retiring Officers

- Chairman*, G. F. CLOSE, Commonwealth Steel Company, Granite City, Ill.;
Vice-Chairman—Railroads, L. B. Sisson, The Pennsylvania Railroad Company, Pittsburgh, Pa.; *Vice-Chairman—Petroleum*, C. A. WARD, The Pure Oil Company, Columbus, Ohio; *Vice-Chairman—Automotive*, V. H. KUPFERER, The Studebaker Corporation, South Bend, Ind.

Corporation, South Bend, Ind.; *Secretary*, RUTH E. CADE, A. E. Staley Manufacturing Company, Decatur, Ill.; *Program Committee Chairman*, C. E. KANE, Illinois Central System, Chicago, Ill.; *Publicity Committee Chairman*, C. WALTER SIEBEL, Oscar Heineman Corporation, Chicago, Ill.; *Membership Committee Chairman*, RUTH E. CADE, A. E. Staley Manufacturing Company, Decatur, Ill.; *Service Committee Chairman*, L. H. McREYNOLDS, Jeffrey Manufacturing Company, Columbus, Ohio; *Judges' Committee Chairman*, H. P. DUTTON, "Factory," Chicago. *Executive Committee*: THE OFFICERS AND ERNEST AUGUSTUS, Mead Pulp and Paper Co., Chillicothe, Ohio; R. H. FERGUSON, Bureau of Safety, Chicago; MARGARET T. STEVENS, The Baltimore and Ohio Railroad Company, Baltimore, Md.

October 3, 1928

GILBERT F. CLOSE, Chairman

Editor "The Commonwealther," Commonwealth Steel Co.
Granite City, Ill.

The first session of the Employees' Publication Section at the Seventeenth Annual Safety Congress was called to order at two o'clock by the chairman, Gilbert F. Close, Commonwealth Steel Company, Granite City, Illinois.

CHAIRMAN CLOSE: As chairman of the section for the past year, I want to make a brief report on our activities. Those of you who attended the meeting in Chicago a year ago will remember that the gentleman who was elected chairman of the section was Mr. R. H. Ferguson, and that I had the honor, as well as the pleasure, of being elected general vice-chairman. It seemed to me at that time that I had had a very delightful office thrust upon me, with a pretty good sounding title and no work, and everything was lovely. But about a month or so after the meeting Mr. Ferguson wrote me a letter and said that he was very much afraid he would have to give up the chairmanship of the section, and he called a meeting of the Executive Committee, and I found myself, with a job that really had some work connected with it.

We had a regional meeting last March in Saint Louis which was attended by 50 editors and at that time we had a very interesting and successful meeting. The papers presented and the discussions held were considered extremely helpful by those who attended. Altogether it was one of the best regional meetings which this section has held.

During this year we have had an unusually successful series of news letters gotten out by our Service Committee under the chairmanship of Mr. L. H. McReynolds, and I think all the members of this section owe Mr. McReynolds a vote of thanks for the fine way in which he has conducted this part of our section's activities. Mr. McReynolds, I think, did a good deal of the work himself, but he showed a magnanimous spirit and invited the other members of the section to edit letters for him or in his place, and two of the letters during the past year were edited by others. One letter by Mr. J. G. Brandt, of the J. L. Clark Manufacturing Company, of Rockford, Illinois, and the other letter was edited by Mr. F. O. Wyse, of the Bucyrus Erie Co., Milwaukee, and a group of Wyse editors. So in the *News Letter* the past year we have had a variety. We have sent very helpful, interesting, and worth while communications every month to our members.

In this connection, too, I want to say a word about the work of Miss Anne W. Buffum, of the Hooker Electrochemical Company. Miss Buffum undertook the difficult task of volunteer critic. She took various magazines from time to time

criticized them, publishing the criticisms in the *News Letter*. I think her criticisms were always kindly and also helpful. If she found anything she didn't like she didn't hesitate to say so, but she conducted that rather unique work in a very interesting and a very fine way. We are hoping that she will tell us something about it during our meeting.

I want to mention, too, another piece of work which was carried on by the section this year, by one of our committees but chiefly by Mr. R. G. Conover, of the Hale and Towne Manufacturing Company. Mr. Conover sent out questionnaires to something over 300 editors and gained some very valuable information, and we are going to ask him to tell us a little about it during our meeting. This was all done voluntarily and to send out circulars and to classify the replies received from a large number of editors, is a pretty big job.

I think I should also mention the work of our Judges' Committee. You know we have a prize contest, and we have judges who classify the publications of our members who enter the contest, and it is some job to pick the winners, and our Judges' Committee this year has done a big job, and we are grateful to them.

After all, one of the really important jobs of the section is the job of the Program Committee, and I cannot stop this little eulogy without saying a word of appreciation to Mr. Kane, of the Illinois Central, and his associates on the Program Committee, for the painstaking and conscientious work, and intelligent work they have put forth in arranging our program at our meeting in Saint Louis, particularly the work which they have done in arranging our program for the meetings.

I want at this time to express our appreciation and pleasure that so many of you are here today to attend this meeting. We hope you are going to get real education and help from the papers and from the discussions and we hope that you will all continue to be connected with this section. There are several hundred, perhaps there are a thousand employees' publications of one kind or another in different industrial and railroad and other organizations, and we haven't counted anything like the complete number. I hope that as time goes on this section will extend its influence and will reach out so that it will touch all of the employees' publications throughout the whole field.

We are going to begin our regular program this afternoon by a paper on the "Make-Up and Art in Employees' Publications," by Mr. Ernest Reidel, an artist and writer of New York City.

Make-Up and Art in Employees' Publications

By ERNEST C. RIEDEL

and Promotion Director for The Stillson Press, Inc., of New York City

It might be possible to view cross-sections of the minds of those planning the piece of printed matter, they would be as dissimilar as the print-estimates that are figuring on the same "printed matter." They are expected to have their readers' interest uppermost in their minds. They are buyers whose ideas are always acknowledged by the printer. Why, then, the buyers know more than anyone else what will hold their interest!

The printer is inveigled into the fog of the buyer's problems. He "works him;" he is careful not to rub the hair the wrong way; he tries to keep the buyer purring. Now the job is off the press—and everybody is satisfied.

But, after many such experiences, we kick off our traces and, in groping the progressive direction to follow, we ask ourselves what it is all

about: These editors and planners of printed publicity are all highly intelligent, well-trained, wide-awake men who recognize the science of having their efforts look interesting, in order to capture a broader audience.

They all have the same formula, haven't they? Well, hardly. And here is how we prove it—specifically—and the demonstration applies to any line of business, any kind of advertising.

A demonstration applied to a direct-mail piece is difficult to find, for the reason that the advertiser lays out his material once—and generally prints it but once. Surely no advertiser ever treated the same text in twenty-six different ways. However, a demonstration of how the minds of various planners of printed material work is afforded by the twenty-six magazines of the Bell System.

The telephone business has practically the same class of workers throughout the land. Yet, in considering the whetting of readers' appetites by the style of approach, every editor had a different opinion of how it should be done. Of the twenty-six magazines issued by as many different telephone companies in the United States, no two employed similar methods of attracting the reader when all of them printed the same text. Each took a different angle, a different aim. The same condition applies to the advertising of any business. Perhaps this mass of divergent ideas of how to capture reader-interest is a healthy condition. We hear "contrast," "variety" mentioned. Now the vital question is, which comes closest to being one hundred per cent correct?

We read many theories. In some cases the expounders of these theories do not apply them to the very printed message which contains their "theories." So we gasp and "blunder on," hoping for the millennium.

You give the reader meat, proven nourishment based on facts that make him remember you. You have him eating—but, to create that appetite you had to appeal to his eye. So, therefore, friends, we know that the layout is the ingredient that can make or mar the entire menu. The appalling neglect of this vital factor in printed salesmanship is a crime that is daily committed.

The arrangement of cuts is given too little real thought. Yet it has a great bearing upon its chances for compelling reader-interest. With the same identical cuts a real book-architect can produce an entirely different and more attractive book. Like a cook with the same ingredients, or an architect with the same building materials, the method of handling is what produces the best result.

Always consider every two pages as one and make them balance. Avoid spottiness, which bewilders the reader. Do not use too many trick shapes upon a pair of pages. Consider the heading, its arrangement and size, in conjunction with cuts upon the same page and its opposite.

The treatment of the heading is another contributing factor in clinching reader-interest, which is too often overlooked.

You have a carefully worded interest-arousing heading. You believe its intrigue sells the story, and that it will lead the reader into the story to find the answer to the question in his mind which the heading has aroused. The heading contains or implies a "how," a "why," a "when," a "where," a "which" or a "who." It does not begin with that interest-dampener "the," which often leads to betrayal in the heading of the subject of the story.

Very good! Now one good turn certainly deserves another. The importance of the heading's layout is too often overlooked. The life of the story's interest is staked on it. The first impression, the introduction, decides whether or not the reader will give his time to the text.

Give the heading air! Have it narrower than the width of the text, no matter how long the heading is. Let its shape be symmetrical, so that it lead the reader into the text. Above all, do not let the last line be so long that it abruptly separates the heading from the text. Let it be of equal length, or preferably shorter than the balance of the lines in the ding.

Do not use too many caps. They become tiresome and difficult to read, they run together unless widely leaded. For main headings, caps lend more dignity than lower case. They form a smoother, more decorative type than the jumpy uprights above and below a line caused by lower-case letters. This applies to main headings of a few words only. For the lengthier headings or sub-headings, lower case is more legible and saves space.

If a heading is to be at the top of a page, sink it to gain white space; lead the lines, and be not afraid to take depth for the heading above and below it.

If a cut is also used with the heading, put it above the heading. There should be no depressing ceiling above the picture unless its size is sufficiently strong to support a heading above it. A picture gains more value in repose if, like a painting, it is hung in the niche it deserves, with no ding above it to grudge the space the picture occupies.

Never allow the running head to appear above the main heading. Its punctatory use has sometimes caused it to read itself into the main heading under it.

The omission adds white space above the main heading and sets it off. Running heads are barnacles whose monotonous repetition unconsciously kills reader-interest. Put them where they do no harm—on solid pages of body-type or pages where cuts are not at the top of the page.

The initial letter at the beginning of an article should never be smaller than the caps of the main heading—generally larger. Ornamental, elaborate initials are dangerous if cuts appear on the same or opposite page. They emphasize the spottiness of a page. Their purpose, that of adding life to page of type, is overdone if cuts are also used upon the same page.

The value of proper margins is also often overlooked.

Of the twenty-six magazines previously referred to, all dealing with the same general subjects and appealing to the same general class of audience, two have the courage to take enough margin. It need not be extravagant. As little as an eighth of an inch more white space around a page of type makes a greater difference than one would suspect. Try it. The frame of white space is astonishingly potent in the relief it gives a page. Yet it is distressing to note so few planners of printing who set off pages and do not crowd pages with so simple a treatment.

It is further astonishing to note the many advertisers who are overlooking "little things" mentioned in this article.

As they are little things, but after they are recognized, established, and put into use they soon prove their bigness, their value and place in the process of selling by the printed word.

Let us see a more established use of these "little things"!

AIRMAN CLOSE: Mr. Reidel, we certainly appreciate the straight-forward and useful, practical suggestions which you have given us in this important part of the program.

Very likely some of you have some specific questions you would like to ask Mr. Reidel, or perhaps there are some matters that he discussed that you would like further information on.

MR. MARSHALL (Firestone Tire and Rubber Company, Akron, Ohio): I don't know whether this can be termed a question or discussion. Mr. Reidel confined his remarks very largely to the employees' magazines.

My experience in a great number of publications that come to my desk is that there is an increasing number of organizations who have their magazines more along the line of newspapers. I particularly have in mind the Pennsylvania Railroad. Their publication is entirely newspaper style, an eight column paper, and I recall others, our own publication the *Firestone Non-skid*, as some of you may have seen, and such publications as the Hoover which is rather smaller than a newspaper but still made up in newspaper style.

This occurs to me because Mr. Reidel spoke of the headings not telling the story. In house publications the great point of resistance is that you give them away. That is to say you have to make them interesting enough for the employee to take them. We have column headings that attract the eye on the stand. Our papers are in racks to be drawn from, and the very same psychology applies as in the case of the newspaper which has a vastly greater circulation than most magazines because they catch the eye with their headlines, and that has been in a way the basis, I think, of making up the different forms of these types instead of the magazine type.

Is Mr. Reidel inclined to give his thought on whether the newspaper style is better than the magazine style?

MR. REIDEL: Magazines come every month and the reader is supposed to be receptive and sit back and take it home by the fire and read it. But the newspaper comes out every day. There may be some that come out every month, but if here are I don't know about them.

The object of it looking like a newspaper primarily is that it is newsy and interesting, and it is in a different category entirely than the magazine. Its object is to be a perfect newsy magazine. There may be some last minute news items in it, marriages, births, and those things, but generally speaking they are articles that can be used from one month to another. They may be seasonable at best, but they are not news items.

A newspaper has to be gotten out very quickly, and I am reminded that several company publications in the past have contested for the best looking newspapers. Some newspaper in the West got this prize. I remember it well, as it was simply the old story brought out in a new form.

Don't make your stuff, even though it is a newspaper, look like it was dumped here. You can in a few more minutes, with scissors and paste arrange your page with balance. The main head up here, streamer, sub-heads, cut, cut, cut, and balance them. Newspapers should balance singly, of course. You cannot in the case that it is gotten out and size, have two pages that balance. One doesn't look at a newspaper as one page, but you do a smaller magazine. Plan a single page, however, and put it on a center line. Let both sides balance, and then you have a pleasing page. Not too many different styles of type, either, and you have to tell the subject of your story because you have a lot on a page.

If you asked a lot of questions, it wouldn't be clear, but you have got to have something on that one page that is going to interest that individual reader. You don't want to know whether all or none is interesting to the reader, and the only way you will get him to feel that unconsciously it is interesting is by balance and white space and nothing that is going to jar his sensitiveness, even though you may think he hasn't any. The crudest laborer has.

In the case of this one magazine that I referred to before, when I pointed out to the editor that he had a brutal, heavy caption here that was supposed to be for a picture, but really belonged to that one, it was a little confusing. Why don't you arrange them even, and make it easy for him. You are even requiring more

gence for this farmer to follow you than the other magazines that have gent audiences and are planning it with good taste.

M. WAGNER (General Electric Company, Schenectady, New York): I am glad been brought up, because it brings out a distinction I have never seen brought efore, and that is that there are two different functions to most employees' zines. The first is the news function, which none of us can avoid even h most of us come out once a month.

instance, if the company announces some new pension scheme or something at kind, it has got to come out in the employees' magazine and there is no in disguising the nature of the story in the head, because it is absolutely ative to get as much in the headline as possible as there are always a few will not read the story. We all know that none of our papers are read by one to whom they are given, and those people have got to find out about articular point.

t is a new pension scheme, they have to be told the essential things of the n scheme in as few words as possible and then those who are interested in it on and read the article, and it will gradually seep out, and then of course is another type of story which the informative headline is not good for. is the surprising story.

pose Bill Jones eats 45 fried eggs some noon. The nature of that story is hat you are going to word your headline so that people will wonder who nes is and what he is, and then they will read the rest of the story.

n there are those headlines which Mr. Reidel spoke of, and I don't believe are enough of those used. Most of your magazines are, in addition to their functioning, informative in a general way, and that is the type that Mr.

is speaking of mostly. We don't seem to have clearly in mind the fact e are trying to do two things at once in the magazine. If more attention is to the point that we have our news side and also our informative side, I we will have better results.

. FISH (*National Safety News*, Chicago): I have two cuts to put on one Would you put the larger or the smaller one at the top?

REIDEL: I would put the larger one at the top, but it depends a great deal he color of the cut. That is, whether it is a dark or light one. If it is very t will dominate the little one at the bottom and fight him. If it is a light I would put it at the top, or if it is a dark one, at the bottom. I go by ue of the picture as a whole. That is a good point, and I am glad you ned it.

etimes I have a nice soft half-tone on one page and I have got to put a line r here. It is full of heavy black lines and is going to hurt this picture, so I em as far apart as I can, and I tone some of them and get a pleasing pair.

LAABS (Seaman Moody Corporation, Milwaukee, Wisconsin): I would ask Mr. Reidel if he prefers sprinkling the cuts through the book or having ges of them or both?

is a discussion we have had many times on employees' publications and we settle the question. Some prefer it one way and some another.

REIDEL: You cannot sprinkle a lot of different cuts all the way through k. If there is one article it depends upon the length of the story, and you all your ammunition. If you group them all on one page, you have two or ages of type.

uld get balance all the way through. I try to have at least one subject on depending, as I say, upon the nature of the story.

LAAB: That is the trouble we have. Most of them are employees' publi- and we don't use stories. They are just news items. We get perhaps two hundred snap shots of men in the plant. They have no relation to s, but they want their pictures printed. One person will group them on

one page or full spread, and another person will put them in between the news items.

We tried to stereotype our work, and we have taken one magazine each month and dissected it in the meetings, and this is one question I was requested to ask. I am the official representative of the group.

MR. REIDEL: Balance; always get them to balance every few pages. You must sprinkle them all the way through. Let each two pages be as one. Whatever you put on both of those facing pages, make them balance.

CHAIRMAN CLOSE: Our next order of business is to give those who are present an opportunity to write down any question which they would like to have discussed at the round table meeting tomorrow. We have a number of blanks here, and I am going to ask Mr. Pulcipher to distribute them. If any of you have any questions to ask, not necessarily in connection with a paper, just any problem that you want answered, write it on this card and somebody in the crowd will no doubt have an answer for you tomorrow.

Our next order of business is the election of officers for the next year. Mr. Boswell is chairman of our Nominating Committee, and I will ask him to at this time present the report of the Nominating Committee.

Report of the Nominating Committee

By FORREST W. BOSWELL

Chairman

The other two members of this committee are Ernest Augustus and Mr. L. H. McReynolds. There was a meeting of the Executive Committee which Mr. Close held today noon at luncheon and some substitutions had to be made.

We endeavored to set up this slate so that we might have those represented who would be active and interested, particularly in this section. We also endeavored, as far as possible, to take into consideration geographical locations. In some cases we could not do that, but we endeavored to work it out so that the committee would not have to travel too far for the purpose of getting together.

The name of the chairman that we wish to present to this Section for next year is Charles E. Kane. He is editor of the *Illinois Central Magazine*. His location is Chicago and he was the chairman of our Program Committee for this past year.

Vice Chairman, Railroads: Thomas E. Owens, Louisville and Nashville Railroad, Louisville, Ky.

Vice Chairman, Petroleum: C. A. Ward, Pure Oil Co., Columbus, Ohio.

Vice Chairman, Automotive: Frank Chiverton, Olds Motor Co., Lansing, Michigan.

Vice Chairman, Public Utilities: Ray Gillan, Bureau of Safety, Chicago, Ill.

I would like to say with reference to having so many vice chairmen, that I think it was three years ago that this plan of having a vice chairman for each of these respective groups was presented. Perhaps this past year these vice chairmen have not functioned as they should. In some instances they did not function at all. The original idea of this set up was that the vice chairmen of these particular groups should promote the matters relating to our Section, The Employees' Publication Section, among the members of that particular group. In some cases they do not have employees' publications, and they are in a better position, perhaps, to recommend and urge why they should be represented as members of this section.

We nominated Miss Anne W. Buffum as the secretary for this ensuing year. She has declined to serve and so we are presenting the name of Miss Ruth E. Cade, of the Staley Mfg. Co., Decatur, Ill., again for the ensuing year.

for the Program Committee, L. H. McReynolds, of the Jeffrey Mfg. Co., Columbus, Ohio, who has rendered such excellent service as head of the Service Committee for the past year. To be associated with him R. W. Liddle, of the Commonwealth Edison Co., Chicago, Ill., and A. T. Irwin, of the Illinois Bell Telephone Co., Chicago, Ill.

Publicity Committee: Chairman, Jack Dempster, Canadian Cement Co., Port Colborne, Ont.; V. H. Kupferer, Studebaker Corp., South Bend, Ind.; L. B. Sisson, Pennsylvania Railroad Co., Pittsburgh, Pa.

Membership Committee: Chairman, S. F. Shattuck, Kimberly Clark Co., Neenah, Wis.; R. G. Conover, Yale & Towne Mfg. Co., Stamford, Conn.; Vern D. Sutton, Postum Cereal Co., Battle Creek, Mich.

Service Committee: Chairman, F. O. Wyse, Bucyrus Erie Co., Milwaukee, Wis.; J. G. Brandt, J. L. Clark Mfg. Co., Rockford, Ill.; J. N. Nolan, Jewel Tea Co., Chicago, Ill.

Advisory Committee: H. P. Dutton. I have shown his connection as the A. W. R. Company, Chicago, Ill. He only devotes a portion of his time in the editorial work of that company. He is on the faculty of Northwestern University.

We have also appointed C. T. Fish, editor of the *National Safety News*, who was a member of that committee this present year. And Gilbert F. Close, of the Commonwealth Steel Co., Granite City, Ill. The committee held a meeting just before this meeting and decided to make him the third member of the Committee.

At the Executive Committee meeting today noon, it was proposed that the past General Chairmen of this Section, comprise the Executive Committee for the ensuing year, to cooperate with the new chairman elect. They will consequently be Forrest W. Boswell, G. A. Doeller, and Gilbert F. Close.

They respectfully submit these names and move their election providing there are no other substitutes.

MR. BOSWELL: You have heard the report of the Nominating Committee. I want to say that I think that committee is a very disobedient and unobedient committee. We had a little conference just before lunch and the question of the membership of that committee for the judging was discussed, and I thought I would give the chairman of the committee very definite instructions as to the name of the third member of the committee, and he comes in and I find that the last word to have a word seems to have the prevailing word and I find myself stuck.

MR. BOSWELL: He suggested Mr. Augustus as the other member, and as Mr. Augustus happened to be one of the members of the Nominating Committee, we didn't agree and we substituted Mr. Close's name.

MR. BOSWELL: Mr. Boswell has moved the acceptance of the report and election of the nominees. Is that motion seconded?

MR. BOSWELL: Are there any other nominations for any of these offices? If anyone wishes to make any nominations from the floor, they are welcome to do it. If there are no further nominations, the chair will put the motion. (The report of the Nominating Committee was accepted.)

MR. BOSWELL: I think we would all like to at least have a look at our new chairman, and I am going to ask Mr. Kane to stand up and smile.

The next order of business reverts to the serious part of our program, namely, reports, and we are to have at this time a paper by Miss Anne W. Buffum.

As you will remember that I said that she had undertaken the job of volunteer critic and criticized some of our various publications in a very interesting and helpful way, and the criticisms were published in the *News Letter*. Miss Buffum is on the program at this time to read a paper entitled, "A Volunteer Critic's Conclusion Concerning the Editorial Content of Employees' Publications."

MISS ANNE W. BUFFUM (Hooker Electrochemical Company, Niagara Falls, York): Mr. Chairman and Fellow Editors and Friends of the Employees'

Publication Section: I think I am perhaps sailing under false colors so far as the program is concerned, since I am listed as a member of the Personnel Department, of the Hooker Electrochemical Company, Niagara Falls, New York.

My resignation from that company took effect last week, when I sought newer, bigger, but not better worlds to conquer. I hope you will pardon me, if, until another connection claims my loyalty, I still refer to our organization and how we do it, as a very small appreciation of four years connection with a friendly and fine company.

A Volunteer Critic's Conclusions Concerning the Editorial Content of Employees' Publications

By ANNE W. BUFFUM

Personnel Department, Hooper Electrochemical Co., Niagara Falls, N. Y.

Editorials are the bane of my existence. I would rather pitch hay than force my flickering intelligence to concentrate upon paragraphs light enough to be read and heavy enough to "mould opinion" as editorials are privileged to do—if they are able. I suspect that at least 50 per cent of the editors here represented would be honest in the confession that a brief editorial causes them deeper and more furrows between their eyes than, say, four pages of "personals." Such at any rate is my frank confession, so I am tarred with the same brush with which I shall decorate my fellow-editors, and must be forgiven for talking to myself.

My first conclusion in making a special investigation for this occasion was that we are a lazy set of thinkers. We will climb chimneys, freight cars, steel girders to get an unusual picture or a novel idea for a story; but when the time comes to concentrate our honest thought upon a single issue, we are prone to fall back on the sage of East Aurora or Dr. Frank Crane or syndicate material for which we pay precious cash from our publication budget.

I have found from study of a most practical survey made for me by the National Industrial Conference Board that of forty-six publications, representing 1,342 pages, about one-twentieth of the material printed was of an editorial nature. Figured accurately it comes to a little under 5 per cent of all the printed matter. That is not much. But, says the *House Organ Review*, "editorials are the keynote of the whole publication," and I am inclined to agree with the definition. It becomes important at once to make the keynote as true in tone quality as any other part of the paper.

No employees' publication is printed just for fun. Back of it, whether the idealist editor is willing to admit it or not, is the same practical purpose which urges the purchase of a new and expensive piece of machinery, though a fairly good job is being done without it. That purpose is profit. Most editors of employees' publications have pattern phrases which are very precious to them: "citizenship," "one big family," "the boss is human, too," "it's your company," and so forth. But under the pattern is the fabric of *business* and the problem of making money. The editor who appreciates his responsibility to his management, without letting it cloud the idealism of this opportunity, is a good editor. The editor who weakens a sentimental rhapsody or hectoring sermon—as some do—is untrue to the purpose back of his paper, and sacrifices an opportunity to earn the confidence and respect of his readers.

Mr. H. F. Browne, manager of the Industrial Relations Department of the National Industrial Conference Board, has this to say: "The employee magazine as a rule is quite carefully read. The editor has the opportunity, if he be intelligent and capable, to present subjects upon which the average employee needs infor-

and can tell them in a manner so that the employee can obtain a fair standing of the subject whether that be some product of the company or question of social justice. If the editor shows by his treatment of company news that he is merely currying favor with the powers that be, his opportunity for constructive usefulness is gone. If, on the other hand, he can cultivate in the minds of his readers the belief that he is fair, thoughtful and highly intelligent, his usefulness to the company and to the employees is boundless." This is a safety conference, which brings us naturally to a primary discussion of how this important subject is handled in our employees' publications.

Hundreds of us use "The Safety Valve" offered monthly by the National Safety Council. This service is necessarily general in its application, but is—as so many who claim the title are not—a genuine service, not operated for profit, but intended to help the advancement of safety in the United States. I therefore commend it to all editors who use it without regard to its application in the solution of their own safety problem. I have not happened upon one publication using the "valve" which did not print it verbatim, without troubling to fit the cap to particular readers whom it was intended to help. I have been lazy enough to do so myself, but my conscience told me each time that I was "passing the buck."

I venture to say that nearly every one of the cartoons sent out to editors by the National Safety Council each month has a positive application to a situation which can make the message of safety more personal, hence more effective. It is only a matter of sleuthing, but we are easily satisfied.

One case in point is a recent cartoon cautioning against hasty crossing in front of trolley engines. It happened that one of our people had met a freight train on the Erie in the material sent by the National Safety Council with the "Crossings Cautiously" cartoon. The man's name was not mentioned, but it was difficult for his acquaintances to take the warning on very personal terms. The local application is not so easy, but it is, I have found, worth the trouble.

Perhaps I misinterpret the spirit of this National Safety Council service, but I think it is intended to assist the editor to do his best in a national problem, not to shift to him the burden of editorial responsibility.

An impression in looking over many publications is that some editors feel safety material is a necessary evil; they check over their columns and count the inches of safety material lovingly, feeling rather virtuous than otherwise if they have squeezed in a little extra amount. I blush to admit this weakness, though I know perfectly well that a minimum of safety material, well planned, can accomplish more good than columns of longwinded "shoulds" and "shouldn'ts." On the other hand, the editor who thinks safety material is an employees publication is "the bunk" is short-sighted. The question is not one of how much or how little safety material should be used: it is how well it is handled. As Albert Chevalier's song used to sing, "It's not so much wot 'e says as the nasty way 'e says it!"

How sanguine to believe a safety consciousness may be developed in an editor. For example, the ability to write good headings may be acquired? I did not know how to write headings when I began to edit a paper, but I was fortunate to have a friend who not only knew how to write them, but understood the special viewpoint must be developed and practised. It seems to me that a special viewpoint in presenting safety material through our columns must be developed to save us from boring or, worse, annoying our readers.

A booklet, "Making, Maintaining and Measuring Interest in the Employee," published by the Metropolitan Life Insurance Company, Earl Morgan Curtis Publishing Company says: "I don't believe you would even build up interest let alone maintain it, with an article, *Be Careful With Your Feet—Safety*

First—Avoid Foot Injuries. But I do believe you would by showing a very badly worn and broken-out pair of shoes, almost pathetic in their appearance, with a caption, *These Shoes Would Be Fine to Hurl at a Bridal Couple, but—*and then following, “you wouldn’t throw them at a man to wear in the pressroom,” and very simply describe what injuries might occur due to lack of adequate shoe protection.” The message is identical in the captions given by Mr. Morgan, but the viewpoint makes the difference between boredom and interest.

I have learned that use of the two, three or four-line editorial is a pithy way to make the editorial page chatty and readable, from the standpoint of typographical pattern or makeup as well as that of potent thought. Various devices are used. Sometimes the company product is worked in to point the paragraphs. One of the major products of our organization, for example, is caustic soda. A special intimacy, therefore, is given our publication’s stock phrase, “Says Caustic Chris” and we put into the old man’s dialect homely bits of wisdom and sarcastic observation that have an edge of humor but no flavor of personal malice. “Caustic Chris” is a *person* in our factory and is quoted by the men; incidentally they look for his remarks and read them with good-humored recognition of their truth.

A paper company uses a department called, “Ned’s Straight Edge.” A powder manufacturing company prints “The Musings of Powder Keg Jim,” and so on. These homely sages may discuss anything from the boss’ weaknesses to the fine job certain men did on certain work. Their dry and biting sarcasm lends itself to safety propaganda, politics, horseplay, health, waste, thrift, economics, signs of the times, etc.; their downrightness makes an honest setting for the sentiment of Christmas spirit, good will, cooperation, pride in company achievement, loyalty and all the abstractions that tremble on the verge of preaching.

I do not mean that every employee publication should include such a department. Every editor must be his own judge of what is taste for his particular paper. It is obvious that many publications could not suitably use so informal an editorial. The example is cited only as a symbol of the possibilities of editorial achievement. I doubt if any work of the editor is more important than accident prevention. And to do it well requires originality, and understanding of human beings. For that matter, originality and understanding of human beings are required in any branch of editorial work.

Several experts on employee publications were consulted in verification of a volunteer critic’s opinion, among them Miss Thelma Walker of the Metropolitan Life Insurance Company, Mr. H. F. Browne of National Industrial Conference Board, Inc., Mr. C. T. Fish of the *National Safety News*, Mr. J. Douglas Brown of the Industrial Relations Section, Princeton University, Mr. S. Douglas Malcolm of the American Express Company, and *The House Organ Review*. Miss Margaret Stevens of the B & O Magazine was unfortunately, due to illness, unable to assist me. I should like to express here my gratitude for the promptness and thoughtfulness with which these busy people showed their friendly interest in the subject which at present engages us.

Almost all of these experts took the opportunity to express their recommendation that editors refrain from “preaching.” “Let editors not ‘write down’ to readers—let the readers ‘read up’—the best is none too good,” says Miss Walker. “Style does not mean much—human nature does. Make the reader feel that you feel—the Colonel’s Lady and Judy O’Grady are really sisters,” is Mr. Malcolm’s comment. “Make the editorials essentially from employee to employee, rather than from employer to employee,” urges the *House Organ Review*, and adds, “A great many editorials are merely clever but not helpful or inspiring. However, a cleverly written editorial with a spiritual value is priceless.”

“Loyalty” was named as the most popular subject for editorials, with “Safety” and “Cooperation” in second place. Loyalty and cooperation are the most valuable—and volatile—of all qualities in an organization: hardest to establish and

siest to destroy. My intuition would be that to harp on these qualities editorially is to arouse suspicion. But again it is the *how*, not the *how much*, that counts. In brief, a volunteer critic's conclusions concerning the editorial content of employees' publications (and never did I have so high-sounding and magnificent a subject handed me for discussion!) is that the majority of editors do not take full advantage of their opportunities upon the editorial page; we are verbose; we are shy; we refuse to accept responsibility; we are rather easily satisfied—in fact a smug; we do not think directly; we are unoriginal.

Of course there are exceptions to every rule, and I confess my enjoyment of not one or two but of many editorial columns. If I have trodden heavily in these few minutes, it is because so many of the papers are good enough to be worthy of perfection, and while I do not advocate sacrificing the *good* for the *best*, I do urge that we keep the best well in view and strive toward it.

CHAIRMAN CLOSE: Miss Buffum certainly told us what we are in a very frank and straight-forward way, and I am sure we all appreciate the picture which she has given us of the average plant employees' publication editor, I am sure what she has said has been helpful to us.

We want to have a discussion on this extremely interesting paper, and the discussion is going to be led by Mr. L. H. McReynolds, who is also quite some one in our line of work. We all know that he is a good editor, because we have been reading his monthly letter. Mr. McReynolds, we will be glad to hear what he has to say about this paper.

Discussion of Miss Buffum's Paper

By L. H. McREYNOLDS

Jeffery Manufacturing Company, Columbus, O.

Before I go ahead with my subject, I want to thank Miss Buffum on behalf of the Service Committee for the task she assumed last year. It took a lot of courage to start something like that.

Right along that line, I was over in our engineering department about six months ago and some man not connected with the editorial work, stopped me and said, "Who is this Anne Buffum?" Knowing that he had no connection with the editorial work, I said, "What do you want to know for?"

Of course, he had a friend who was editor and the editor had been talking to him and evidently this editor's magazine had been panned by Miss Buffum. I won't mention any names, but he is in Columbus and was a little bit riled up about Miss Buffum and her criticism.

I stood up for Miss Buffum and told him that was just one person's viewpoint; that I hope you all look at it that way, because criticisms do not hurt. I tell everybody in the Jeffery Manufacturing Co. to come right out and take a swat at us; that we will appreciate it if each one will give us their criticisms because we cannot progress without it.

I received this paper, however, and went over it rather hastily and set down a few things.

When Miss Buffum compares pitching hay with writing editorials, it seems to me that she is giving the farmer the best of the deal. Personally, I'll take the writer's limp from using the pen rather than the sore back from using the pitchfork.

Where a good many editors have trouble in starting an editorial, I confess that similar hesitation would come upon me were I offered a pitchfork and a load of hay. Editorials, of course, are the hard part of your job as magazine editor. A good

many editors have trouble in starting editorials. The saying, "Rome wasn't built in a day," is applicable to editorials. I don't know how you start to get your ideas or start writing editorials, but no idea is new and if you get an idea, jot it down no matter where you are or where you happen to be. Jot down your idea. Carry cards along with you.

You can see good ideas in walking up the avenue here. In fact, I got two ideas last night that will make good editorials. There are a lot of different things that you can work up.

If you see somebody put a paper in front of a man and he reaches down and signs his name without reading it over and knowing what he is doing, you have an idea for an editorial, and that editorial I would head, "Did You Ever See A Man Sign A Paper Blind Folded?" and you can work that right up as far as you like.

I find that by jotting down your ideas and then putting it in your drawer, perhaps you have one or two paragraphs written, and the next day you feel a little better. Your mind is a little more settled, and you reach down and pull out this sheet and perhaps write another paragraph, and maybe it takes two or three weeks to complete the editorial. Then you go over and over it, because a great number of people will read it and will criticize.

Our good friend Webster tells us that an editor is one who edits a book, newspaper, etc., and secondarily, also one who writes editorials. I think one of the first requisites is to write editorials. I don't know how you feel about it, but it seems to me that every writer who puts out a paper should have a page or column or two for his own use, as editorial to convey certain things to the men in the shop. Perhaps the majority of us make the task look or seem more difficult than it really is.

Why do you have trouble in writing serious matter? Good writing is nothing more than having something to say and saying it naturally. There's a good point—be natural. The average man has intelligence enough to know when you are making lavish statements and saying something that he cannot understand. I think plain language in your editorials will do more than trying to use flowery language and looking in a dictionary for big words and writing so that only a college professor would be able to read it. I would rather stick to the shopman's talk, because he is the man you are writing for—the shopman.

Yes, the editorials should be the keynote of the publication, by all means. They should be productive of the best that's in you. Most magazines were established with the thought in mind that they would be producers. You have a wonderful chance through your editorials to promote that efficiency which every company wants. The editorials are agencies through which the editor can work wonders with his personnel. There is the chance to make employees think, and when you have them thinking, you have accomplished much. Of course, you know that, but I read *The Houghton Line* by Carpenter. I suppose quite a few of you read it.

In one issue in particular, he had a lot of criticism which was very frank, and a man asked him why he wrote the editorial. He replied, "I write them to make people think;" and when you have your employees thinking, you have them satisfied.

You are working for a common purpose and when the different elements in any organization establish among themselves a relationship whereby their activities aid and supplement each other for the accomplishment of that common purpose, the institution thus formed may be called an ideal organization.

Personally, I don't mind writing editorials. They give one a chance to broaden out, to develop, to grow bigger, to speak a higher grade of language—but do not get away from the shopman's talk. Now I say most of the 800 or 900 publications in the United States are poorly edited and a great majority have no editorial policy whatsoever. I get about 400 publications myself. I don't review them like Miss Buffum did, of course, but I look them over and get ideas, as much for

out as for special articles like re-writes, and everything like that; and some of them don't make any provision at all for an editorial page.

Of course, that is their personal lookout, but there is one thing I will say for a newspaper type of magazine, and that is I'll venture to say that the majority of them have more editorial policy than some of the better magazines which have more money.

If you will pick up the *Firestone Non-skid* or the *Pennsylvania News*, you will notice that on a certain specified page, they have two or three short editorials, and they are written in the shopman's language and not flowery language.

In most cases, there is a part-time editor, and I suppose as he doesn't put in a lot of his time he doesn't have time to sit down and give serious thought to the editorial; and it does take time.

It is up to the editor himself to train his readers to read the editorials. Make them good enough to read.

The editor has a chance to mould; he can work wonders through his writings. He can bring about a welcome condition in any plant—that of convincing the employee that he is a member of a big family, which entails responsibilities not to be avoided. Single individuals can't do much, but as a big happy and contented family much can be accomplished. Family standards can be changed as well as a community and social life. The making of others is the paramount thing.

We try to get away from using syndicate material whatsoever. In other words, as Miss Buffum emphasized, when we see an article we will try to re-write it in our own words. We will give the idea to a shop man or any man in the personnel and let him re-write it in his own words, and he doesn't have to think up the idea himself. We either give him a subject or another article and let him write it. Safety material is a big problem. At the Jeffery Manufacturing Company, we have a safety director who writes, month after month, along the same lines, which employees are bound to get sick and tired of—same kind of language, the same column or whatever is necessary. For safety material I would advise pictures every time.

I venture to say that when one picks up a Jeffery Manufacturing Company magazine, he first glances at the cover, of course, then goes through and looks at the half-tones, and the safety page is passed by quickly. I have observed that when you have pictures they will stop and look at them. In this last issue of our paper particularly, we had these half-tones on one form. We run two forms, eight pages to the form, and as I was handing them out, one man said, "I like that. I got a lot of pictures in it and I will be able to read it;" and most of them do once through and look at the half-tones. If you will check up you will find that the first thing they do is to look at the pictures, because pictures tell a story. That is the only way you are going to get safety over; and as I say, if one man writing the personnel is bound to become tired of it, and it is tiresome to them because it is not going over.

Of course, the editor can help the safety director, but not all editors are safety directors. I know that Mr. Augustus is; he handles his own safety work and also the magazine. In my case we have a safety director and often he comes down to me and wants to know if I will take his page and write it for him. He gives me an idea and asks me to write it so that it will be somewhat varied.

I was going into a lengthy discussion on the first line or the heading and the first paragraph of the editorial, but I think Mr. Reidel covered that very nicely. The main point is making your heading readable and having an appeal in it. In all articles regardless of whether it is a special article or editorial, it is the heading that gets the attention. It must be catching.

First the heading and then in the first paragraph, I suppose, are where you have most of your troubles. Get a catchy heading and first paragraph, and take your time on it. Get your idea fixed in your mind and then write it over and over

again. Maybe you cannot do it in a day, or in a week. Last year, I wrote two editorials a month, and I don't suppose that one out of the twenty-four was written in less than a week, that is, in its entirety. It is hard to do it, and you must remember that a number of people are going to read it. You have got to go over it from the other man's standpoint, and you know that he is bound to be critical.

My idea coincides with that of the *House Organ Review* when it says that cleverly written editorials with a spiritual value are priceless. The subject for an editorial will vary every month according to that particular point you wish to get over. They should all hinge upon and be built around the common purpose of the company and its employees.

After all, you may have no special endowments, no decided evidence of being a genius in any certain line, but if you have plain common sense and if you are fair minded, you are in possession of the fundamental and basic qualities which go to make good editorials, and a great help to your fellow man through those editorials. In the final analysis it should be remembered that a man's work will not tower above his character.

I have jotted down here some points which you might keep in your mind:

1. Good writing is nothing more than having something to say and saying it naturally.
2. Many of us are over-conscious of the fact that we are writing.
3. Be natural.
4. Do not strive for effect.
5. Do not over-state or over-estimate. That is an undesirable habit and leads one into embarrassing situations.
6. The average man with ordinary intelligence is able to distinguish between lavish statements and real facts.
7. A magazine should be a producer. Keep that end in view always.
8. Promote efficiency through your editorials. Efficiency takes the frenzy out of business.
9. Use horse sense.
10. Fair mindedness and plain common sense are important as basic qualities of a writer.
11. Heading and first paragraph important. Must have appeal.
12. Use names employees are familiar with—no flowery language.
13. Don't brag; be sincere. Let readers know you are trying to help them.
14. Comparisons help to get editorials over. By that I mean start off with an article and use something they know about. If you compare something and work your editorial out that way it is going to have a punch and they are going to recognize something and will read it.
15. Shorter editorials are read more. I don't know how you feel about that, but I don't believe many people will sit down and read a long editorial. It gets burdensome and heavy and they are going to tire before they get through. So I prefer two or three short ones to one long one.
16. Find out the reader's reactions to your editorials; candid opinion.
17. Editorial board—three or four—vary the editorials each month. All write but take turns.
18. Jot down an idea, write it and rewrite it, and lay it aside. It may take weeks, but one is better fitted one day than the next.
19. Get ideas from employees.
20. Give them something they want.
21. Keep everyone on even keel.
22. Magazine is tonic to keep nervous system in shape.
23. Promote efficiency.

Those I have jotted down just as a summary.

While I was talking to the boss, I said, "Why wouldn't it be a good idea to go out and see some of the men and find out what their reaction is to our editorials?" Of course, he came back and said, "You ought to do that anyway." So I started out. I saw the general foreman and about ten or twelve shopmen. The general foreman told me his candid opinion, and said that was about all he did read.

Another man said the novelty had worn off.

The man who starts a magazine certainly has a cinch over somebody else. The paper is new in the plant and they will all look for it and read every line, but after you have gone for fourteen or fifteen years, then it becomes a settled fact that they glance through and pick out the parts they want.

Lack of time, of course, has something to do with reading a magazine. They are discouraged and they don't want to have anything to do with it.

If there is anything you want to discuss here about what Miss Buffum has said in her paper, I will be glad to take it up, or any question about editorials.

HARLES E. KANE (Illinois Central Railway System, Chicago, Ill.): As chairman of the Program Committee, I think I ought to say that both Miss Buffum and Mr. McReynolds were put on because we thought we should make them personally known to all the members attending this convention.

The *News Letter* is the life blood of this organization. I think it has done us a world of good in the last year, and I think one of the best things that ever happened to us was when Miss Buffum undertook to criticize some of these magazines. She very cleverly backed up Mr. McReynolds' work and I only hope that whatever she gets into at this time she will keep in contact with this organization.

J. G. CONOVER (Yale and Towne Manufacturing Company, Stamford, Connecticut): During Miss Buffum's and Mr. McReynolds' talks I made two or three memoranda, and I would like to say with regard to Miss Buffum's talk that I think the honor last year in Chicago of delivering a brief address to this body, in which I emphasized the very facts that she brings out: that fundamentally employees' publications are printed to make money for the company that employs the editor and if you will only keep that in mind you won't go very far wrong in material for editorials.

A great many of us have been in the habit of wanting to turn out something of high literary value. I turn out a paper on the first and fifteenth; and we are prone to think that because we turn out a sheet, something with type in it, heads and everything like that, that we have done our work. The question to yourself is this: Is this the kind of a publication that is calculated to make money for my employers?

We say, up in Stamford, that the function of the paper is in the way of making money for Yale and Towne Manufacturing Company, in the lessening of labor turnover. If you can lessen turnover you have made money, because it is said up here that it costs fifty dollars to bring a new man to the employ of the Yale and Towne Manufacturing Company and assign him to his particular work.

Therefore, if you can put something in the paper that makes the employee believe that Yale and Towne are good employers and that Stamford is a fine place to live and there is no use of moving on, you have in that sense made money for Yale and Towne.

So in reference to what Miss Buffum said about our being lazy, I wonder whether you have ever watched a chap lolling around in the grass who was called by his father and mother and it was said they couldn't get him to do anything. Finally you see him go through nine innings of a baseball game and shine, or run in a football game. He wasn't lazy at all.

Now, as far as I am personally concerned I have not in six years paid a penny for syndicate stuff for my paper or used a shears to put something in the *Yale*

Panel, and for this reason: I begin at the top of our offices and I call the roll. I go into Mr. Allen, the president, and say, "You are about due. I want a column from you."

He may say, "I haven't got time," but I come back and ask him what he is going to do about it and that he preaches cooperation. Then I go to the first vice-president, and the second vice-president, and I go all around; and they have all got to put something in on holidays. But in addition to that they must come across with a special article every once in a while.

When Mr. Reidel was talking I seemed to smell now and then a long acquaintance with newspapers. I had twenty years with them, and I was very much interested in the remarks about the heads. I wonder if Mr. Reidel has ever heard the statement that a good head can carry through a bad story, but a bad head can damn a good story? That is a newspaper axiom.

Mr. McReynolds spoke about these long editorials. That is what we are all proud to do. When you write a letter if you get in trim it flows right along.

It was Charles A. Dana who said, "Any damn fool can write a long editorial, but to write a short one that is a gem and has a pull in it, that seems to be a lost art, and one cannot always do it."

I was very much interested in listening to Miss Buffum, and I think she hit a keynote in her remarks about why we are editors. I cannot emphasize too often that when you get down to it, editors are to help make money for their employers.

CHAIRMAN CLOSE: I am inclined to think that the proper place for the good head we have been talking about is on the shoulders of the editor. I think if we have a good head we will probably get along with the rest of it all right.

MR. AUGUSTUS: I would like to ask Miss Buffum's opinion on one thing, about which I have had some disagreements with other editors.

Do you think that an editorial should ever deal with matters outside of your own immediate organization? For instance if you are in a small community where there may be the question of a community chest, or some bond issue for a worthy purpose, something that concerns the community at large, do you think it should have a place in employees' magazine if your company is backing the project and it is for the good of the community? Is it wise to editorialize that to your employees?

MISS ANNE W. BUFFUM: I feel that any subject which intimately concerns your employee is a fit subject for editorial, and your question would be whether your people are benefited by the community chest you suggested. If they take part in it as individuals and members of the community, as well as of the company, then they are interested in it, and it is perfectly good material for editorials. I think your question would be whether it was their business or not.

MR. AUGUSTUS: I might have gone one step further, by explaining that sometimes on these things that are of community interest, there may be a difference of opinion on the part of certain people in the community.

Our manager has taken the attitude that where there is a difference of opinion, even though he feels that the cause is just and should be supported, he doesn't feel that it is the part of the Mead Paper Co., to take sides and print in our magazine that we are for or against some particular project, or ask our employees to support it.

MISS BUFFUM: I think that is the right attitude to take. It is a personal matter rather than company or management.

CHAIRMAN CLOSE: It seems to me in connection with Mr. Augustus' point, that many of us would make a mistake if we took sides on controversial matters in our papers. If you stir up antagonisms you are not going to get very much good from it.

K. D. PULCIPHER (Pennsylvania News, Chicago, Illinois): In connection with Mr. Augustus' question, the editor who doesn't know what to do on the policy

ter of his company needs to get straightened out for his own personal benefit as well as that of the employee, and it seems to me that the editor hired by the company and the publication representing the company should follow strictly the company's policy.

R. AUGUSTUS: May I say just a word more? I think Mr. Pulcifer has misunderstood me. For the sake of argument I can very easily see where you are forming a real service by taking sides on certain controversial subjects.

One of the purposes of any employee magazine is to help form opinions, the same as a newspaper helps mould public opinion. Now then you may have a worthy cause in your community, something that sides have been taken on, which you think is a good thing for the community, and will benefit your company or your organization.

I cannot see—I am saying this for argument—why it isn't all right to take sides on that, and state your reasons why you think it is a worthy cause and why it should be supported, and try to help mould that public opinion insofar as the personnel of your company is part of the community.

Of course I agree with Mr. Pulcifer that you have to abide by the management's decision. If the management is not in sympathy with the particular project, you want to keep your job, you had better keep still. But where the management is in sympathy with the project, isn't it good policy to try to sell your argument on the idea that they should come out and make a statement on those issues and publicly support them? They do it through newspapers.

I know of one instance where a certain matter came up where our management came out publicly in the newspaper and in a written statement and by liberal cash donation helped a certain cause; but the manager of our plant didn't think it was wise to say a word about it in our magazine, although it was known all over the community.

R. PULCIPHER: There is only one answer to that. No company should be allowed to print in its own publication what they are willing to say outside.

W. BOSWELL: It seems to me that Mr. Conover in his remarks hit a vital point in connection with our employees' publication. Isn't it a fundamental province of our publications, as he says, to make money for the company? Of course, we are creating a fund of good will among the employees. We want them to believe in the company. We want them to believe it is the best company to work for in our particular community, and it is a good community to live in. That is all well and good about being a good community to live in, but when you get out and begin dealing with things like the community chest, there is a wide difference of opinion among the men as to whether they ought to give or not, and I feel that if we begin exploiting in the columns of our paper the *pros* and *cons* of the community chest or the Red Cross, or whatever the drive is for—theater in Florida, and so on—while they are all good causes your special function is along a given groove of creating that fund of good will among the men between the management and the men. That is my notion about the editorials. We do not write any editorials in our publications. I believe that Miss Buffum ought out in her paper something about preachers. Too frequently your editor is really a preacher and that is not what you are there for. I feel that if we get into this editorial matter too far, we are preaching to the men and our function is not going to accomplish the thing that it should accomplish, which, as I have said before, is good will among the men and between the men and the management, and to make profits for the company.

AIRMAN CLOSE: You have just heard the ideas expressed that perhaps editorials are not the proper function after all. Anybody else agree with that?

F. HALL (G. M. & N. Railroad): When you write on a point like the community chest and try to persuade your men to contribute to the community chest, you jeopardize your influence on other subjects by talking about a controver-

sial subject. In the first place if it is an official utterance, they think you are dictating.

MR. AUGUSTUS: If you have a different opinion on safety or anything else in your organization, you may tramp on somebody else's toes.

E. R. TREVERTON (The Ohio Public Service Company, Cleveland, Ohio): When you gentlemen speak about these controversial matters in your editorials, you should be in the utilities business and you would be almost afraid to print your name.

Backing up the more lazy member, I have found that it pays to pass it on to the boss. We run in our paper just one editorial which is written by the general manager, and he uses it to put out any special information or especially good work done, which helps some.

H. P. McDONALD (Kings County Lighting Company, Brooklyn, New York): It seems to me that there is some confusion here with regard to these opinions. There is a confusion here between opinion and attitude.

Newspapers, of course, write more on public opinion because they represent certain parties, or they represent what is supposed to be certain ideas, but the companies that we represent here simply are trying to develop an attitude or character among the employees, and for that reason, a subject must be an employee's subject. It is only the attitude of the employees that we are trying to correct.

CHAIRMAN CLOSE: Our next order of business is the report of our Judges' Committee which will be presented by Mr. C. T. Fish, of the National Safety Council.

C. T. FISH (National Safety Council): Mr. Chairman and Fellow-Slaves of the Typewriter and Scissors: I am pinch-hitting for Professor Dutton. He was unable to be here today, but he expects to be in New York tomorrow, and if at all possible, he will come around and say a few words.

Before I give the report of the Judges' Committee, I want to express my appreciation of the very kind remarks that Miss Buffum made when she listed me among the experts of employees' publications. She was more than kind to me in her comments on that so-called service for employees' magazines that I grind out every month. If it is hard to write editorials, it is about three times as hard to get out that stuff which goes to editors who are supposed to be critical and is passed on by them to the workers who are supposed to be ready to yell "boloney" at anything that refers to safety. At least I take that attitude when I am writing and try to avoid preaching.

I never feel offended when any editor re-writes it to suit his own uses and I have often wondered who it was in the Hooker Organization that improved it.

Now to return to the Judges' Committee. They picked out three of us. Professor Dutton, who is on the faculty of Northwestern University and associate editor of *Factory*, published by the McGraw-Shaw Co., was made chairman.

The others are Mr. W. L. Ballou, an advertising man of Chicago, who got out that ill-fated *House Organ Review*—It was a good publication while it lasted, but the market seemed to be too thin for it; and the third member of the committee is myself, originally a printer, subsequently a bookkeeper and now an editor by accident.

We had widely different points of view. In fact, we were 40 points different on one publication and I insisted that it was impossible for any publication to be as rotten as the grade given by one of us and still survive. Another time, I accidentally graded the same paper twice. The second time was on a hot day and I had just discovered a bad typographical error in my own magazine, so my rating was 5 points lower than the first time.

We try to keep our personal taste out of the matter, but it is bound to creep in. Perhaps we like the cover or we are particularly interested in some article or perhaps we like the flavor of the Scotch jokes.

As for our basis of award, first of all came safety. The contest is held under the auspices of the National Safety Council. We had to give it a fairly prominent

e, and we tried to take a liberal attitude in our view of safety. A department cannot publish as much safety material as a rolling mill, and we made advances for public and home safety, and health, and even thrift. It was easy to find from some of the magazines that the editor personally and the company and him was strong for safety, and that counted a lot.

The schedule of points that was drawn up is not arbitrary. You cannot draw a hard and fast line. If the safety story is really effective, it can also be listed for general interest, and educational features.

Another difficulty we were up against, was the borderline magazine—like the one gotten out by Mr. Augustus. It was quite a problem to tell whether to place the magazine in class one or class two. We placed it in class two.

Just as an experiment, I took one magazine, *The Bancroft Bulletin*, published by Joseph Bancroft & Sons, Wilmington, Delaware, and graded it according to standards of class one and of class two. There was only about one point difference.

Makeup and art, according to the scale of points, could not make more than two or three points difference between a good magazine and an indifferent one. Appearance, however, cannot help but exert a powerful influence.

Report of the Judges' Committee

By H. P. DUTTON

Chairman

The committee—Mr. Fish, Mr. Ballou, and myself—after rating each publication independently and averaging these individual ratings have come to the following conclusions:

For publications in Class I the *Wisconsin Telephone News*, with an average rating of 90.7, takes first place. *Norfolk & Western Magazine*, with a rating of 87.7, takes second place; and the *Hercules Mixer*, with a rating of 87.7, takes third place. The following publications have been awarded honorable mention:

Louisville & Nashville Employees Magazine.....	87.3
Telephone Topics (New England T. & T.).....	87
The Mouthpiece (Michigan Bell Tel. Co.).....	87
General Electric News (Schenectady).....	86.7
C. C. C. Mutual Magazine.....	86.3
International Paper Monthly.....	86
The Ohio Bell.....	86
Vacuum Oil News.....	84.3
Illinois Central Magazine.....	84
Telephone News (Bell Tel. Co. of Pa.).....	83.3

Class II *Mead Cooperation* takes first place with a rating of 90. The *Bancroft Bulletin*, rating 88.3, takes second place, and the *Armco Bulletin* came third with a rating of 85.6. The following were awarded honorable mention:

Consolidated News.....	85.6
Motor Coach.....	85.3
United News Letter.....	82.6
House Dope.....	82.6
Reo Spirit.....	82.6
Gas News (So. Calif. Gas Co.).....	82.3
Harrison Radiogram.....	82.3
Tick Talk (Western Clock Co.).....	82.3
Twin Topics.....	81.3
The Hardwood Bark.....	80.6

In Class III the *Hawthorne Microphone* led the list with a rating of 87.6. Next came *The Bessemer* with a score of 77, and the *M. S. A. News*, a mimeographed publication, took third place with 75.3. Since the total number of contestants in this class was less than 10, specific awards of honorable mention was deemed inadvisable. *The Exciter* and the *Dunlop News*, however, ranked close to the place takers, and none of the publications lagged far behind.

In going over the papers the judges were impressed with the fact that many publications, while not conforming to the scale of points adopted as a basis for rating, nevertheless showed evidence of very intelligent adaptation to the specific problems of their publication. Since these purposes are so diversified, ranking by points cannot give a really accurate indication of their effectiveness.

The rating, however, may afford the editor some indication of his points of excellence and show his publication compares in a more general way with others in his field.

The committee was impressed with the fact that a large majority of the publications were excellent jobs of printing and make-up. As might be expected there was more variety in the editorial point of view and in the general contents. In the great majority of cases the editorial attitude showed an intelligent appreciation of the point of view of men as well as of the management.

Your Judges' Committee would offer one suggested modification of the present rules. Certain publications, for one reason or another seem to be in a position to be serious contenders in every contest. Would it not be a good idea to borrow from the practice of our golfing friends, handicapping for the ensuing year, the winners of first, second and third places?

While the Judges' Committee, pending the wishes of the section, has not worked out any scale of points, it should not be difficult to devise an equitable scale of handicaps and after a year's experience this could be corrected, if necessary.

MR. FISH: The certificates for the winners will be distributed as soon as possible after the Congress. Our last meeting was just three evenings before I left for New York and it was impossible to arrange all the details.

Class three was a difficult one. We had printed magazines of the newspaper type, and also some mimeographed magazines, and there was one little hectograph sheet produced on one of those gelatin pads, and gotten out with considerable ingenuity; but we hadn't any standard by which to judge it.

CHAIRMAN CLOSE: You have heard the report of the Judges' Committee. We all join in felicitating the winners and condoling the losers.

These contests have had a very important effect in stimulating interest in our section and I hope that we can keep up this very interesting and important feature of our Section.

ADJOURNMENT

October 4, 1928

GILBERT F. CLOSE, Chairman

**Editor "The Commonwealth," Commonwealth Steel Co.
Granite City, Ill.**

Luncheon Session was called to order at twelve-forty o'clock by the chair-
Gilbert F. Close.

IRMAN CLOSE: Our speaker is Dr. James Melvin Lee, head of the Depart-
f Journalism, New York University. I suppose there are a good many of us
at would like to know how we got to be editors or why, and Dr. Lee is
to tell us. I don't know whether he is going to tell us why we are editors or
man ought to be an editor. Nobody is better qualified to give such a talk
rofessor Lee. We appreciate his giving us this time in the midst of his
us duties.

Why Be an Editor?

By DR. JAMES MELVIN LEE

a, Department of Journalism, New York University, New York City

much easier to answer "why be a speaker?" I can give you one very good

In no other way would I know how many dining rooms this hotel has. I
rom today's experience. That is another story, as Kipling would say.

king of Kipling, although he is a great master of prose, when he has a real
e, he puts it over in the form of verse. You possibly may recall his
quatrain:

keep six honest servants.

They taught me all I know.

They are who, what and when

Where, why and how.

pose when the cubs come to you, you tell them to get the answer to all those
stions. Many textbooks have been written around lessons in that quatrain
ling's. Which one of these questions you answer first will depend upon
ortance. I may have a cold and you will never know because the "Who"
portant; but if Smith or Hoover, either one of them, has a cold, you will
bout it in the morning.

uld much rather talk to you on either one of those questions than the

It would be an easy task. I could talk to you on Who are editors, but
I would be giving you almost a book on Who's Who in Journalism. I
peak to you about the Where are editors and I would be compiling some-
ke Ayer's Annual. I might speak to you about the When, and I have dug
When a good deal and produced a history of American Journalism. I
desire to advertise that book to you, although I can bear a message of

me from what I have heard at the table this noon that your discussion
y took up the question How, and that is much more attractive than the one
discuss this noon. A compilation of the answers of the How will give you a
manual on your special line of work in journalism. That question Why
hard one to answer. I remember when I used to cover the police courts,
the judge talk to the jury repeatedly. He would warn them, "Be careful
interpret a reason. Sometimes the Why on the surface isn't at all the

Why a man did it." When they stop to consider why these men were before the judge, we wonder why they did it.

Really, I don't know why I should be here right now. I dare say a great many of you at the close of these rambling remarks will be qualified to say why I should not be here. An old city editor of mine said "If you can't get the Why, there are Why-nots; bring them into the story. That will enable you to answer the six questions completely." That is not a bad thing to do. I can tell you some why-nots—we ought to be editors merely for the sake of the money. I don't believe many of us are in it for the salary we draw. I think all of us could earn more money in other fields. Certainly, we are not in our present line of work for honor. Our names are not blazing on the boards as the butcher, the baker and the candlestick maker appear in their business. We are not in our business because we have sought soft jobs. We are not in a line of work where we can easily escape from our mistakes.

Speaking as a teacher, it is rather easy. You can make all sorts of mistakes, and until many years after graduation your students don't know you made the error. A doctor's mistakes are soon buried and covered up; your lawyer's mistakes the client never knows, they are taken up to a higher court; the manufacturer takes his mistakes and dumps them in South America or he sells them as seconds without his name attached to the product. The preacher—well you have to wait until you are dead to find out whether he made a mistake.

The editor, therefore, has his mistakes in cold type. He has to face them the minute his periodical comes out. He has a hard time passing those mistakes.

That may really be one of the reasons why we are editors. We like to face difficulties. We like to have new experiences every day. We are not contented with having produced one good cake of soap or one good car and sit back and draw our dividends. We want something new every day. That gives a variety of experiences. You are dealing with men and you are dealing with materials and you are dealing with management. But more than everything else you are dealing with life, and that is one reason maybe we are editors because we like to deal with vital things.

Along that same line of experiences, I think editors, more than any other group, have learned to take the thing that is working against them and make it work for them. I could give you numerous illustrations in the editorial field, but if I did I might betray confidences, so I will go into other fields.

A very distinguished individual says that his success in life is due to the fact that his father on his dying bed gave him this bit of advice: "Son, whenever you have an important decision to make always scratch your head and count nine before you hand down that decision." He has anecdote after anecdote to show that his success has been due to the fact that he counted nine before he made an important answer. One important illustration is his first job, sweeping out a little country store, for which he got \$3 a week. One morning he started to sweep out the store; having finished that he started to sweep off the walk, when he noticed the wind was blowing his way, and as fast as he cleaned the walk the dust blew right back. He went to the other end and began to sweep with the wind. The rival grocery man across the street saw this and said: "Bob, how much are you getting?" "\$3 a week," he said. "I'll give you \$4." Bob was ready to grab at that when he thought of his father's advice, and he began to count. The grocer, noticing his hesitation said, "I'll give you \$5." "I'll give you \$6." By the time he had counted nine, he had been offered \$7.

There was a good illustration. You can see what that means. It was his ability to take the thing that was working against him and make it work for him. I remember speaking to a group at Kansas City. While there I heard the story about the junior in the State University who was working his way through college by conducting a chicken farm. During the summer he grew corn, wheat,

age, carrots and things of that sort, with which to feed his fowls in winter, by saving money. This particular year the State of Kansas (as it sometimes had an epidemic of grasshoppers. They were eating up the things he expected to feed his fowls in the winter. What did he do? He set traps and caught grasshoppers and dried them in the hot Kansas sun. That winter he fed his fowls dry grasshoppers. He got more cash from those grasshoppers than from the cereals which he fed the chickens in the winter. We all know that fowls do better on having a meat diet than on a regular cereal diet.

A good old Southern gentleman found his exchequer was low because of the time his friends came to visit him, it drew heavier on him. What did he do? He took the thing that was working against him and made it work for him. By the help of five letters he put above his front porch, the word "HOTEL." The thing was working against him, now it was working for him. It was as comfortable as before, even more so as guests felt more free to come.

That's one of the things about editors, I think—why we are editors. We know how to take the things that are working against us and make them work for us. I think really the Chairman spoke the thing "Why we are Editors" with apology. I might have spoken otherwise. Shakespeare said some of us are born editors, some of us achieve the editorial chair, and some of us have editorial jobs thrust upon us. That doesn't explain why we continue to be editors. I think the real reason may be found in the philosophy we live. I think, more than any other class of workers, we believe that if we are not finding pleasure in the routine of the day we are missing the best that life has for us, and I submit to you that that is the real reason why we are editors—because we are finding pleasure in our work and in no other line of work do we find the same pleasure that we find in being editors.

He started off with a personal allusion. Elbert Hubbard gave this recipe not for an editor but for being a good after-dinner speaker: "Select a subject," he said, "about which you know a lot and your audience little." He was one of the few who practiced what they preached because he talked about himself.

A Fox had a great blue print for short stories. This might be helpful on the house side of journalism. He said that when he played the piano and was about to leave he hated to leave until he struck the same note at which he opened. He struck this note it was all right for him to leave. I know less about music than about any other topic but those who know say there is a very definite connection between the opening note and the concluding note. He took that as a blue print for many of his short stories that he put in his volume. The concluding note is in relation to the opening note. For example, the first of the story depicts a man sitting by a fire sucking his thumb, and he is the villain of the story. He starts what is coming to him, and in the concluding note he is sitting by a fire sucking his thumb. When you are writing news stories, strike the same note in conclusion that you opened with.

He started with a personal allusion and will conclude with a personal one—why here. Because I have been receiving so many of your plant papers during the past year. I want them to come to me during the next year.

IRMAN CLOSE: We appreciate all the help and inspiration of your talk. You have given us a vision of our jobs. While we may have had it in the background of our minds, we haven't seen it as clearly as you have presented it to us. I wish to thank her for his suggestion that you send him your magazine.

ADJOURNMENT

October 4, 1928

GILBERT F. CLOSE, Chairman

Editor "The Commonwealther," Commonwealth Steel Co.
Granite City, Ill.

The second session was called to order at two-ten o'clock by the chairman, Gilbert F. Close.

CHAIRMAN CLOSE: You will remember that at our session yesterday afternoon, Miss Buffum prepared a paper on a "Volunteer Critic's Conclusions Concerning the Editorial Contents of Employees' Publications." She told us quite a little about what she discovered in looking over a lot of our publications from the point of view of editorial policy and editorial contents, etc. Now we are going to approach the general editorial this afternoon again from a somewhat different point of view. Mr. E. T. Wilkins, one of our old friends who has been an active member of this section for a good many years, is going to talk to us on the opportunity for improving the editorial contents of employees' publications. Mr. Wilkins is the editor of the *Schenectady Works News* and those of you who have read his paper will agree that he knows a good deal about the subject and is well qualified to tell the rest of us some things from his own experience in this work.

Opportunities for Improving the Editorial Content of Employees' Publications

By E. T. WILKINS

Editor, "Schenectady Works News," General Electric Company,
Schenectady, N. Y.

We, the members of the Employees' Publication Section, are assembled at this National Safety Congress to discuss ways and means of improving the editorial content of the most valuable and most direct medium for dealing with human relationship in industry.

An employees' publication, therefore, is the voice of your organization seeking good-will among your employees, urging them to greater efficiency, creating loyalty to the company, stimulating interest in work and pride in quality of product, fostering initiative, promoting safety and creating a spirit of harmony and cooperation between men and management.

The editor, on the other hand, is the spokesman for the organization through the employees' publications. As an editor of an employees' publication, you are the sculptor and the contributors are the clay. While you can't altogether choose your own clay, you can, at least, refine it, and certainly in your hand lies the shaping of that clay. I earnestly entreat that the clay that passes through your hands be moulded into something worthy of the stamp of approval of your organization and the principles for which it stands.

What the editor writes and publishes in the employees' publication spells loss or gain in prestige to the organization. If he uses phrases that are empty of thought, he depicts a hollow organization. If he overstates, he portrays an organization prone to exaggeration, which is distasteful. If he boasts or brags, he pictures an organization overpleased with itself, and resentment naturally follows. If he is flippant, or careless, or smart, or indulges in ill-timed familiarities, all these shortcomings are charged up to the organization that sponsors him.

If, however, he selects or writes sound, helpful articles, he establishes in the

s of his readers a sound and helpful organization.

incerety, therefore, should be the keynote of an employees' publication. The editorial content should be written in language which is clear and simple, but dignified—neither slang nor poor English is necessary to secure reader interest.

The material used should be concerned with the lives of the members of the organization at work, at home, and at play.

A friendly tone should permeate all of the articles. Personal reference should be used with caution.

The employees' publication should neither preach nor assume a paternalistic attitude. A preaching or commanding attitude is bound to create contempt and loss of interest, and will lose for you much of the good that may already have been accomplished.

Talk to the employee in his own simple language about the things in which he is most likely to be interested. Talk to him from the viewpoint of the man in the shop rather than from your own personal viewpoint, or from the viewpoint of the top-ups in the management. Make your viewpoint the viewpoint of the men in the shop, and you are more likely to put across your message in a way which will be understood by the majority. To get this viewpoint, talk to the men and discuss their ideas on important subjects.

To win immediate favor, write something to make the readers laugh and forget. To derive some benefit, write something that will make them think and remember.

The question of editorial content is one deserving most thoughtful consideration, especially as it affects your employee contributors.

Don't destroy your contributor's style and make it a pale imitation of your own. If your contributor chooses to write in short, staccato sentences, and you prefer long and balanced ones, there is no reason why you should destroy the effect of his effort by sprinkling it with conjunctions. With many employees' publications, monotony of style is a curse. Think what the *Saturday Evening Post* would be like if it were all written by George Horace Lorimer.

Obviously, there are some subjects which must be dealt with by the management, and still others for which the editor should be solely responsible. In the majority of subjects, however, the article will be far more interesting if it is dealt with from the viewpoint of the employee.

Use Names to Maintain Interest

The use of names all through the editorial content of your publication is sure to maintain reader interest. "Mr." and "Miss" should be used sparingly. An employees' publication filled with live news of the plant, of employees, their activities and their interests, is a publication in which not only the man of the shop finds interest, but those at home and outside of the plant are likewise interested.

Safety material should occupy an important part of the editorial content of an employees' publication. In fact, the judges of the plant publication contest awarded twenty-five points for safety material in Class 1; twenty-five points for Class 2; and thirty points for Class 3. Since one of the reasons for the existence of the employees' publication is for the welfare of the employees, I feel that the judges made no mistake in giving safety material such a high rating. Safety material is usually divided into two groups; that of local interest, and that of general interest.

At the Buffalo Safety Congress, in 1923, I suggested twenty-one proved methods for presenting safety and health through employees' publications, so you can see that there is a wealth of safety material available for the live-wide-awake editor. It

is, therefore, not a question where to get safety material, but how to use it to improve the editorial content of your publication. Do not centralize your safety material on one page, or devote a certain section of your paper exclusively to safety. The best way is to scatter this material well through the publication. Some editors make one big shout on one big page, but twenty-one whispers will serve a great deal better than one shout, for it is through the constant hammering, the everlasting trying, that we are going to get somewhere in safety educational work.

This leads us into another subject, and that is, devoting full pages to departmental activities throughout the plant with special illustrated headings for each department. This has a tendency to promote class spirit among the employees rather than creating a spirit of harmony and cooperation between departments, and should be discouraged wherever possible. The editorial content will be greatly improved without departmentalizing your publication.

Stories foreign to your organization seldom are effective, unless there is some tie of interest. Therefore, if you want to improve the editorial content, syndicated material should be used only on special and infrequent occasions, and then only when it is exceptionally good and applicable to some particular thing which you are trying to bring to the attention of your readers. Just as soon as the workers in the plant make the discovery that you are trying to fill them up on a lot of material written by some person wholly unknown to them, on conditions prevailing in their plant, they lose interest in it entirely, and the whole purpose of your publication is wasted.

General interest stories must, to be of real value, contain news of your immediate plant, its product, or its employees.

"The man who stands all day at a machine," says A. J. Andrews, editor of the *Scoop*, in the last issue of the *News Letter*, "usually fails to see beyond the walls of the shop wherein he works. It is part of the business of your magazine to tear down those mental walls which close about him—give his imagination the opportunity to see the distant horizons of the institution of which he forms a part. Show him the origins of the raw materials with which he works—let him see the product of his work advancing civilization and benefiting his fellow men. Tell him the history, not only of your company, but of your product. The tools and materials used in its making. Give him vision to see his work making him of service to the world. Put romance into his job. And, by the way, can you see far enough across your desk to find the romance in yours?"

The real news for an employees' publication varies to such an extent with the newspaper that there is little comparison. The news in the plant publication is not necessarily new, but should be presented to its readers in such manner that it is news. This brings us up to the point where we may inquire what is "News?" News, according to a winning definition submitted by Mike Wallach of New York City in a contest conducted by the New School for Social Research, is as follows:

"News is a perishable commodity, distributed by the newspapers, marketed daily for consumption by the literate mind. It constitutes written presentation of the events of the world, the nation, the state, and the city in all fields of intellectual and emotional interest, such events being of sufficient importance socially, economically, politically, scientifically, or individually to engage the attention of vast numbers of people. Like any other commodity, its careful preparation, the quality of its ingredients, the integrity of its purpose, reflects credit or discredit upon the honor of its purveyors. Substitutes for truth, or adulteration of facts, cheapening of method in the manufacture of news, constitute abuse of public trust and threats against the health of the public mind."

In rating news items in employees' publications, the judges of the Plant Publication contest, give a credit of twenty-five points in Class I; twenty-five points in Class II, and thirty points in Class III.

News Articles

1 news articles should be short and to the point, without being blunt and
pt. A sure way to breed lack of interest and staleness is to fill up the pages of
publication with long, rambling articles. The average reader does not like to
long discourses on any subject, and it is, therefore, important that you keep
articles short, preferably not more than one page in publications measuring
3½ and over. If the reader can see at a glance that an article is short, he will
than likely read it, whereas if it is long, he will pass it by for the time
s, intending to come back to it at some later time and read it. Nine chances
of ten he forgets about it entirely, and eventually the magazine is cast aside
out the article having been read at all.

d lest some well-meaning editor may misguidedly assure himself that the
cular message on which his pen is busied cannot be told completely in less
six or eight hundred words, let him delve a bit among admitted master-
s that have moved generations of readers. For instance:

e creation, as related in Genesis, requires less than 800 words. The Beatitudes,
ronicked by Matthew, are complete in approximately 140 words.

e complete document that published the Monroe doctrine to the world con-
s 575 words, but after the proper diplomatic conventions had been satisfied
e elaborate preamble, 102 words sufficed for a warning that has restrained
pean aggression ever since.

coln's Gettysburg address, in spite of the wealth of its message, betrays not
ightest straining for condensation in the perfection of its 271 words. Because
ffecting portrayal of emotion, Lincoln's letter to the mother who had lost
sons in battle will never be forgotten, yet salutation and signature, it does
xhaust 150 words.

Editorials

editorials should carry with them some news value. The timeliness of edi-
s should be readily recognized and understood. The editor should keep his
ind ears open and take advantage of every opportunity which presents itself
riting editorials. Such subjects as safety, thrift, company policies, employee's
and regulations readily lend themselves to editorial comment.

glancing through employees' publications there is plenty of room for improv-
e page used by the editor for editorial comment. This page should be dif-
from a typographical point of view than the rest of the publication. One-
eads are suggested, and these heads should be set in special type, all caps,
lented with copy run around. This page offers good space for the use of
submitted by your contributors. However, if you endeavor to maintain an
's Page, don't use it for news articles.

onsidering how to improve the editorial content, I cannot refrain from men-
g a few suggestions on make-up and art which the judges of the Plant
ation contest give fifteen points in Class I, ten points in Class II, and five
in Class III. You have, of course, only two things with which to work—
nd paper. But, you have numerous ways of combining these two to make
express exactly what you want them to. Four essential features, therefore,
be considered. First, balance of material; second, artistry of appearance;
consistency of type; and fourth, harmony.

'Balance of Material' I mean a certain proportion of light and heavy mate-
ng and short articles, a certain amount of news, and human interest stories
ng them divided as evenly as possible through your publication to appeal to
eaders and their various interests.

Various editors cite the newspapers or the magazines as showing the proper balance or range of material to be used in employees' publications. Whether the newspapers show the proper balance of material for an employees' publication would depend on the purpose behind the employees' publication. If the purpose is to attract a group of readers having varied interests, which seems to be its purpose, then perhaps it might safely parallel the newspaper in balance of material.

In other words, the specific needs of an employees' publication compared to the purpose behind magazines or newspapers would determine the wisdom of copying their style.

The laying down of set rules on this subject would seem to be dangerous. About as much as can be said that while the study of newspaper and magazine make-up will help any editor, the most helpful plan might be to study successful employees' publications and to profit by their experience. A good exchange list helps.

Artistry of Appearance

By "Artistry of Appearance" I mean the setting of your articles and how they are combined. Placing print and pictures in proper relationship to an artistic appearance on the finished page. You have as your tools the various styles of type, art work, pictures and white space. They must be combined in their proper relation to produce an artistic and yet readable page.

No matter how large or how small the publication, whether it be a four-page or a thirty-two page publication, the pages should be planned in pairs. Unity of ideas and compactness of thought govern the artistic layout. Too few editors plan by the double-page idea, with the result that the publication appears as a collection of unrelated pages. Especially in the matter of picture layout, editors who succeed in developing artistic as well as harmonious pages probably are in the minority. The modern desire for illustrations too often is expressed without considering the weight of the illustration in connection with the size of the page on which it appears. The result is generally anything but symmetrical, and may lead the eye off the page, or in other directions.

Plans may be expressed in verticle lines on facing pages, or in triangular form over the two pages; or in circles, so that the focal point is always center. Simplicity should be the governing note of any layout.

Consistency of Type

The subject of consistency of type is one which will mar or improve the appearance of the editorial content of your publication. It is through type, after all, that you speak to your readers, and it is through the type you must touch their feelings.

One of the marring features of otherwise good body type is the heady page with long, complicated headlines and long hangers or second decks on short stories. Headlines should be considered in proportion to the importance and length of the story, as well as the type used in the body of the story. It is a good practice to use two-line heads for all stories. A one-column story should have a one-column head, a two-column story a two-column head, and a three-column story, a three-column head.

Good headlines are snappy and never labels. The story should be told in the head. *The Verb Is the Life of Every Headline.*

Avoid all awkward expressions. Negatives should be avoided, and never use the word "may." The head should, as a rule, tell what happened, or is going to take place, and not what did not happen.

void ending a headline with a preposition, an article, or a conjunction. Do not divide phrases or words in the lines of a head, and try to make each head fit.

Furthermore, one must consider the running head, the line which heads every page of the publication. In the opinion of many successful editors, the running head is desirable. The repetition of the name on each page is a help in familiarizing the reader with the name of his publication, and, also, is most useful where publications are filed by pages or articles. However, the running head, where used, should be as simple as possible.

Harmony

"Harmony" I mean simply to have your publication a complete unit. Have your material and your make-up harmonize with your publication, your standards, your policies. Each publication is usually different. It is for you to discriminate, and produce a harmonious publication.

In my opening remarks, I claimed that the employees' publication is the most able and most direct medium for dealing with human relationship in industry. We, as editors, are the spokesmen for the organizations through these mediums. With circulations running into thousands and tens of thousands, the influence exerted by these publications is enormous. Therefore, the position of editor today is on a higher plan than ever before, and should be classified among the professions recognized by the management of our industries and corporations as such. Under such conditions we, as editors, should endeavor to improve the editorial content of our employees' publications by adopting a code of ethics. This code, if adopted and placed in the editorial offices of our members, will create many opportunities for giving the employees and employers a better conception of the motives influencing all of us and will, therefore, have a most beneficial effect.

Following is the code of ethics proposed for the Plant Publication Section:

The employees' publication's first duty is to print the news honestly and fairly to be unbiased by any other consideration, even including its own editorial opinion. Its second duty is to construe honestly and fairly, in its editorial columns, happenings at home, in the office, and the shop.

Its third duty is to protect its readers, in so far as may be reasonably possible, from dishonest and misguided persons, who may seek to exploit someone's misfortune by allusion, insinuation, or innuendo.

Finally, its duty is to itself, the employees, and the company—and the principles which it stands for.

In furtherance of these duties, we hold these principles to be compatible with high ideals and sound business conduct of a successful, prosperous and useful employees' publication.

SERVICE for our own company and its employees. Our criticism shall be constructive, not destructive. Our columns, whether news or editorial, must be governed by the policy and general welfare of our individual organization, for we are entrusted to us the guardianship of our company's prestige.

FAIRNESS to the readers, the public and the organization's competitors. Recognizing honest differences of opinion, we may vigorously maintain our own position without denouncing others as dishonest and unfair. Under no circumstances must we countenance the use of our columns to vent personal spite nor to innuendo, often more deadly than direct charges. We regard it as unwise to underestimate our employees, unethical to disparage them, and dishonest to misrepresent them.

DECENCY, which should be the guiding star in the printing of news items, editorials and all feature articles or illustrations. "Is it fit to print and to be read

by own mother" should be the crucial test. It is an editor's duty to keep the columns of his publication decent and thus strive to hold steady the employee's mind in the path of righteousness, morality, and the service of God. Let us be enterprising without being sensational.

4. **CONSIDERATION** for the unfortunate and for guiltless victims of the faults of others. We should protect the names of employees, their families, and their associates. No story justifies needless damage to a good reputation, nor wanton pain to an innocent party.

5. **RESPECT AND TOLERANCE** or those of different religious races and circumstances of life. Ridicule may bring only pain to them, but its author cannot escape real injury in loss of the respect in which he is held by his coworkers and by himself.

6. **HONESTY** is an employees' publication's paramount duty,—to print news honestly and fairly to all, unbiased by any other consideration, even including its own editorial opinion. Honesty must always be exercised in our dealings with our company and our fellow workers, our competitors, and with all whom we do business.

7. **TRUTH**, first, last and always, to the limit of our ability; to be accurate as human fallibility on the part of others as well as ourselves will permit; to willingly mislead none, and to be fair to all. There are two sides to every story. Let us weigh the truth of both. If we do anyone an injustice, we should correct it at once, whether the injured person demands it or not.

Though temporary prosperity may be achieved by violation of some of these ideals, we conceive our duty to hold steadfast to these principles and believe permanent success will reward their faithful performance.

CHAIRMAN CLOSE: We have heard this interesting and fine paper by Mr. Wilkins. He presented in the latter part of his paper a sort of program for the Section, a sort of code. I just wonder whether the Section wants to take any action on that, whether they want to just consider his suggestions of helpfulness, or do they want to go any further on that. Any thoughts on the matter?

LESLIE MARSHALL (Firestone Tire & Rubber Co., Akron, O.): I move that as it is a valuable consideration, it be referred to some other committee for further investigation and precise drawing up for submittal at the next meeting.

CHAIRMAN CLOSE: The motion is that if we are in favor of it, we refer it to some committee for further action, with the idea of drawing it up and adopting it as the code of the Section. What committee shall we refer it to?

ERNEST AUGUSTUS (Mead Pulp & Paper Co., Chillicothe, O.): I would ask what are we going to do with it?

CHAIRMAN CLOSE: To adopt it and send to every member of the meeting to remind them of their privilege and high duty.

MR. AUGUSTUS: Do you have to wait a year for that? I would offer an amendment to that original motion and refer to whatever committee that is given authority, that when they have drawn up the proposed code of ethics, they send to the Section, have it mimeographed, and we will know what it is.

CHAIRMAN CLOSE: Is that the intention? The motion is as it now stands, that be referred to a committee with power to draw up the recommendation and have promulgated as soon as possible to the members.

(The motion was seconded and carried.)

CHAIRMAN CLOSE: I will leave this as one of the first duties of the new chairman to see that that resolution is carried out. Mr. Kane is going to be our new chairman after this meeting adjourns. We were to have the discussion on Mr. Wilkins' talk read by Mr. Sterling Patterson, but we heard a day or two ago that Mr. Patterson had met with misfortune of some kind and he will be unable to be here. We

I be glad to throw this question open at this time for a few minutes for a discussion.

The next subject is a round table discussion of questions previously presented, before we have that discussion, I am going to ask Mr. Conover if he won't read the report of the findings of his committee who sent out a questionnaire to 300 or 400 editors. Mr. Conover has some very interesting information. I'll lead up nicely to our round table discussion.

Report of the Editorial Questionnaire Committee

By R. G. CONOVER

Yale & Towne Manufacturing Company, Stamford, Conn.

During the time elapsed from our Chicago meeting last June up to three or four weeks ago, attempt was made by the use of a questionnaire to find out the end the goal and problems of the members of the Section. The idea was in cases that we had a number of editors of small papers who may have attended these Section meetings, and while they were greatly edified perhaps by papers read, for practical utilization it was far beyond benefit and value. As to the National Safety Council in Chicago and through the courtesy of Mr. Fish, I obtained a list of 334 publications and editors. The editors previously were those active in furthering the aims of this Section. Of those 334 I received replies from 114. That is, 114 questionnaires were filled out. The benefit of those present who were not in Chicago at our last meeting and this resolution was adopted launching this questionnaire, it is as follows:

MEMBERS OF THE EMPLOYEES' PUBLICATION SECTION NATIONAL SAFETY COUNCIL

At the last session of the Employees' Publication Section, in Chicago, a resolution was adopted directing the gathering of data concerning our Editors and publications. The writer was named at the convention as the editor-member and assemble the data desired.

With such data at hand it is hoped that the Section, whenever requested, can helpfully just how our publications might be improved. This advice can be made-up, editorial forcefulness, effective general content—and perhaps how any selected Section publication might be issued at less cost. Such would naturally consider whether or not an editor has to conform to a publication policy set by his management. Advice on cost can also be given though the editor does not care to name his publication budget total.

The resolution recognized that our smaller publications may receive but little from technical addresses or typographical essays delivered at our Section. The budgets of these smaller publications may permit only meagre use of lithography, photo-engraving, or ornate printing. To give learned talks, for example, about the half-tone process, may be helpful to higher grade publications, but a smaller publication editor may not be much benefited thereby. He has problems more vital to him although of a smaller calibre. He is more likely to listen to brother editors who, with data before them, may be able to say to him assuming that you must keep your publication of the size, and volume, and at the cost that it is now, we would suggest that it can be improved by doing it so."

The writer will appreciate the filling out and return of the questionnaire below so that a report may be presented at our next annual session in New York. With this data, editors of publications of every grade may be aided, according to problems and needs.

Publication Title? Published by? Where?

Monthly? Semi-monthly? Number printed?

Number pages? Size pages?

Special cover? Pictures?

Does management lay down detailed publication policy?

Do you publish to benefit others besides employees? Whom?

Do you care to name publication budget total?

With and without salaries?

What section conventions have you attended? What years?

What publication problems would you like advice upon?

Do you publish paid advertisements?

How many employees in your plant?

Are you employed at other tasks besides editing?

Is your publication made up by you or by printer?

Yours very truly,

(Signed) _____

Director of Publicity, The Yale &
Towne Mfg. Co., Stamford, Conn.

Response. Out of 334 employees, publications circularized, 114 sent in replies—a return of 34 per cent.

Attendance. Out of 114 editors responding with questionnaire data, 50 had never attended an Employees' Publication Section gathering. This makes the convention attendance 56 per cent. More in detail, the replies show that 19 editors attended only one of our sectional meetings; 13 editors attended two of our meetings; 8 editors attended four of our meetings; 6 editors attended five of our meetings.

Advertisements. Of 114 editors responding, 93 report they do not run paid advertisements. This makes about 18 per cent who do. Some of the editors are tactically opposed to paid advertisements. One says, "Do not believe in it." Another says, "Absolutely not." Another says, "Nothing doing." One editor says, "Not now but may in a short time." Another editor says, "Our cost of each issue is entirely covered by advertising revenue which yields \$20 to \$30 per month."

Number of Employees. Large and small manufactories and other various kinds of corporations are covered by the replies to the questionnaire. The number of employees ranges from 80 to the very large employment roster of 170,000. This is a widely differing volume and class of employee readers, calling perhaps for special editorial treatment in many cases. Twenty editors report the number of employee readers at less than 1,000; 42 between 1,000 and 5,000 employees; 19 editors report employee readers numbering between 5,000 and 10,000.

Ten editors report their readers numbering between 10,000 and 15,000. Twenty-three editors report their readers numbering from 15,000 to 170,000.

Amount of the Publication Budget. In the questionnaire sent the 334 editors, all were asked if they cared to state the amount of their publication budget. Quite a number responded. From the figures given, and the information also submitted regarding the size and number of pages, of the publication, it might be possible for members within our Section to point out how an improvement could be made without increase in cost. However, that is for the Section to take up. Of the 114 editors who returned questionnaire, 16 left the question line blank. Nineteen stated they had no budget or else that they did not care to state what it was. Those editors who gave figures ranged in totals from a mimeographed publication costing \$150 a year, to a publication costing \$100,000 a year. Four publications cost less than \$1,000 a year. Thirteen cost between \$1,000 and \$5,000. Nine cost between \$5,000 and \$10,000 a year. Seven cost between \$10,000 and \$15,000 yearly. Four cost between \$15,000 and \$20,000 yearly and 7 cost between \$20,000 and \$100,000 a year. One editor wrote, "We have no budget. We let the paper cost what it may, but try to be economical."

These figures admonish us again not to judge and criticize the publication with a \$100 a year budget on the same high plane as the \$15,000 or \$50,000 a year publication.

Another point is "Is the editorship subject to management's detailed policy?" Twenty-two of the 114 editors report flatly "No" to this question. That is, they are not required to follow specific instructions from issue to issue. One editor says, "Management does lay down a publication policy." Another says, "Publication is passed upon and issue passes through a publications committee." Another says, "Management approves copy." Another says, "Publication left to editor, management executive." Another says, "Directed by Editorial Board." It may be gathered from those replies that the editor alone is not always responsible for the contents and typographical appearance of his publication. Let us bear this in mind when criticizing.

Additional Tasks. Only 11 of the 114 editors state that they have no duties additional to their editorships. Of the 103 editors quite a number have tasks added with publicity, insurance, advertising, personnel, safety, industrial relations, athletics and printing. These are some of the interesting comments made by editors in stating they have duties additional to editorship. One says, "I have other tasks—plenty." Others, "Very much so." "Editing not considered as a job but a duty and social recreation." "Athletic, picnic and safety." "Yes, about 14 other tasks." "Editorship a side line." "Yes, numerous." "A few other little jobs." "Have 21 other assignments."

Up of Publication. Of the 114 publications reporting 6 editors only say that they do not make up their publications, that the work is entirely performed by

the printer. In several instances, mention is made that the make-up is the result of joint work between printer and editor. In other cases, editors say they do the work entirely. One editor says, "I make up without assistance from anybody." Another says, "Written, made up and printed by us." Another says, "Printer makes up from our exact dummy." One publication is reported printed on a Rotospeed Duplicator. One publication reports, "Printed at our own plant."

Advice on Publication Problems. To the query concerning the matter of problems confronting editors, there came a number of interesting answers. But at the same time, 49 editors of the 114 who replied left this line blank. This may mean they need no help on the subject, or it may mean that the query had little significance for them. One editor answered, "We have no problems." Another editor, "How to get out a paper without doing any work." Some of the other problems outlined by editors were: "Do editors work full time?" "How to get material received into 32 pages." "What proportions of space to be allotted for company policy and sugar-coated stuff, safety, plant news." "How readers' interest may be measured, best methods inducing correspondents to write." "How to judge accurately whether publication is accomplishing its purpose and is being read by majority." "Interesting copy and other plant news." "The real test of readers' interest." "Are standard departments advisable?" "Methods of securing educational copy to benefit own employees." "Getting cooperation from correspondents and employees." "We want criticism from responsible sources." "How to get news easier." "How to obtain enthusiastic cooperation from correspondents." "Cover suggestions—way of improving art and illustrations." "Economy in single and group cuts." "Typography and make-up." "How to get news and keep on getting it. What type of news is best to publish and how best to tell it."

Round Table Discussion

CHAIRMAN CLOSE: I think we should have our discussion now. I am going to ask Mr. MacReynolds to collect any more questions that may come up. In the meantime, we have a number of questions which were submitted yesterday. There are three questions which cover the same general subject, and one person wants to know what methods have been found effective in getting better responses from correspondents. That also is one of Mr. Conover's problems. That is, "How do you get them to send in the news of their particular group?" Another, "What methods are being used to stimulate interest and encourage employees to contribute?" Another, "How to get articles for the papers and what method to use in getting persons to write?" "How to reject material that isn't wanted?" Who would like to say a word on "How do you get your material?" How do you get the correspondents throughout your plant to send in material? Who has a word for it on that subject?

E. T. WILKINS (General Electric Co., Schenectady, N. Y.): We have 18 reporters at Schenectady. They are elected by popular vote in the Works once a year. They doubtless are the popular employees of each section. We divide the 605 acres off into 18 sections—and we have at least 53,000 employees—or 3,000 employees to handle. They in turn have subreporters whom they appoint in the various sections of their department. We have a dinner once a month or thereabouts and we discuss our problems; they have abundant interest there, and we have no trouble in getting news items for the *News*. In fact, I have too much. I can't use all of it. I had to put out a letter of apology in my last issue because I couldn't use the material on hand but would use it as soon as I could. I think that your problem of success is to get your editors and your reporters and have them elected by popular vote and then have them subdivide their districts into sub-reporters and I am sure you will get results.

IRMAN CLOSE: Mr. Wilkins says he has his reporters elected by popular vote. How are you going to be sure that the popular man is going to be a good one? Perhaps it might be better to have the editor-in-chief appoint his reporters. Does anybody do that?

G. CONOVER (Yale Towne Mfg. Co., Stamford, Conn.): I have been through a good deal of that. I understand the difficulties. In our plant we have organized what we call the Scribes Club. We give a couple of dances in winter, an outing in the summer. Although they are dances and social gatherings, mainly, we manage to get in talks about correspondents. No matter what you approach to 100 per cent results is far from favorable. It is an uphill battle. When Brother Wilkins says he can't publish all the material he has, I think there is a millenium up there. As for electing them, I think you said is a deterrent to trying that way. I have asked our men to name anybody in the room that he thought was especially fitted as a correspondent nine times out of ten they made a mistake. They will pick a man or woman for no reason he thinks would be a fine writer of news. Experience has it isn't so. You have to smell around and find out for yourself.

IRMAN CLOSE: I think one trouble is that our reporters, while their experience is good, put off the matter of turning in news until the last minute. Then you are all ready, you haven't got it. I find that one of the best solutions is to pick up the telephone and jog them up and in that way you can get a casual word with your fellows. You can generally reach him by phone or go down in the shop and look him up. My experience has been that if I let him slide and send out a letter, saying please send your news by a certain date, you don't get very much. But if two or three days before the time I jog them, then I am very frequently in the same position as Mr. Wilkins—I have no idea what to do with it. It seems to me that that personal touch at the last minute is a great help.

EST AUGUSTUS (Mead Pulp & Paper Co., Chillicothe, O.): We don't have reporters at all. Like Mr. Wilkins, we have more material than we can do with. I found the best way to get live news that you want is, about a week or ten days before the deadline date, personally go yourself and talk to different boys who may have news, or send an assistant out and let him spend a day and a half around the different departments getting in touch with the different fellows most likely to have news, but won't take the trouble to write it down. Before you get away from him you've got four pages of stuff. I tell you it but won't write it. We've got all kinds of stuff that way. We have as much material of that kind as I have seen.

IRMAN CLOSE: We have done that more or less, too. Frequently, you get fellows who have a certain amount of ability in writing, tickled to death to write you items. But in some departments if you are going to get it you have to go down and talk it out of them.

. STRICKROTT (Mohawk Hudson Power Corp., Albany, N. Y.): I think the question comes down to one point, that is, to get somebody that is interested in the thing in the first place. We have been through all this and when we started out with our paper, the thing was first to find somebody that had some ability. We gave up that idea pretty much. Then we tried to get somebody that had a pretty good education. We came down from that to the other end to somebody that knows the organization pretty well.

When you get through it, if you can find somebody in the organization interested then he or she will find a way to do it. If they can't do it themselves, you'll find somebody in their particular group to help them out. If you work with them you can develop a news sense. They can at least give you news facts and bring their particular section of the company and with that background of

interest you will be able to work in such a way so you will be able to get the thing across.

CHAIRMAN CLOSE: Does anyone give any particular reward for turning in news? Or has anyone tried paying their people? Does anyone pay their reporters?

C. E. KANE (Illinois Central System, Chicago, Ill.): The Illinois Central is not like some of the others. It is a bigger publication and on a larger scale. We carry articles by the correspondents each month and award prizes. We found it works well.

We have three prizes; first prize for three-column head stories; second prize for the best two or one-column head; and the third prize for the second best two or one-column head. I find that wherever we award a prize, for a long time thereafter we have interest at that particular place; and while we strive to reward merit as it arises we also do try to keep the prizes from going to the same place all the time. We attempt to regard the correspondents and the editor together. I find that contact as you mention here is a fine thing to get the people together on more of a basis talking about the publication and it tends to keep their interest between meetings. Of course, we always give credit when a story is written by an editor or a correspondent, chiefly if the name is handled or the thing is handled carefully.

MISS M. LAABS (Seaman Body Corp., Milwaukee, Wis.): We have such a group in Wisconsin. There are 13 editors who belong to it. The reporters come down to our dinners. The editors bring along two or three reporters, and we have a speaker, and in that way we reward our reporters. We don't reward a man if he hands in material, but we penalize him if he doesn't. We have a space for him or his group with a heavy black line. If it is habitual we say, "This space again reserved for the crimp cutting department," or "What is wrong with administrative?" When they see their names, they are going to get after him.

One man took a heavy piece of paper and attached a pencil to it by means of a string and sent it in a Western Union envelope. On the top of the envelope he wrote this, "Expect an answer. Hurry up." Inside, he had a question on the paper, "What news for our next magazine." At the bottom, "This is not to come back blank." He sent out 250. In his plant, he got every one back. Where he didn't have news items, he had cartoons or jokes or ideas for 32 pages. An extra special edition came out of the hurry-up notice. He had 64 pages of extra news. He had said he was going to print every single item. That was one way of doing it. It was tried in another plant. One man got 75 per cent returns.

CHAIRMAN CLOSE: That's interesting. The man who said he would print everything that was turned in had a nerve.

What are you going to do when your plants are two or three hundred miles apart, when you don't come in contact with these correspondents or editors or reporters?

Mr. Kane edits a railroad magazine. He has that problem in a large degree.

C. E. KANE (Illinois Central System, Chicago, Ill.): When the travel is far, it is simply impossible to get the material by personal contact.

CHAIRMAN CLOSE: We are going to pass on to our next question, "How do you get by when you have lots of plants scattered around and can't have the personal contacts?"

ERNEST AUGUSTUS (Mead Pulp & Paper Co., Chillicothe, O.): We have four or five places to get news from. We have one man, usually the employment manager at that distant plant, who although we don't call him assistant editor, we depend upon to get that material from his plant and forward it to us. He edits it. When I get it, all I have to do is to write a head on it, and maybe cut out a few words here and there, and it is ready for the printer. He serves

the same purpose as either myself or my assistant in the home plant, and the boys all look to him to turn their news in.

CHAIRMAN CLOSE: You've got to have a key man in each of your places to handle it. Now we are going to another question. "Many house organs have a standard make-up for cover, and other changes from month to month. Which way is the better? Is it better to stick to your standard cover or change it right along? I presume those who change it will say it is better to change; those who don't, will say it isn't." Has anyone any thought on that subject? Variety is the spice of life. If you look at anything too constantly, you don't see much after a while.

HARRY A. GROESBECK, JR. (Walker Engraving Co., New York): I should think a part answer is to notice our large magazines. While you may change from month to month, there is always a mark or portion of it that carries along—one name and what goes to make that one name worth while. Take the *American Magazine* or the *Saturday Evening Post*. There might be a drawing there. Peeping through it you will see some of the title, so it is of some benefit to change but always have quite a percentage of your title or magazine or front page cover remain there so it does not lose its identity.

CHAIRMAN CLOSE: I think so. There ought to be enough on the cover to identify it the minute anybody gets it. He knows there is the plant publication again. Certainly that much ought to be done.

MISS RUTH MILLER (W. T. Grant Co., New York City): We have done something like that with our magazine. Our cover is a frame. It might be a picture frame, inside a cut. The cover is arranged in such a way that we can use anything in that frame. I have used photographs of people, cartoons, etc. This time we have used quotations. Fancy type, all sorts of photographs. I have purchased unusually good photographs our own people had painted and mostly the pictures have carried out some special idea. No matter what I have tried to use in that cover, the idea itself fits into the frame, which we have used as our standard.

CHAIRMAN CLOSE: We are going to rush along. "What size type would you recommend for a monthly magazine, 6x9 page size, two columns to the page? Some of our technical fellows what size? Everybody seems to agree on 8 point.

MR. AUGUSTUS: The size of the type should depend upon the width of column. A page 6x9, two columns, not less than 8 point, nor more than 9.

CHAIRMAN CLOSE: "In an effort to make a sheet newsy, how much value do you attach to personal items, anecdotes, jokes, etc., in comparison with such personal items as births, marriages, trips, etc.?" That is an interesting question. How much should you devote, or should you use at all, jokes on the other fellow and these kidding items, etc.? There is no question but that the fellow who gives them to you is tickled. The question is how about the other fellow?

It seems to me you are perfectly within your right to use them if you can keep the sting out of them. You don't want to put anything in your paper that is really going to hurt seriously a man's feelings. You don't want to put something which would embarrass, because the man might want to take the paper home, for example, and his wife is going to see something which she probably never heard about before. To a certain extent, joking items get a good laugh on a fellow, while the boys in the shop are tickled to have it come out in the paper. If it is a friendly sort of thing, he probably gets as much fun as the other fellow.

We use them more or less in our paper in a general way. How many of you use items of that kind?

(About 20.)

How many of you think that items of that kind should be taboo?

(About 7.)

We have a respectable minority who object. Somebody who voted against tell us why.

E. E. CRISWELL (New River Co., Macdonald, W. Va.): I had my hand up in both cases. We use items of that type and we have had, to my knowledge, five fist fights on account of it. That is the chief reason why I am recommending not using them. You say to keep the sting out of those items. It's pretty hard to know when you have the sting out of them. What will ride or sit well with me, won't go well with you. I say you can use those items if you personally know what it is all about, and know the man the joke is on. But if you don't know him and don't know what the joke is and the real point behind it, I think it would be advisable to lay off. When I say we have had several fist fights, I mean it. A couple of correspondents got in bad trouble. So far, I am not in trouble myself.

CHAIRMAN CLOSE: "Which type of employees' publication is the most effective in bringing about friendly relations and better understanding between management and men, the magazine type or the newspaper type?" When we had our regional meeting in St. Louis last spring we had a debate on that subject. We had one man who got out a newspaper type, present a paper on the advantages of that type; then we had a fellow who got out a magazine type, criticize his paper and he presented the advantages of that. We didn't have any formal judges but I would say the bout was more or less of a draw. There is a good deal to be said on both sides. How many of the editors here get out a magazine type?

(About 18.)

How many get out a newspaper type?

(About 8.)

R. G. CONOVER (Yale Towne Mfg. Co., Stamford, Conn.): When you ask about that, what difference will it make? I'm getting out a newspaper type because my management says it must be done. If the editors could go to their management and say that they are convinced from one of our section meetings, offering well-meaning evidence and suggestions, that the magazine is better than the newspaper type, if you convince them it is all right. But suppose you can't?

CHAIRMAN CLOSE: If you can't, you can't.

MR. CONOVER: We might tackle it. If you can show more reasons for the magazine than newspaper, we are going to run a magazine. There may be deeper reasons. It's what the management in my own company says. Some years ago they held several meetings on that subject and it was executively discussed. They concluded they would run the newspaper type. I would have a hard job to have the president and management alter that.

CHAIRMAN CLOSE: In connection with that question, here's another question, "Is it better to get out four pages every two weeks or eight pages once a month?" I think that is more or less involved in the other question. You can get out a newspaper type of magazine twice as often as you can a regular magazine, I suppose, without any greater expense, and I presume that the expense is the big item. What do you think about it?

(Several suggest eight pages once a month.)

LESLIE MARSHALL (Firestone Tire & Rubber Co., Akron, O.): I think the semi-monthly publication is the more valuable for our industry. It brings the facts more quickly to their attention. You can bring them news about births, deaths, etc. They don't get old. Our aim is to get as many names of individuals as possible in our employees' publication. If it goes too long, they lose interest and turn over a picture to you and if they don't see it for two months, they also lose interest. Whereas, with the semi-monthly publication or weekly publication, you have a chance to quicken the interest and to cash in on it.

CHAIRMAN CLOSE: The question of distribution. What is the best way to distribute your paper or magazine? I suppose probably the most common way when

he paper comes out is to have them distributed at the check gate or some place here when you go home. Some are mailed out. Is it better to mail your paper or distribute it at the plant? It is a lot easier to distribute it at the plant.

MR. AUGUSTUS: We have tried both. It is better to mail them out. We have come to that conclusion because of a number of reasons. In the first place, if you put them out at the pay window, as we used to do, we had men coming in on duty and men going off duty at the same time. The fellow who is coming on, took the magazine with him. He went to his locker room, either left it there, laid it down some place and somebody else picked it up, forgot it, or took it out on the job; while the machine was running, and the current on, through the machine the magazine went. Sometimes a two-ton roll has been destroyed that way and damage done to the machine. Is it better to spend \$50 on postage or \$1,000 for damage to paper and machinery?

On the way home, they might stop at a pool room, or see a friend, and leave it here. By mailing them, we get it into the home. We have found out that the wife and family do read the magazine, and if they don't get it they are the first ones to call up and find out what's the matter. By spending \$40 or \$50 a month, we are getting it into the home, and the man can sit in the chair, smoke his pipe, put up his feet and read to his heart's content, and the wife can read it when he gets through with it.

CHAIRMAN CLOSE: Do you have any trouble in getting your list corrected?

MR. AUGUSTUS: Yes, we are starting a new system. Once a month we are going to put a card at the pay window or the day before pay day send it to the foremen, requiring the man to fill in his name and change of address, if any. He must present that at the pay window before he gets his pay check.

CHAIRMAN CLOSE: We had much difficulty keeping addresses up to date, particularly where we have had colored men and foreigners. People of that type move around rapidly. It is impossible to keep track of them. I think that is perhaps the only real serious problem involved in mailing the magazine. I am interested in knowing how many folks mail out their paper.

(About 10.)

E. E. CRISWELL (New River Co., Macdonald, W. Va.): My company operates a number of coal mines. In the gaseous mines our magazines are put out—understand we have a definite date that the magazine comes out—to those people who ask for it, when they check out at the end of the shift. In the non-gaseous, it is put out at the payroll office. They go in and ask for it. Those who ask, get it; if they don't ask, they don't get it. I figure that if they are interested in the magazine, they will ask for it. If we thought nobody reads it, we might as well suspend publication. Therefore, we put it in the hands of those who want it. Those who don't want it, don't get it. We have found a good deal of success in that plan. Practically all of them want it. Most of them ask for it.

A. V. CRAIG (New York City): I have been listening to these very valuable talks. I want to make a motion. Before I do that, I want to commend the excellent talk of Mr. Wilkins. It shows he understands the newspaper field and understands the whole thing clearly. I move, Mr. Chairman, that this body appoint a committee to work out a style book for house organs. Every big newspaper has such a thing, even the Government Printing Office.

When you realize the importance of the work, you will see the need of such a thing. I don't know how many of you people who are editors know what it is to use such a manual, such as newspapers have to do. I think it would be a great help to do such a thing. For instance, the gentleman gave statistics of research which are valuable. Of course, I wouldn't suggest that everything be introduced but you ought to have a book like that which would be a guide to the other people and put your work over more helpfully. That's the motion I make.

CHAIRMAN CLOSE: The motion is that this body appoint a committee to work up a style book, for the publications, and this book would be given to different people in getting out their publications. It is a good thing to put out. Many people, no doubt, need the experiences of others in this field, especially when the responsibility of getting out a publication for which there is a printing bill, a paper bill, etc.

NILS JUELL (Michigan Steel Corp., Detroit, Mich.): I wonder if it wouldn't be better to amend that motion providing you have orders. It would entail quite a cost. As I understand it, it would direct and would permit the committee to go ahead.

CHAIRMAN CLOSE: I might say that this section of the council has no funds of any kind. We don't even have a treasurer. As a matter of fact, the council told us we better not have any money, and we haven't any money. I think this question might very properly be referred to the Executive Committee of the council to see if there isn't a way it can be worked out. If you are in favor of having us do that, will you so signify?

(The motion was seconded and carried.)

I want to read these one or two questions. "How many pages should a publication have before using a cover page?"

(Unanimous reply of audience "Not less than 16.")

CHAIRMAN CLOSE: I think that is the answer. It will take 16 pages to carry a cover. If you get much beyond that, you are a lot better off if you can have a nice cover on it.

Here's another question. "I would like to know of any practical method of keeping or filing photos in such a manner that they may be exposed to view and not damaged, some method that makes them accessible and does not require too much time. Any one any suggestion on a good method or system of filing photos?"

O. D. FREDERICK (Dierks Lumber & Coal Co., De Queen, Arkansas): I had the opportunity to see an example in the Texas Power & Light Company, Dallas. They had a very nice system of filing their photos. They had a card index. The photos were pasted or pinned on this card and if for any reason they want to refer to them they had a key in the index file and no matter what size of the photo, it was put on this card and filed away in this card index system. I thought it was complete.

CHAIRMAN CLOSE: That's interesting. "If your magazine circulates among other than employees (stockholders for instance) and the management insists that you consider them outside readers, in your selection of material, what are you going to do? Are you going to do it or lose your job." Whether you think it is a good thing or not, you will do it.

We will go on to our next subject. We are very glad to have with us here Mr. Harry A. Groesbeck of the Walker Engraving Co., New York.

Getting the Most Out of the Illustration Budget

By HARRY A. GROESBECK, JR.

President and General Manager, Walker Engraving Company, New York City

One must take a rather broad view of a topic like this, for it embraces not only illustrations and pictures, but translates them into printing plates, and finally, deals with the actual printing of them. It may be difficult to believe that different types of illustrations affect the printing process itself, but they do. They affect its appearance, cost, and the returns from the readers, which, after all, represent the objective.

In looking over a number of plant publications, one feels a lack of professionalism and a spirit of uncertainty as to their purpose. Not in all of them, to be

re, but in enough of them to give that reaction. In one magazine evidently tended for internal distribution exclusively, the effort to appeal to the vanity of some employee, whose youngster was pictured, was like the well known arrow which was shot into the air. In another was illustrated a piece of pipe with some fuses wound around it. The heading of the article was on being considerate of one's fellow workers. The two did not hook up together, apparently, until well into the text, where the danger of fuses in that environment was explained. There was no title to the picture, which helped the mystery. One could go on at length with such examples, but these will suffice to bring home the fact that there should be a good and sufficient reason for all illustrations, and that reason should be flashing like an electric sign at night, to catch the eye of the casual reader instantly. If Mr. Jones' little boy needs illustrating, let there be a typical newspaper heading and title to the picture. If fuses are in the wrong place, when posing around a piece of pipe, let there be a "scare head" to the picture. "Dynamite in the wrong place" would at least excite some curiosity.

Just because a plant publication is to be distributed only in the "family" is no reason why it should not have the same reader appeal as a great daily or a broadsheet. Even though this particular reading public be simply employees, they act just the same as those who pay their money and get their publications at the newsstands. It would seem, therefore, that newsstand publications would offer an excellent example to be followed; in fact they should be excelled, because it is human nature to pay more attention to something which has been bought, than that which is given away. "Easy come, easy go" applies to plant publications very decidedly.

One very good reason for taking a "professional" publication as a guide is, that their publishers have all studied the psychology of John T. Public through many generations and his likes and dislikes are catered to with the most discriminating care. Such publications need not wait long in order to learn of their stakes; their paid circulation and their sale of advertising space are indicators of the highest order. True, such publications are supported largely by their sold advertising space; but the advertisers, in turn, are supported by the readers, and complete the circuit, each must get his money's worth. So the editors obtain the best possible reading matter for their particular field; the art department operates with the editors to illustrate the text with an eye appeal equally highbrow or lowbrow, as the case may call for, and the advertising department juggles up to them with "next to reading matter" stuff so that the reader simply cannot escape if he has the slightest potentiality as a purchaser. Even if the so-called "reader" just wants to look at the pictures, he can be snared by a judicious placing of them throughout the text. But the plant publications carry no advertising (and there is no denying the fact that modern advertising is good to look at) so the appeal of both illustrations and text should be even more skilfully handled, if it is to get its message across to its "free list" subscribers.

It is a matter of historical record, that pictures came before alphabets. We are told that pictures speak a universal language, and by a stretch of the imagination, we may believe the old Chinese proverb that "A picture is worth ten thousand words," but it is no mean accomplishment to make pictures carry their message effectively and efficiently. Effectiveness and cost, therefore, may be isolated as the two factors upon which depend the success of the "Illustration Budget."

According to the Dictionary, "Pictures" are "images; works of art; likenesses." As such they stand alone and their value depends upon the skill with which they have been made; humor; historical interest; news value and so forth. It takes a pretty good picture to hold its head up all alone and be worth the space it occupies. Illustrations, on the other hand, are just what their name implies. They illuminate; they explain; they must necessarily be related to the context or

they will become just pictures again and if they were not built to stand that strain they are surely a waste of space.

It would seem, with the foregoing in mind, that pictures and illustrations should have different treatments, in so far as placing and decorations are concerned. The *National Geographic Magazine* and *Collier's Weekly*, represent two extremes in good taste and effectiveness. While the former is severely plain, it is dignified, beautifully executed and replete with "pictures." These really tell their own story and in many instances the legends under them are hardly necessary, save to complete the picture and to attract one to the general text. *Collier's*, on the other hand has few pictures, but many illustrations. They are all by artists of National repute, they have the eye-catching feature which halts the busy individual who "runs and reads," and they too lead one to the text unless one's curiosity is sound asleep. But note the care with which the pages of these two publications are laid out. The effect is not a studied one, yet they each, in their class, represent high spots in editorial and artistic ability and every nickel's worth of value possible, is obtained. There is no evidence of misapplied effort and the outstanding feature is simplicity. There are no disturbing borders, no tricky typographical arrangements, but just enough novelty, either in the pictures and illustrations themselves or in their environment, to give satisfaction to the eye and excite interest in the text which they "illustrate."

When this can be done with plant publications, even though it be in a lesser degree, the money spent will pay larger dividends. Even such trifling details as selecting the high spot in a picture, where the interest is centered, and cutting off all the remainder will prove to be a step in the right direction. This is particularly true of snap shots and other photographs, made under conditions which do not permit of a study in composition. A square inch of interesting detail can be enlarged three or four times in a halftone plate and give ten times the return that would result from the same section, surrounded by packing cases or something equally uninteresting. Emphasis can also be concentrated on a square inch hidden in some picture, by drawing a white line around it. If an air brush artist is available, all the comparatively uninteresting parts of picture can be grayed down to a phantom, leaving the essential feature in full color, yet surrounded with its original environment which may be needed for complete understanding of the subject. Details in planning these apparent trifles work wonders in effectiveness and add little or nothing to the cost.

Borders and decoration always add to the cost and should only be used when there is a definite reason for them. In an obituary a dignified frame acts as a silent tribute; in a page group borders may be used to hold pictures together, but it is well to remember that white paper makes one of the best and least costly borders available.

The size of a picture or illustration is an extremely important factor. It is not good design to crowd a space, but it is equally bad practice to make plates too small. If a picture is of so little importance that it merits a space so small as to destroy its clarity, it is better to leave it out. Small pictures are like small type, they should not be used except in cases of evident necessity.

In publications distributed to employees only, great value can be obtained from pictures and illustrations depicting the work of other departments. In these days of quantity production and highly specialized work, men in one department know only too little about what happens to their product as it passes along in the manufacturing train. In publications sent to consumers, "family stuff" makes a great hit. Intimate views which show how the consumer's interests are safeguarded offer a great selling feature on which the ever ready sales department can capitalize.

In the making of printing plates the way to get the most for the money is to

inate waste of time and material. First, employ the services of a photo-engraver who knows not only his own business but something of yours. Take him your confidence and let him decide your technical problems for you. Introduce him to your printer too, for the engraver's work is not finished until the etched sheets are off the press and if printer and engraver work together, the results cannot help but be improved.

Too many people are studying the photo-engraving business from the wrong point of view. They are burdening themselves and their staff with details of chemistry, optics and physics, which they will seldom be called upon to use in actual practice and at the same time they are overlooking some very essential things which they should master. The user of the photo-engraving process should be fairly conversant with the general principles of photography, especially that part of it which makes halftones and line plates possible. The proportions of copy and how it can be made to fit a given space are among the first things to study and many a plate has been wasted because it was marked to be made a certain size, only to find that it came too high or not high enough.

This is particularly true in grouping, where subjects must fit into borders, and a single step costs real money. A slide rule is not difficult to master and will solve such a problem. If this instrument seems too complicated, there are other methods for accomplishing the same result, which any engraver will gladly demonstrate. The color of a copy is another vital factor to be studied because most commercial photographic emulsions are blind to certain colors and will spring great surprises on the uninitiated.

Next comes the method of stripping negatives together. This is a practice well known to some and intelligently employed, but to others, it is an "Alladin and lamp" method and they just shut their eyes and say "strip this in." Stripping negatives together is merely an assembling operation, exactly like cutting photographs and mounting them together. The substance of the negative film is thinner than a photograph and permits of a neater job than combining the actual copies. It is therefore to be recommended in some instances, but the method does not perform miracles.

When to use the line process and when to use halftones are questions which can be answered readily after a little practice. Photo-engravings are relief plates, produced by protecting certain areas of the metal and etching others until they are deep enough to skip the printing rollers as well as the paper on which the rest of the plate prints. The whole essence of the process is to get the etched parts deep enough for the grade of printing paper to be used. Rough, soft-stock requires more plates than hard, smooth stock, because the plate sinks more deeply into the soft paper. In line work, deep plates cannot be obtained if the lines are too close together as there is insufficient space in which to do the deep etching. In halftones, a screen of suitable coarseness must be selected for the same reason; this is why there are so many different screen meshes from which to choose. With a knowledge of these factors, the choice of the line or the halftone process becomes simple. Line work will reproduce tones, if the tones in the original are composed of isolated areas with spaces between them wide enough to permit suitable depth of etching. If this condition does not exist, then the halftone, with its symmetrical arrangement of dots, must be employed to break up the tone into spots which can be etched to proper depth.

This article does not touch on the technique of photo-engraving more deeply, for to do so it would take upward of fifty thousand words to describe, even briefly, the intricacies of the process. Even were it possible to devote the space to it, the subject would be too complicated for the casual reader. If one wishes to make a study of the process, there are excellent books on the subject, but none will be as much help as a heart to heart talk with an intelligent photo-engraver. To a man, one should turn in his troubles as one would consult a physician.

With a knowledge of how to prepare copy and how to order plates, the requirements for the customer's technical knowledge ends and the remainder of the process should be left to the engraver. Tell him what is wanted, not how to do it, and you will get the most out of your Illustration Budget, so far as photo-engraving is concerned.

MR. GROESBECK: Somebody asked here what is the best way of keeping used engravings or used plates, which you want to use over again, how to keep them from being scratched up, so they won't get lost? If they are blocked or stored on edge rather than flat, they should be kept away from moisture and dampness. Celophane, very thin paper, wrapped around candy boxes, is excellent to protect engravings. They can be wrapped with that whether blocked or unblocked, sealed with sticker tape used in packages and stored away. That celophane also has the advantage of being transparent so you can see what the plate is. The plate should be clean when put away. If there is any ink on it, it will gradually solidify. It will be like enamel to get off. It doesn't harm the plate to be greased. In fact, if there is a little oil on it, it will keep the mixture on it. Air is the worst enemy. It oxidizes the copper and zinc that the plates are made of.

But wrapped up in that way it is not convenient to use celophane. Simply use newspaper, but wrap them to keep them as free from air as possible. If they are blocked, stand them on edge. The celophane is thin and as transparent as glass.

DONALD R. PRATT (Union Carbide Co., New York): My questions are in regard to making an engraving and enlargement from an actual photograph. A great many of the illustrations used in our paper are photos about $2\frac{1}{4} \times 27$ picas wide. We have occasion to use them to widths of 37 picas. We have made a practice of getting an enlarged print of that 5×7 . Just how far can you enlarge from the smaller print?

MR. GROESBECK: It is the same as any other photographic process. We have made plates three and four times the size of the original copy by direct enlargement. That is a matter of mathematics pure and simple. It depends on the focus and the camera, in making enlargements. To enlarge direct from the photograph itself, it is rather hard to get an enlarged print and reduce from that. If the original negative is available when you get an enlarged print your results are pretty good. If you work from a print you have to make a negative, project from that, from that make your half tone. The most direct method is to enlarge from the smaller print, unless it has been retouched, then enlarge it. You magnify the brush marks and that is objectionable. A little bit of Chinese white on the print, when enlarged it comes out larger.

R. G. CONOVER (Yale Towne Mfg. Co., Stamford, Conn.): Before we adjourn, I would like to inquire if we are to have another judges decision on publications this coming year. If a new committee has been appointed to judge the publications for next year and if that committee is willing to do the work, I have no doubt we will have a contest.

I would like to make a motion, in the light of data furnished in those 114 replies to questionnaire that it just take into consideration plant editors and publications of the two lowest classes and judge them additional to their other forms of judging, by the amount of money they have to spend. The lowest class was up to \$1,000. The next class was up to \$5,000, and I would make a motion that the judges be asked to make a decision on those kinds of publications with no larger budget than that, rather than that treating them alike from points of excellence regardless of money to be spent.

CHAIRMAN CLOSE: Is that motion seconded? Of course, at the present time we have three different classes. The third class being the magazines of the type which you speak of. Possibly Mr. Fish who was on the committee last year can tell us whether that was considered this year or not.

T. FISH (*National Safety News*, Chicago, Ill.): We tried to take that into consideration. Of course, we did not know how much money the editor had to do or how much time he had. We couldn't tell whether he was full-time editor or part-time. If you are involved in too many side issues, the job will be so busy that nobody will be willing to undertake it. And after all, according to the scale of points, the appearance is comparatively a small matter. It did influence us unconsciously, although we tried to judge the publications chiefly on their merit and their effectiveness in putting over the message.

CHAIRMAN CLOSE: Does anybody want to second the motion?

R. CONOVER: It seems to me the classification could be made by money expended. Marvelously inexpensive papers don't have a chance against some of the publications where the cost runs \$15,000 or \$20,000 or \$25,000. Some of the publications you don't know about.

W. ASHE (General Electric Co., Pittsfield, Mass.): I was on the judges committee for three years, and I can give my experience. I think the average judge in doing the judging to visualize the conditions under which the editor operated. What I mean by that is, he could take a paper, if he were in earnest about it, whether it was four pages, printed on very simple paper stock or whether it was a very ornate publication such as the Telephone Company's, and he analyzed it and really tried to see whether under the conditions under which the editor operated whether he is putting it over. That is the test of the value of the paper, whether he feels that that paper is doing a real constructive piece of work in the industry and it is going over. In that way, I think, if you try to grade these things on how much the paper costs, you will get into a multiplicity of complications; and if editors don't put any time in; and when you get into many complications, I think the present system of judging is best. If you are going to change it year after year, you are going to lose stability. Anyone who has done much research work in a big organization really knows after you establish something fairly good, you don't change it slowly.

I think that this year the judges went ahead and added a third classification. They made certain modifications in the rating. Looking at that from the standpoint of the judging for three years, I think they have made definite progress. That is the way to go ahead. If after going ahead for four years, you change your basis of method, I think you lose a lot without gaining anything. The point I am trying to make is that the man who is putting out the simplest type of publication is the one who receives careful consideration with the judges. It is a task to judge. I think in my case it took two hours a day for a period of six weeks to judge 250 magazines. It is quite a task because you have to go through every magazine five times. When you do, you have a good idea of what to do.

R. CONOVER: I would like to say one more word. It took quite a long time to do this. After you get it, how are we going to help it if we don't make use of it? The idea is if you take a man who has \$1,000, if he is getting the most out of the \$1,000 in his paper, he might get more if he had a larger amount and good experience and advice. I wouldn't suggest that we curtail or change the method of judging. I was a judge myself for three years, and I know the labor attached to it. This idea is merely supplementary to their other efforts.

NEST AUGUSTUS (Mead Pulp & Paper Co., Chillicothe, O.): Along the line of Mr. Ashe's suggestion or objection, I don't think if you pass this it should be entirely on the gross cost because you may have a fellow who may have only \$100 to get out 10,000 four page magazines a month. Some of these railroad magazines go to a great number. Take, for instance, the Pennsylvania Railroad Magazine. They get out a newspaper which can't compete with Bell Telephone Magazine. Their budget, so far as unit cost compared with my magazine is concerned, is far less. I have only \$1,600 a month. Now, the total amount of money expended may be as much as they are spending per month, but they are reaching a whole

lot more readers. If you base it on cost, it should be per unit cost per month.

CHAIRMAN CLOSE: Well, I think there are a good many things involved in it. If you are getting out a magazine distributing to 10,000 people and somebody else gets out the same kind distributing to 1,000, the unit cost on the 1,000 fellows will be out of proportion. There are a lot of things involved. I think we might very properly present this angle of the situation to the judges with the recommendation, if you like, that they consider it in their work. I was appointed one of the judges and so I am a little bit hesitant in making any recommendations; but I think perhaps it would be better if they receive the recommendation or a suggestion to consider, rather than to have this body command that they give the matter of expense certain weight because of the fact there are so many items involved in it. I do think it ought to be considered but just such difficulties prevent us from formulating a rule to cover it. I frankly don't see how it can be done.

MR. CONOVER: Suppose we recommend that they consider it.

CHAIRMAN CLOSE: In my capacity, not as chairman but as prospective judge, I would prefer that.

MR. CONOVER: I make the motion that way, that the unit cost be taken into consideration.

(Motion seconded and carried.)

CHAIRMAN CLOSE: I will give the new chairman an opportunity to say a word before we adjourn for the season. Mr. Kane, won't you present yourself.

C. E. KANE (Illinois Central System, Chicago, Ill.): I don't want to delay anybody any more than I have to. I think the session proceeded very nicely under Mr. Close's direction. There is very little that can be changed in the way of improvement. I only hope that everyone who is here today will endeavor to stir up a little more interest among the persons with whom he is acquainted so that next year we will have a turnout bigger than this year. The growth of the section has been very encouraging. I think it is largely due to the excellent *News Letter* that has been put out, and one of the main efforts of the incoming administration will be to foster the *News Letter*, to increase its value to the membership, and if possible to encourage regional meetings, say six months from now so that in every possible way the contacts between the various members of the organization will be maintained, so that we may have discussion such as we have had here today, and which I think is a fine evidence of the possibilities of the organization. I believe that is all I have to announce.

MR. AUGUSTUS: I move that a standing vote of thanks be given to the outgoing officers and members of the committees for the splendid work they have done in the past year.

(Motion seconded and carried.)

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SEVENTEENTH ANNUAL
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VOLUME II



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NOTE

Volume III of these Transactions, containing the Public Safety Sessions, the Education Division, and the Women's Session, is being mailed automatically to certain members of the National Safety Council who are believed to be interested in them. Any other member of the Council may receive a copy of Volume III by requesting it.

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Food Section

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Vice-Chairman—W. P. PENTY, Kellogg Company, Battle Creek, Mich.

Secretary and News Letter Editor—GERALD L. GORE, Casualty Reciprocal Exchange, Kansas City, Mo.

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VERN D. SUTTON, Postum Company, Inc., Battle Creek, Mich.

A. C. LEWIS, Detroit Creamery Company, Detroit, Mich.

G. A. NOXON, Ralston Purina Company, Inc., St. Louis, Mo.

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Seventeenth Safety Congress

October 1, 1928

F. A. HASSE, Chairman
Safety Director, Corn Products Refining Company, Chicago

The luncheon session of the Food Section at the Seventeenth Annual Safety Congress was called to order at two-thirty o'clock by the chairman, F. A. Hasse, Safety Director, Corn Products Refining Company, Chicago, Ill.

CHAIRMAN HASSE: We are mighty happy to have so representative a gathering as we have here today. While we are known as the baby section of the National Safety Council, nevertheless, those of us who gathered in Detroit at the time the Food Section was organized, more or less feel today that we are going to be, eventually, one of the leading Sections. Every year we have increased our membership just a little bit, which means that in the end we are going to have practically every food industry in the United States in our Section, and that is what we are aiming for.

As the first subject on our program this afternoon, I am going to ask the chairman of our Statistical Committee, Mr. Prouty, to read his report to you.

Report of the Statistical Committee

By RALPH E. PROUTY

Chairman

The duties of the Statistical Committee are described in a pamphlet prepared by the National Safety Council and may be summarized as follows:

1. To assist the headquarters staff in securing from the section members accident data to be used in compiling the annual accident experience.
2. To prepare an accident cause classification chart, have it reviewed and finally approved by the members of the section for local use.

The chairman of the statistical committee last year reported at the Chicago Congress the submission of accident data by 63 establishments representing 20,928 employees for the calendar year 1926. It is pleasing to report that 121 establishments reported for 1927 and this is an increase of 92 per cent. This is indeed gratifying as the dependability of statistics increases as the statistics increase in volume.

While no attempt will be made to give a detailed comparison of the 1926 to 1927 record it is interesting to note that the frequency rate for the section is 16 per cent lower for 1927 than for 1926 and the average severity rate 3 per cent lower in 1927 than in 1926. Sixty-three per cent of the establishments reporting had lower frequency rate for 1927 than 1926 and 79 per cent had lower severity rates.

From what has been said it is easy to see that the duty of assisting the headquarters staff in securing accident records was not a difficult one. The section members cooperated in a whole-hearted way and it is the belief that each succeeding year will find a larger percentage of the members submitting their records for cooperation in the annual compilation.

Shortly after the Chicago Congress, the Statistical Committee, which was composed of the Chairman, Jerome J. Lyons, John F. Jelke Co., Chicago, Illinois, Charles Prahl, Gridley Dairy Company, Milwaukee, Wisconsin; Frank Smoke, Kellogg Company, Battle Creek, Michigan, and C. J. Strobel, Wagner-Taylor Company, Philadelphia, Pennsylvania, began work on accident cause classification. A tentative classification was prepared by the chairman, sent to each member for

Accident Cause Classification

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[illegible]

the criticisms and suggestions for improvements, and finally considered complete.

By referring to the cause classification it will be noted that No. 4 is "Power Driven Machinery." It was the thought of the committee that it might be well to prepare a separate machinery accident cause classification on which accidents could be charged to specific machines. Correspondence soon showed that the number of machines used in the food industry was so large that such a special classification would be impracticable. The committee, therefore, presents for your consideration and possible adoption for sectional use a cause classification embodying 20 separate items.

CHAIRMAN HASSE: Now we will go on with the program. You are at liberty to speak as you please. What we want to hear now, is about the best stunt which has been used by the members in their plants during the past year in putting over their accident prevention campaign. Who is going to be the first one to get up and tell us what they did? We are all in this game of accident prevention, looking for further information.

Our Best Safety Stunt During the Past Year

By W. GATES

Peter's Chocolate Company, Fulton, N. Y.

It is common experience that a good record on Industrial Safety can be obtained only through a well organized, general program, which is carefully carried out in all details over quite a period of time.

It is only when a background of such a program exists that special features or stunts are effective. Therefore, in discussing special features, we should bear in mind that they are accessories to the main program.

The mechanical features of safety, such as guards and safety appliances are in general well covered and in the majority of plants are not a cause for worry. The large part of the safety problem is that of making each employee see it as a personal problem.

It is along this line that our special features have been of the greatest help to the general program. Of these, the following have given the best results.

Infections.—In all cases of infections which arise from failure to get first-aid promptly—and this causes nearly all the infection cases—the employee is interviewed by the manager or personnel manager. He is questioned regarding the case and the matter of infections is explained to him. His promise is secured, not only to report promptly to First-Aid in the future, but to urge his fellow workers to do the same. A second case of neglect results in dismissal. This method although in operation a little over a year has produced good results.

Machine Accidents.—Following two rather serious accidents arising from employees injuring their hands by inserting them into moving machinery, a general notice was sent to each employee that anyone putting their hands into moving machinery if detected would be discharged whether they were injured or not. Any employees so injured have been discharged. The inflexibility of this rule is well known and has had a good effect.

Individual Records.—A record is kept of lost time accidents to each employee. A tendency to accidents, as shown by the records, results in a personal talk by the manager on safety and an explanation that employees who do not work safely are a source of expense to the company and are not as valuable as those who do. If improvement is not shown, the employee is dismissed.

First-Aid Records.—A similar record as to individuals is kept on minor accidents which involve only first-aid treatment. These are analyzed for cause and if they

indicate carelessness or inattention, the man is marked for general observation as to his value as a workman. Publicity cannot be given to this record nor can the man be confronted by it, since this would soon have the effect of causing employees to keep away from First-Aid and more serious trouble would ensue. However, there are some indications that an abnormal number of First Aid cases is often tied up with lost time or major accidents and that the employee who has a large number of small accidents is likely to have a major one sooner or later.

In most cases investigation develops the fact that such an employee is not the best type and there are usually other objections to his work. His failure to take the general safety program seriously is often coupled with a failure to carry out instructions on his work faithfully or to take his work seriously. It therefore follows that the First Aid cases in the main give an indication of a poor worker in other respects.

Where the investigation shows that the employee's work is good, the foreman is instructed to pay particular attention to the employee and to see that he improves. The foreman usually knows when the employee goes to First Aid but at any rate he gets a notice of the visit. By watching the recurrence of minor accidents he can make a point of each one. Failure to improve leads the foreman to warn the employee and usually the man becomes a safe workman, in most cases without the necessity of a definite warning from the management.

These four special features in combination with the general program have undoubtedly produced results. We should not wish to give them undue importance in comparison with other special efforts. However, they are fundamental and since they are always in application their effects are constant and not temporary. In these respects they may be more valuable than other types of special safety work.

W. B. COSTER (American Sugar Refining Company, Brooklyn, N. Y.): I want to apologize to the Chair. I really should have brought up this question while Mr. Prouty was discussing his Statistical report. I wonder how many of us here in our statistical work or in our classification or nomenclature of "Lost Time Accidents," go on the same basis. I mean this: In our plant we have a safety committee. We are striving, the same as everybody here, to reduce our lost time accidents, and we have as a definition for lost time accidents, where the injured loses time other than is necessary to obtain first aid. For instance, if an employee is injured at three o'clock in the afternoon and goes to the first aid station, and the doctor passes on the accident and deems it wise that the employee go home, and the man goes home and is away from one to three hours on that day, we classify that as a lost time accident.

Now we entered a contest here some time ago conducted by the Merchants' Association, and we didn't make a very good showing; and I was wondering if the reason we didn't make a very good showing in that contest was because possibly all of the firms who entered that contest didn't do so on the same basis. Was it understood just what a lost time accident is?

So I would like to ask you if it is permissible to poll this room to find out if the majority of us here classify as a lost time accident one where the employee does not report the next day or shift, or if it is figured as such when he loses time on the day on which he is injured?

A: A. CLARKE (Secretary-Treasurer, General Baking Co., New York City): I was on the Merchants' Association Committee, and we went a little further than your classification on lost time accidents. We classified as a lost time accident an accident where a man was injured and went for medical treatment and didn't report back the next day for the same duty. Now a man may be injured and report back for partial duty or some other duty, but unless he reports back for the same duty we figured it as a lost time accident.

W. B. COSTER (American Sugar Refining Co., Brooklyn): In other words, if he loses time only on the day on which he is injured, it is not classified as a lost time accident?

MR. CLARKE: That is the understanding.

MR. COSTER: I wonder how many in this room go by that definition.

C. C. CLEMENTS (Sheffield Farms Co., New York City): I want to add to what Mr. Clarke said in regard to the contest held by the Merchants' Association. We were entered in that contest and were under the impression that if a man returned to work the next day on the same job, it was not to be classified as a lost time accident.

MR. CLARKE: You are right; I didn't mean to convey the impression that it was.

ALEXANDER DIENST (National Sugar Refining Co., Edgewater, New Jersey): We happen to be entered in a contest in the State of New Jersey, and the lost time accidents there are so classified when there is time lost other than on the day of the accident. That is their definition.

CHAIRMAN HASSE: I believe the understanding, so far as the National Safety Council is concerned, is that if a man is injured today and returns tomorrow on his regular job, it is not considered a lost time accident.

Well, who is next? Who has another problem or has something to add?

T. M. LIPPINCOTT (Liberty Mutual Ins. Co., Erie, Pa.): Up in Erie I have a bakery. Some of you people might be interested in it. I have been trying a little stunt and there is a lot of fun connected with it and it has brought results. This bakery was having a lot of accidents. There was a pretty jolly sort of a foreman. I happened to know them all from about 12 years' contact with them, and one of the managers had a toy elephant which stood about three feet high. They named him the White Elephant. And the idea of the contest is that this elephant is the booby prize. The department having the most injuries, not necessarily lost time injuries, but calls to the doctor, for the month, wins the elephant. Now when a department wins the elephant for a month, the foreman of that department comes to the department where they now have the elephant and gets on the elephant and these fellows push the elephant over to the other department. This is usually done at noon hour. And the outcome has been that this company has not only reduced its accidents, but has gone three months without a lost time accident.

CHAIRMAN HASSE: That is what we like to hear. Someone else has a good stunt in his system; who is it?

FRANK T. COLEMAN (Continental Bakeries, New York City): I got a pretty good idea from Bob Clair, who is chairman of the Taxicab and Fleet Owners Section. In one of his news letters he set out a scheme that had been tried in the west, and we have adopted it in some of our bakeries. It is to divide the men into two or three teams and have each man put a nickel a day in a glass jar in the office. At the end of a five weeks' period the team having the least accidents took everything that was in that kitty, plus what the company put in, either a quarter or a third. The only trouble we had was in getting those nickels out of them. If we made it 30 cents a week it sounded like too much, but a nickel a day wasn't so bad. In the plants where we tried it, it went over very well—it was the best safety stunt we had seen this year. But I think the Taxicab and Fleet Owners Section worked that quite considerably through their membership.

CHAIRMAN HASSE: Has anyone else a stunt? Perhaps Mr. Clarke has some sort of a stunt that he would like to tell us about. I understand his company has a very good record.

A. A. CLARKE (General Baking Co., New York City): Well, this is unexpected, Mr. Chairman. I came here to listen. It is quite unfair, I think, in discussing

a contest procedure, or planning a contest, to just say that this is work. I think first that all plants should be put on a similar basis of comparison to make sure that a plan, if expounded to you, would work out satisfactorily.

We have been using numerous ways of promoting safety. We are trying to think of most novel ways. We don't want any so-called straight line track systems. What we do in one plant we don't do in another, and I think sections of the country are different in every way. This year we have used so-called inter-plant contests. The biggest thought we have given to safety this year has been along the personnel program. That is not so much a contest as it is to foster safety from the very inception of an employee's service, to see that the employee has a good foundation; to instill safety as our company believes in safety, right from the beginning. We do all the things that I have heard about. We analyze our accidents. We classify our accidents by employees, by vehicles, by horses, by whatever ways and means necessary to find out the source of trouble. And then when we find out what the source of trouble is we begin some kind of a contest which is practical to the section of the country where the trouble is arising.

At the present time we have 47 plants, and we have these plants divided into groups. Our lowest group consists of about seven plants. We compete each plant against another. We have a banner that we give at the end of every 30 days to the plant in that group that goes through with a perfect score. Last month we had 26 of our plants go perfect through the preceding month without any accident.

CHAIRMAN HASSE: I am sure someone else here has a good stunt we would all like to hear about.

Well, I dislike very much to bring in my own connection. However, we have a man with us today from our Edgewater plant which has operated since March 5th of this year without a lost time accident. Just how that man has accomplished this good record I am not going to tell you, but I am going to leave it up to the man himself. Mr. Schraediger of our Edgewater Plant!

F. SCHRAEDIGER (Corn Products Refining Co., Edgewater, N. J.): As far as the Food Section is concerned I think, from what we had for dinner, it is going to be a success. So Mr. Hasse said to me, "Bill, I am going to have you tell the boys how you did it."

Now Edgewater plant has been an awful problem, as Mr. Hasse well knows, because he once had the same job I have now. It has taken a good many years to put this thing over. Our plant went through six months without a lost time accident. In October, 1924, the Edgewater plant made a record; it went through one month without a lost time accident. That was considered a wonderful achievement. Then, in 1925 we had one accident each month. In fact we had 13 that year. In '26 we had 14, and in '27 two departments went six months without a lost time accident, and one of those departments was the can plant, which was considered wonderful. It was nothing new to see somebody coming from the can plant with a finger cut off, here and there, regularly. And you have an idea what the can plant is with the hazard of the stamping machines. But that has been done away with. This can plant has gone one year and nine months without a single lost time accident. Also the filling department has gone a year and nine months. Furthermore, the entire plant went six months and we have only had three lost time accidents so far this year.

Mr. Hasse wants to know what particular stunts were used. That is something I can't tell you. There were no particular stunts, just the regular fundamental principles of putting up bill posters and having safety committees, and the likes of that. There was one thing that I did; that was to have plenty of patience and perseverance, and a little diplomacy, and above all, personal contact with the men.

Now the first thing to do, according to my way of thinking, is to get hold of your foremen. In a plant like ours some of them have been there 23 years—try to talk safety to them. They resent that, and say, "You can't come here and tell me how to run this department." Tell him you don't want to run the department but want to run the safety end of it. Win him over. You can do it. Of course you have got to have a lot of patience. Some of them won't like that idea at all; but finally I have won them over. Then you want to get him to feel his responsibility; get him to immediately take care of the existing hazards in his department and get rid of them. But you must have the backing of the executives; otherwise you are handicapped. Show them how to work safely, how to build scaffolds, set ladders properly, and teach them how to use tools in a safe manner. That is personal work. This is especially important on a new job, or with newly hired help. Get after them.

Of course, in order to do this it is well that the safety inspector have a good mechanical knowledge and experience. Every safety man hasn't got that, but if you haven't, try to get someone for your assistant who has. Pick one of the men with mechanical ability and experience to do it for you if you can't do it yourself. I naturally have had mechanical experience; I have been a mechanic all the way through the building trades lines. So I could tell them what they ought to do and what they ought not to do. I soon noticed the effect of my personal contact with the workers in this manner. I observed that after a while working safely became a habit with them. I used to take each department separately. Take the pipe-fitters; if they were doing a new installation of pipes I would go over and watch them. If they weren't putting the ladder right, or had no shoes on it, it was up to me to see that the shoes were on. So I finally made them get ladders with shoes on, or have the shoes put on, and showed them how to set a ladder, and if they had a ladder too long or too big, made them get a shorter ladder. I would probably spend several hours in that department, and that is the way it worked out.

But then there is the labor turnover. New men need constant watching. After I got through with one department I followed the other departments. However, I attribute a good measure of this success to your chairman, Mr. Hasse, for his persistency. When he is after a thing he gets it. I am sure he is well known to you gentlemen for his persistency because he has made the Food Section such a success, or at least helped to do it. As you know, he is at the head of our safety department, and if an accident occurred at our plant he would persistently keep in touch with me until he was satisfied that the hazardous condition was changed and a similar accident would be impossible.

So the only thing that I can say of my particular stunt is personal contact with the men and show them how to do it.

CHAIRMAN HASSE: In connection with what Mr. Schraediger has said I might mention that we have, for the past three years, been offering to the plant making the best record throughout the year a safety trophy. This, we find, has added a good deal of pep to the boys around the plant. The first year we ran our contest our plant in Pekin, Illinois, won the trophy; and in 1927 the Argo plant won it. Incidentally, Argo plant also made a reduction of 50 per cent in lost time accidents compared with their 1926 record. Now I believe there is somebody else here who has something to say.

H. E. WHEELER, JR. (Henry Heide, Inc., New York City): I wanted to sit still, but I brought three of our superintendents along and one of them has been consistently poking me in the back to talk.

You might be interested in knowing that we went eight months without a lost time accident. We only have 700 employees, but have over 900 machines. The candy industry is now a machine industry largely, compared with what it was in former years. I was glad to hear your safety man say that they didn't use

any particular stunts. We don't use any either. We have entered all the worthwhile contests conducted among manufacturers. Two years ago we went into the Associated Industries contest. We went 11 of the 13 weeks without an accident. Last year we won in our division in the Associated Industries in New York State. We just made a 100 per cent record in the Commercial Vehicle contest in New York City. So far, in another campaign we haven't had any accidents, and in the Merchants' Association contest we had 350,000 working hours without an accident and then we had a minor one.

We do all the things we are supposed to do according to insurance standards. We have two safety rallies a year, and our foremen's organization devotes one of their monthly meetings a year to safety, with an outside speaker or motion pictures. We get out our plant safety notices and keep bulletins posted, and we everlastingly keep at it. In the first place the company is sold on safety. Our general manager has spoken at our safety rallies. We had a crew of men who spent a year and a half doing nothing but revising our guards to bring them up to present standards. All of these things we try to do as a consistent program. There are no special stunts at all.

We have in our organization a club called the Horseshoe Club, consisting of men and women who have been in our employ at least 25 years. And three or four years ago we had a very enjoyable event, and the son of the man who was most concerned in that event is with us today, and I think he would like to say a word regarding his father. Mr. Grebenstein!

EDWARD GREBENSTEIN (Henry Heide, Inc., New York City): This is just a little bulletin I want to read. It is one of the bulletins issued from time to time by Brother Wheeler.

Fifty years' service without an accident. Mr. Charles H. Grebenstein on October 21, 1922, celebrated the Fiftieth Anniversary of his association with Mr. Henry Heide, founder of the firm of Henry Heide, Inc. Few men attain the distinction of a business golden jubilee, and yet Mr. Grebenstein, in addition to having reached that goal, has not had a single Lost Time Accident during his career with this firm. Truly a remarkable record, and we should all try for such a record.

THOMAS STROBHAR (Wagner-Taylor Company, Philadelphia, Pa.): I have a message to give to you. We have recently had two particular losses that come to mind in connection with cold storage warehouses. The warehouse was being rebuilt or improved and a new cold storage section added. The plans and specifications that were drawn up by the architect and were argued with the owners and the engineers perhaps did not take into consideration at the time of those conferences the safety engineer, or someone who might have had some hand in them. The concrete walls first had to be prepared to receive the cork. They had a coating of paralin (I believe it is) material that looks like tar or pitch. It was heated in portable kettles, because the specifications provided that this material must be heated within 20 feet of the place of application. The workmen came on the job the first thing in the morning in order to get busy in putting on the cork. The cork and material had been piled on each floor, 7 or 8 or 10 feet high, and running nearly the length of each of the floors. Some of it had already been put on, and it was possibly piled as near the elevator openings as they could get it.

These pitch kettles are heated by oil burners which you have to put under some sort of pressure. Well, that workman won't tell us just what happened, but evidently the kettle either boiled over or was knocked over, and got on fire and spread rapidly to the cork. It set all the cork piles on fire and the cork on the walls and on the floor and the ceiling was burning fast, and there was plenty of smoke. Two of the men, I believe, are still in the hospital, and six

of the pipe fitters, are still wondering what it is all about. They were caught in the smoke and penned in the building.

Now it seems to me that in arranging for the application of cork insulation on a cold storage warehouse, more than ordinary precaution should be taken with regard to how you stand up one of those kettles or where you place it. Don't put it so it is going to upset easily. There certainly should be someone provided to supervise it. There certainly should be provided some extraordinary precautions with regard to extinguishing fire if it should occur. All of the workmen in the building should be told the different ways out.

I cite that particular case because of the losses in connection therewith, not only the fire damage, which is to the extent of \$30,000 or more, but the poor men who were injured.

I have another case that may be interesting to those in the Food Section. It was the removal with a varnish remover of the paint or varnish from the ceilings. The whole area of the room was arranged with a scaffolding, which gave about six feet headroom. The flooring of the scaffold was sealed tight so as to preserve the machinery and equipment underneath from this dripping material. The only access to this whole area was through a very small opening near one of the windows, a recess in the window with a ladder where these fellows climbed on this scaffold to work. Well, they daubed the ceiling and the whole covering of the scaffolding was pretty well saturated with the benzol varnish remover. They found that after putting up the scaffolding they didn't have sufficient light for anybody working to see by, so they had to bring in some portable lights, cluster lights, and various other kinds. They had the lights fastened, I presume, on a nail that the nearest workman happened to drive in, and another workman stumbled over the cord or wire, and down came the cluster, a spark lit the benzol soaked scaffolding and the thing began to burn and burn fast. Now, then, to see those babies scampering out. They had extinguishers, they had Foamite, but there wasn't a man who would stand up there and use it. That place was burning and burning hot. Most of them got out with just burns. They couldn't get out of this opening fast enough and tried to break their way through somewhere else, and they were burned and cut.

Now that is a hazard that seems to me could have been prevented. There should have been more means of access to that scaffolding. There should have been ways so that the fire could have been fought by people below with different extinguishing apparatus. That is something that hadn't been considered.

CHAIRMAN HASSE: The afternoon is still early and everybody seems to be very attentive. Who else wants to tell of some stunt?

H. S. TUTHILL (Vice President, Sheffield Farms Company, New York City): I think this is a good time for me to tell you a little bit about our experiences in the Sheffield Farms Company.

I was in charge of the claim department work of that company for about nine years, and our accidents were increasing all the time, faster than the growth of our business. And a year ago the first of last July I had the good fortune to get with us Mr. Clements, the gentleman here who has charge of our safety work. During that period, for one year, we have reduced our accidents 13 per cent. Our business is a hazardous business. We have about 3,000 wagons on the street; we have about 800 automobile trucks, and so forth. But the thought that occurs to me is that the biggest part of safety work is getting 100 per cent cooperation of your employees. If you don't have that you will not make the success, you won't get the results. And we have sold safety work, I am proud to say, to our employees, I think, 100 per cent, just as though it comes from them. It is a work that we have got to keep after all the time. If we don't, things get slack and carelessness develops again and accidents will increase.

But one thing that Mr. Clements introduced in our company was to equip several wagons with posters denoting safety—and our employees, every one of them, are crazy to drive those wagons. Not only is it a great advertising proposition, but we also get letters from the public commending us on that work.

CHAIRMAN HASSE: Thank you, Mr. Tuthill. I believe this has been published in the last issue of the *National Safety News*.

Has anyone else anything he would like to tell us?

V. D. SUTTON (Postum Co., Inc., Battle Creek, Mich.): I always like to see ladies present wherever food is involved. In our plant one of the problems has been a safety rule book. I am not referring to this in a boastful way—it might better be apologetic—but as I sat down here I was introduced to a gentleman who said he had recently read my attempt at a story—I don't know that he put it just that way—in the *National Safety News*, about the safety calendar. You will notice that one of the last things in that little story was criticism of the plant because they didn't have a safety rule book. That criticism was very personal. Our plant hasn't a safety rule book. For a number of years we have tried to have a safety rule book. I don't know what the opinion is here as to whether we should have a safety rule book. But as was said in one of the sections this morning, a safety rule book in some industries would require a man to take a long vacation to read; and perhaps he might have added, a college course to understand.

I don't know of any industry, unless it is shipbuilding, that involves more variety of hazards than the food industry, and that is the reason we haven't a safety rule book. It would be too long, because we have so many different kinds of hazards; and I wonder if members of the Food Section, representing other industries, have a safety rule book in their plant?

CHAIRMAN HASSE: Has any one of the members present a safety rule book that they could tell Mr. Sutton about? Evidently the rule book seems to be a problem with everybody. Perhaps that is one of the reasons why they haven't any.

Has anyone else anything he would like to bring up?

MEMBER: We are supposed to be in the Metals Section but your subject looked so good we thought we would drop in and listen to what you had to say, and since that my conscience has sort of bothered me to speak.

We reduced our accidents, since January first, 45 per cent, and for our principal safety stunt we divided our employees into three sections. There were three classifications according to their hazards. The first classification was called the "Compensation Class," which included foundry, machine and plate shop. The second was the "Lost Time Accidents"; and the third classification, where the departments weren't very hazardous, was classed as "Any Kind of An Accident," where you bruised your finger, or got a sliver in it, or had it cut off. This contest ran from the first of this year up to date. The prize was that the man most interested in safety from each classification in the winning department would be given a trip to this convention, all expenses paid, and his pay from the time he left the plant until he came back again, which amounted to a considerable amount of money.

I have here a man from the machine shop. Our machine shop ran with just two compensation cases from January first. We have a man from the Lost Time Accident class; they haven't had a lost time accident since the first of January, and we have about 50 men in there. That has never happened before. And then we have a man from our finished stock; they had four accidents since the first of January. We think that is pretty good.

At our gate, where all the employees go out, we have a large signboard about 18 feet long and five feet wide, and there is a flag staff for each department, with a removable flag, and they are divided into the three classifications, and at

each classification they have the number of accidents per hundred men pro-rated. At the end of each month we set these flags according to their standing, or according to the number of accidents they have had the previous month; and the men take considerable interest in it.

Then we have our bulletin board and we have a safety flag, a green and white flag, that comes down for 24 hours every time we have a lost time accident, and a bulletin is placed on the main bulletin board telling where the accident happened,—what department. That is run in connection with our other plant in Evansville. We have an inter-plant contest and also inter-departmental contests.

I think for about six months we ran "Safety Suggestions." Each month we would collect the suggestions from the boxes distributed around the plant, and we gave \$25 in prizes for the best suggestions, distributing that in four prizes, \$10, \$7, \$5, and \$3. And any one man was eligible to all four prizes.

In our steel foundry where we had the most accidents, we put out daily bulletins, just took a piece of wrapping paper from the shipping department, and if we didn't do anything else we would put a safety slogan on there; and every time there was a lost time accident we would put that on the bulletin board along with the night steel foundry and the rest of the plant, so they could compare how they were going. We used to have 10 and 12 lost time accidents a month, and we have reduced it to four.

Then the last, but the best, thing that I found was the personal contact with the men. I interview every new man that is employed, and I go through this so-called rule book with him. We give each man a pair of goggles and we tell him that if he isn't interested in safety that we don't want him, and there is only one man that we have had to reject on that score. He knew too much about safety and we let him go; we thought he would do better some other place. We have strict rules for goggles. They have got to wear them, and if they don't they are given two weeks' lay-off the first time they are caught, and they are fired the second time.

I spend a great deal of my time walking from one department to another and conversing with the men. You might call it "chewing the fat," but it counts a whole lot, and they get to know who you are, and we make a great deal of progress that way.

We also have a safety dinner about once a year, where all the men on the safety committee come and we talk things over. At least once a month we have a meeting in each department, and the foreman is chairman of the meeting, and we talk over the accidents that we have had and get each others' experiences and thoughts.

That is a brief résumé of what we have done in reducing our accidents 45 per cent in our plant, and we are quite proud of it.

CHAIRMAN HASSE: I am mighty glad that you came in. Has anyone else anything to say?

FRANK MORRIS (Liberty Mutual Insurance Co., Boston, Mass.): My experience with this rule book proposition might be a suggestion to Mr. Sutton. About 12 or 13 years ago I was in a plant where we had everything, apparently, except a rule book along safety lines, and we thought that we would get one up. So the duty devolved upon me to compile this rule book. Well, when I started out to write it I found I didn't know much about the rules for the individual departments so I asked the man in charge of each department to write up a set of rules to be incorporated in this book. Incidentally, in going around to see the different men on this proposition, I found that the book would have to be printed in about eight different languages in order to get it across. Then it occurred to me that inasmuch as my job was not preventing the accidents but helping the management supervise the foremen so as to keep their interest up, why did we need a rule book at all? If the foremen knew what the rules should be for their departments,

then my job was to see that they enforced those rules. And so we decided not to have a rule book.

G. A. NOXON (Ralston Purina Co., St. Louis, Mo.): I don't know as these are exactly safety stunts, but I will give you a few of the high lights of the campaign we have carried on this year. We are operating 12 plants. To start out with we organized safety committees in every plant. There is an inspector, as a member of this committee, who makes a complete inspection and report each week of the entire plant, and then once each month three members of the committee make an entire inspection of the plant. A copy of the committee's report comes into the Home Office at St. Louis. That gives us a means, when we go from one plant to another, of checking up and seeing that the work is actually being done as far as safeguarding mechanical hazards, and things of that sort.

Then we designed a Purina Safety Button (just the small button that I am wearing) and a man is entitled to that button after going six months without any sort of an accident. And I can say right now that we have, I should judge, over 50 per cent of our men wearing those buttons. It has been quite a help to us.

Then we held a safety slogan contest. We gave prizes for the best slogans from each plant, and then we posted these slogans on the various bulletin boards and gave credit to the men who produced the slogans. The regular Bulletins issued by the Council were used, of course, at all plants. Then we tried out making home-made bulletins, and we had the men suggest or draw up bulletins that they would like to have us use, and we put these over the time clock, changing them every morning. We found that the home-made bulletins had more drawing power than the ordinary bulletins we got from the Council. We held mass meetings at every plant, not at any special times but whenever we could get a good speaker we would hold a mass meeting. At the St. Louis plant we had eight during the year. We had no trouble in getting good speakers from outside plants to come in. We generally hold those meetings for a few minutes after the noon hour, 15 or 20 minutes, and get the men pepped up. At one of these meetings we had a safety play, a short sketch with a lot of humor in it, showing things that happened in the plant.

We put up score boards at every plant and post records from each of the other plants so that they can know just where they stand. I might say that we are carrying that further this year, and instead of posting the records once a month we are going to post them every week, and we find that that has quite a pulling power. We designed a safety pledge card and we require every new employee to sign this card and turn it over to his foreman, who turns it in to the employment department. That card is kept on record; we do have some use for them. If a man gets hurt we go back to him and show him that he has been explained the safety rules and that those accidents shouldn't happen. We have a safety pin organization that is made up of members who suggest special improvements or actually do some outstanding thing to prevent accidents, and the badge of this safety pin organization is simply a large horse blanket pin. But that goes pretty well in the shop.

Now of these various activities the four outstanding are, first, the safety committees, suggesting the carrying out and removal of hazards; second, the contest for the best safety slogan; third, the home-made safety posters used over the time-clock; and fourth, the safety pin club. The first had to do with removal of actual hazards, and the other three were getting safety over in the minds of the men.

CHAIRMAN HASSE: We have with us today a representative of a well known food manufacturer. They have the reputation for building "Pep" and I believe it would be only fair that we heard from our good friend and secretary, Mr. W. P. Penty, of the Kellogg Company, Battle Creek, Michigan.

W. P. PENTY (Kellogg Co., Battle Creek, Mich.): I was quite interested in some of the stunts which have been going on throughout your plants during the year; also very much interested in getting a fine letter from Brother Wheeler who said he was going to have his three superintendents with him, and when he got up to speak I said, "They sure are here." I appreciate that very much.

But we have, at the Kellogg Company, in Battle Creek, pulled off stunts of all kinds, a good many of which I listened to here today. Getting up slogans was one thing that helped us greatly, and was very instrumental in helping us go 72 days at our plant without a lost time accident. We gave cash prizes for those slogans, but the interest was lost after a while. And we have also used the banner system in our company. We would have a blue banner to go for a month and if there was not a lost time accident we would put up a gold banner, and should we have a lost time accident the gold banner came down and the blue banner went up. And then naturally the employees would want to know all about the accident.

In the last two months we have started a little different plan. We have in the lobby of our factory a large board, on which we have each of our departments noted. The number of employees in each department is listed, and each day that that department has no accidents we put a white chalk mark there; if it is a minor accident, a blue chalk mark, and a lost time accident, a red chalk mark. It is surprising how that has proved interesting to the employees. They gather there each morning after our safety inspector marks it up. And should there be an accident in any department it is very noticeable how the employees laugh at the one that has gotten hurt. It is going to be the means of cutting down a lot of our lost time accidents.

Regarding the rule book, we really have not got a safety rule book, but each new employee is given a card which he in turn turns over to his foreman, and after the foreman has instructed him along the lines of safety in that department, or the machine that he may be working on, the employee then is supposed to sign that card and it is returned to the employment department. As someone said here today, in case he should be hurt and his injury should be of a serious nature and try to say he had never been instructed along the lines of safety, you have a check on him.

Also we have a safety inspector who does that work. Every new employee that comes on now, regardless of what shift it is on, is instructed along the lines of safety as far as possible, and we are having splendid results along that line.

We have a special safety committee composed of five members, of which our assistant superintendent is the chairman, and any accident outside of a minor accident that occurs at our plant is investigated by this committee. We try to lay the blame where the blame belongs, and whatever the history of the accident is, or whoever is to blame for it, we put it on the bulletin in the lobby where it can be read by all employees. That has had a good effect. We also have a general safety meeting once a month in our social hall attended by the heads of all departments, foremen and inspectors. There are usually about 80 at those meetings. We try to have a good speaker, and we always have Travelers Insurance representatives there. They usually make their inspection of the plant at that time, and I can see that their staying right on the job and not letting up has its good effect on safety. I think we did let up for a little while and soon found it didn't pay. You have got to keep eternally at it, and the way you can do that is by educating the employees.

ADJOURNMENT.

October 2, 1928

F. A. HASSE, Chairman
Safety Director, Corn Products Refining Company, Chicago

The Tuesday session of the Food Section at the Seventeenth Annual Safety Congress was called to order at nine-thirty o'clock by the chairman, F. A. Hasse.

CHAIRMAN HASSE: We extend to the members present a hearty welcome. As I stated at our luncheon yesterday, our Section is now going into its third birthday. I believe that the Food Section has progressed considerably, perhaps not to the extent of rendering the service that has been expected by some, but, then, no one will deny that we have accomplished much. We have uppermost in mind one thing and that is building up the service that we can render to our members in accident prevention. To accomplish this, of course, requires the cooperation of all interested members.

The *News Letter*, one of our best mediums of exchanging ideas on safety problems, has probably been more or less neglected. Therefore, I now ask that, in the future, all our members contribute very liberally to the *News Letter* each month.

I want to again call your attention to the Annual Industrial Accident Experience pamphlet which is issued by the National Safety Council. This gives everyone a good view of the accident experience which was established by the Food Section members during the past year. It is worth studying.

Today we can boast of 140 members in our Section. What a wonderful organization we could build, if each of those members would contribute his share toward ways and means of combating our accident problem, thereby helping each other and rendering a service, perhaps, not only to the members of the Food Section but to all interested in the field of accident prevention.

We will now proceed with our regular program. I take great pleasure in introducing Mr. Frank Morris, Assistant Chief Engineer, Liberty Mutual Ins. Co., Boston, Mass.

The Status of the Safety Engineer

By FRANK MORRIS

Assistant Chief Engineer, Liberty Mutual Insurance Company, Boston

At the Chicago Congress a year ago I dropped into one of your Food Section meetings. I confess that I was surprised by your numbers and I left your session with the impression that you were a sincere group, really trying to get somewhere. So I feel that it is indeed a compliment to be asked to address you.

Early this year I was speaking on successive nights in Cleveland and Detroit and I took my first airplane ride between the two cities. I do not presume that none of you have ever gone up in a plane. I know that Frank Coleman was terribly sick crossing the channel and the only reason that he didn't jump out, like Lowenstein, was that he was too weak to open a door. There is really but little hazard to life in a trip of that kind; it is certainly safer than automobiling. The greatest thrill one gets is the feeling of absolute freedom. Up there mundane affairs, like topping your drive, how to see Broadway and get the expense on your swindle sheet—all of these problems fade away like mist before the rising sun and you are for the moment reborn—you are free.

If you want to know how mean and trivial are the worries and cares of your

work-a-day existence just go aloft in a good plane a thousand feet or so and look down on this old world of ours from that vantage point. With your feet off the ground you have that sense of detachment that is necessary in order to properly evaluate the affairs of men whom you can't see but whom you know are thickly congregated in the towns and cities far below. The landscape swims by under you in review, the varied colored fields of a farm resemble a patchwork quilt on a baby's bed and that curling string of baby ribbon weaving along over hills you finally recognize as a concrete highway. You see a sizeable green area with a large building at one end and you guess that it must be a golf course. You suspect that some humans are in that building playing the 19th hole offering all kinds of known alibis and that on the first tee is a group of men arguing vociferously about their handicaps. Ordinary affairs of apparent consequence vanish as being too trivial to consider. You sail along over a town peppered with tiny houses on the outskirts and you give a thought to babies and flowers. Then your eye catches the smoke rising from factories and you imagine the workers at their daily jobs, some watching the clock, trying to do but little, others doing their best to earn an honest day's pay.

Somewhere down there in that big group of brick mill buildings is probably a man who is called "Safety Engineer" and like a shock it occurs to us that if the smoke from one or two of those chimneys failed to rise tomorrow that safety man would probably lose his job. Because our job is of vital interest to most of us I want to talk to you for a moment about that aspect of our profession—so if you please, we'll come back down to earth.

We safety men know from bitter experience that in times of business depression our casualty list is high, but to my mind the fault is ours because we ourselves have not estimated our job correctly, and if we do not value our work correctly of course we cannot blame the management for underestimating our worth to his organization.

Will Rogers has a story that illustrates my point. "I go down to da boat to meet my brudder Sylvest just come from Italic. I seea da boat and bigga da crowd on da dock. I pusha to da front and I yell 'Hallo—Sylvest,' and he holler 'Hallo—Tone,' and wava da hand. Then I heara someone yell 'Man Overboard' and, Christopher Columbo!—I looka round and I see it's me."

There are three or four thousand of us here in New York decorated with Congress badges. The world must be saved from accidents and we are the people who can do it. We are rather proud of ourselves and we like to get together every year to brag about our wonderful accomplishments, but I sometimes wonder if some of us (most of us in fact) aren't overboard and don't realize it. Do you know, I think that most so-called safety engineers, instead of having their feet firmly planted on the solid planks of business, are wallowing around in the waters of emotionalism. We are holding our jobs on a "blood and bones" and "widows and orphans" basis instead of "a reduction in the unit cost of production" basis and that's just why safety men lose their jobs when business slows up.

We call ourselves "safety engineers." Is there anything emotional about any of the other branches of the engineering profession? The civil engineer throws a railroad over a mountain range and brings communities together and people are made happier; the sanitary engineer plans a sewer system for a great city and the people are healthier; the electrical engineer reduces the cost of the kilowatt so that millions benefit; the mechanical engineer develops an internal combustion engine and as a result everybody in town autos out to the country on Sunday and everybody in the country tries to get into town. The work of these engineers results in great benefits to the human race but I doubt very much if the welfare of the race was the motivating instance in any case. An engineer is one who develops the forces in nature to the benefit of mankind. They handle the stored up energy in coal and in water power, they make use of gravity, they deal with

inanimate forces and make them work for people.

Can we not stretch that definition to cover us? Are we not dealing with latent forces in the individual which if brought to the surface and made to work will result in benefit to all mankind? We certainly are. Clearly we are entitled to be classed as engineers. These other engineers know that one horsepower will lift 33,000 pounds 1 foot in 1 minute. The safety engineer on the other hand has to guess that a man may lack horse sense and that in lifting 33 pounds he may drop it on one foot any minute. And why should *safety* engineers then not find an economic basis on which to stand rather than an emotional one? Is there such a thing as an economic excuse for our existence?

Here's a chap up in Racine, Wisconsin, who says "Safety work in our punch press room increased the production of that department 65 per cent and all the other departments are now shooting at that mark." Another man in Walkerville, Ontario, says "Our costs on eye cases alone were reduced from an average of \$1,600 a year for five years to an average of \$80 a year for the last five years." The Buick Motor Car Company shows a saving of \$70,000 a year due to safety work. Let's analyze that. Assume that the safety work costs \$20,000, we still have a credit balance of \$50,000 and that represents, at 6 per cent, some \$833,000 capital investment. Eastman Kodak, annual cost of accidents reduced from \$35,000 to \$3,500. Commonwealth Steel from \$40,000 to \$4,500. International Harvester saves 25 cents on every \$100 of payroll due to safety work. During a 15-year period, for every dollar the American Car and Foundry spent on Safety work they got \$1.70 back. The Norton Company expended in 1922 \$17,456 for accidents; in 1926 this figure had been reduced to \$1,535, less than one-tenth of the former annual cost. Over a 10-year period, for every \$9.70 spent by the Steel Corporation on safety they got \$14.60 back. It is true that probably 40,000 serious injuries and 250,000 minor injuries were averted by them in that period, but why need we, as engineers, drag in the emotional appeal when we are talking about a 50 per cent interest return on the investment? I say this company spent \$9,700,000 in 10 years and got \$14,600,000 back—50 per cent interest on \$9.70 is \$4.85 and add these and you have \$14.55. Safety work isn't wildcat oil or blue sky or gold plated brick—it's a bona fide business investment.

James Stewart & Company contractors right here in New York are today saving \$2.80 on every \$100 of payroll because of their safety work. It is no wonder that Mr. James Stewart is the chairman of a big safety drive among contractors. A small plant making earphones for radios guarded four presses and the net saving is \$1,747 a year. Show me a plant large or small in any kind of business, steel rails or suspenders, locomotives or latch keys, battleships or buttonhooks, automobiles or atomizers, where intelligent well supervised safety work has not paid well in dollars and cents.

Let's talk more about "the reduction in the unit cost of production" and less about "widows and orphans."

We are told by a most reliable authority that 98 per cent of accidents in industry are within the control of supervision. (Even the earliest safety engineers recognized that to be successful we had to have the backing of the management—the Big Boss—as we then called him.) Another report that we can couple up with that is that of the American Research Council who made a study of 13,898 plants for the years 1922-1925 inclusive. That report reveals that the minor accidents appear to be more important from the standpoint of incidental loss than has been realized. Productive time lost in minor cases is three and one-half times that lost in major cases. The loss of production value in the minor cases being three times as great as in the major cases.

Now let's conservatively tie those two reports together and say this: "The production value lost in minor accidents is *twice* that lost in major accidents and proper supervision can control 80 per cent of all industrial accidents." Doesn't

that sound like an engineer talking? Those statements are **matters of record**, they are true, we have the proof Q. E. D. So let's think more in **these terms and less** in terms of blood and bones.

We safety men used to be called crusaders. We weren't even that. We had courage but we lacked a horse. Between you and me we were **simple crepe hangers**. Today, possessing the same old courage and armed with facts **such as I have** outlined, we take our rank along side of those other groups of **engineers who are** conserving our material resources while we are conserving our **human resources**.

But let's keep in mind that we are new in the field and that we are **few in** numbers. True there are thousands of delegates at this Congress but the **men** in industry today giving full time to safety work are numbered by **hundreds only**. Most of us have hybrid jobs made up of first aid, timekeeping, **employment and** so on, and too often in such cases the importance of the safety work is **minimized**. Our safety engineering jobs will be just as big as we make them.

I can't imagine a safety man losing out because he induced the management to supervise and thereby control the accident situation; we will always need safety experts just as we will always need mechanical experts and electrical experts. But who is there who does not want to progress? And what better opportunity to serve do you want than to have chance to reduce the unit cost of production.

I have no quarrel with the altruistic safety man whose sole aim is to prevent human suffering. We have some rare examples of doctors, teachers, and preachers of that sort but most of them are in their chosen professions to make a livelihood. Some of us consider ourselves doctors of the accident disease, others teachers of safety education, others of us feel that we are preachers, or Missionaries, or evangelists, of the safety gospel. All these are but tools in the kit of the genuine safety engineer to be used at his discretion to loosen the particular nut that he is confronted with at the time. Above all let's be engineers.

From my office window I can look down upon the monuments in the famous Boston Public Garden and one of them is inscribed "In gratitude for the relief of human suffering by the inhaling of ether." As safety engineers, we care nothing for monuments to signify that we have prevented human suffering. Our work is on a sound practical statistical basis. We can prove that accidents can be prevented and we can prove moreover that it is good business to prevent them. We talk a lot about lives and limbs saved and we proudly display a chart that shows the decline in accidents but the greatest thrill that you and I really get out of our charts is that it is proof that we are doing well the job we were hired to do and we know full well that if the accident curve continues to go down in all probability our individual wage curve will go up.

Perhaps I have shocked some of you with this rather crass picture of the real status of the safety engineer. But listen—if an oculist prescribes glasses for you and saves you from eventual blindness you don't fall on his neck and kiss him—you pay him \$12, that's his business; if a doctor pulls our child away from death's door we're grateful, of course, but our check on the first of the month looks just the same to him as any other check; if a life guard at the beach rescues some fair maiden from the water we don't decorate him with medals—that's what he is there for. If foolish folks wouldn't venture out too far he wouldn't be earning a living patrolling that particular playground.

So, I say, let's be engineers, let's quit prating about spilled blood and cracked bones, let's think more in terms of, and talk more about, our work reducing the unit cost of production. I am fully aware that reducing the cost of a steel rail that will probably be a part of a roadbed in far Montana, or reducing the cost of a pair of suspenders that may eventually support the pants of a laborer in the oil fields of Texas, or reducing the cost of a loaf of bread to

feed we know not whom, these ideas have no appeal unless we consider our job as a part of the world's work, unless we can see our daily task as a contribution to the welfare of citizens generally.

Our natures prevent us from sustained emotion—we simply cannot live in an ecstasy of constant emotion—and that fundamentally is why so many safety engineers realize that their jobs are insecure.

As the result of your efforts you are preserving men for useful labor and by so doing you are performing a most important duty to society and by society we mean those who constitute the state in the highest sense. But keep in mind also that the engineer who reduces the unit cost of production is also rendering a great service to society. Therefore, we safety engineers may well be doubly proud of our avocation. Let's not be content to be looked upon by management as a necessary evil, or as a sop that capital holds out to labor, or as an experiment in industrial welfare work to be thrown into the discard the moment the first cloud appears on the business horizon. Let's not be content I say, but let's renounce those reputations; let's claim and strive to attain that place that is rightfully ours in the social and economic affairs of men—let's be engineers.

Our heads are in the clouds and that is fine—but let's keep our feet on the ground.

CHAIRMAN HASSE: I believe that Mr. Morris has given us more food for thought. Is there any discussion on Mr. Morris' subject?

The Chair will now take the liberty of appointing the Nominating Committee. This Committee consists of the following:

Mr. Ralph E. Prouty, Chairman, Aetna Life Insurance Company, New York City.

Mr. W. H. Cunningham, Pillsbury Flour Mills, Minneapolis, Minn.

Mr. W. P. Penty, Kellogg Company, Battle Creek, Mich.

I will ask these gentlemen to select the officers for next year and present their report at tomorrow morning's meeting.

WILLIAM P. COSTER (Safety Supervisor, Brooklyn Refinery, American Sugar Refining Company, New York City): Mr. Chairman, is discussion in order?

CHAIRMAN HASSE: Yes.

MR. COSTER: In connection with Mr. Morris' address, some time ago I attended a safety conference in Buffalo, and a gentleman in the same business as Mr. Morris made a very fine address along the same lines. His theme was, "Watch your severity rate and costs, and your job will be a success." I was sitting among four or five fellows who put their heads together, and one fellow said to the other, "See, that is all they worry about; cut down their expenses and let us be killed."

WILL COOPER (Stevens Hotel, Chicago, Ill.): Mr. Chairman, I would like to have some discussion and some views from the members of the Section, leading to the formation and adoption of a uniform accident report plan. I think that this is a very vital thing to accident prevention and correction. There are so many questions that can be asked and so much information that can be gathered with relation to accidents that a great many people only have a very hazy idea of what is necessary. I received through the mail, before I came down here, a sample questionnaire that was made up by the chairman of the Hotel Accidents Committee, and it contains so much material in it that I showed it to Mr. E. J. Stevens. He said a man would have to take a day off to fill that thing out. In our business, we are approaching this thing in the dark. I believe that there is no other hotel member of the National Safety Council, and it has been quite a problem as to just what information we will require and what is really of vital importance. I would like to hear somebody's views on this.

CHAIRMAN HASSE: Is there anyone in the room who could answer Mr. Cooper's question? Mr. Cooper, I believe you are the only hotel man we have here.

MR. COOPER: I do not mean to restrict the discussion to hotels. I do not care whether an accident happens in a hotel or it happens in the subway. There is certain vital information that is necessary in order to classify it and take steps to prevent a repetition of it: the age of the person, whether he was in possession of all his faculties or not, and the kind of an accident it was, and all such things as that. It seems to me that there is a skeleton form that could be drawn up and adopted as a standard by the National Safety Council that would fit all cases with very little change.

CHAIRMAN HASSE: I believe the National Safety Council has on file, Mr. Cooper, some forms of accident reports. I do not know whether you have ever communicated with anyone in the National Safety Council in regard to it, have you?

MR. COOPER: Yes, I have.

CHAIRMAN HASSE: What did they say?

MR. COOPER: Most of them are sample reports submitted by different industries.

CHAIRMAN HASSE: I believe we have a subject here that would be quite interesting and we could, I believe, suggest this subject to the National Safety Council in some way and see if they could not draw it up in a form that would be available. We might also have the Statistical Committee of the Food Section draw up a report which I will suggest to them and submit it to all members for consideration. They could make necessary changes and finally submit one for standard adoption to be used by all members of the Food Section.

MR. COOPER: To make clear what I am trying to get at, you all know the National Safety Council has a standard definition for an accident. It is, "disability that causes a man to lose time from his work on the shift succeeding the one on which he was hurt." That applies in all cases and to all industries. I would like to see the Section pass some resolution to the National Committee that they draw up a standard accident report form which would include the principal facts to be ascertained in all cases.

VERN D. SUTTON (Postum Company, Inc., Battle Creek, Mich.): Mr. Chairman, Mr. Cooper mentioned receiving one of those questionnaires. He is very fortunate. I congratulate him. I have received anywhere from six to twelve of them a year, and I see the need of some standardization. Some questionnaires I received would require me to take some of my classifications and divide them up, a very difficult proposition; others would require me to take my classifications and add them together, because each person sending in an inquiry or each organization is asking for some different sort of classification and division of the information they require and I think the headquarters staff is working on something of that sort—to get a standard form. I do not believe they have yet arrived at it. I think it a mighty good thing for this Section to take up and discuss and see if we can arrive at something nearly a standard at least, and that is a good thing for us to do in our *News Letter*. The *News Letter* is my hobby, as you probably know, and it is the most difficult thing we have attempted in this Section. If we would all contribute our ideas freely in the *News Letter* during the year, we would have a *News Letter* worth while. That is one of the things that we might be discussing in the *News Letter* during the coming year.

R. C. STRATTON (Hartford, Conn., Travelers Insurance Co.): Mr. Chairman, I have been very closely connected with the research problems of A. S. S. E. for a period of three years. The questionnaires that Mr. Cooper has taken up and also Mr. Sutton are special questionnaires developed for the express purpose of evolving special information for research subjects. There has been no attempt in those questionnaires to develop a standard form because we are digging out information for the express purpose of dividing classifications and perhaps adding classifications. That questionnaire is not for a permanent fixture by any means. It is to cover a given period to develop specific information so it can be broken

down and thereby evolve a hazard of specific classification from which a pamphlet or brochure of some sort will be developed and distributed wholesale to any and all Sections of the National Safety Council.

FRANK MORRIS (Assistant Chief Engineer, Liberty Mutual Ins. Co.): Mr. Chairman, I would like to take another minute to answer Mr. Cooper's question. The point I want to get at is this: We are saving money. I see plants saving thousands of dollars and there is some fellow out there in that plant who is responsible for this saving and, in many cases, he does not even know it. Now our job is to find out what we are saving and letting the big boss know that we are responsible for that saving. I have no quarrel with the safety man who is saving humanity; who is out there to keep people from getting hurt. We have preachers and doctors and teachers of that same sort but, mind you, most of them are in their chosen profession to make a livelihood. We can call ourselves teachers of accident prevention, doctors of accident prevention, missionaries, evangelists, or whatever you will of the safety gospel, but, at the bottom of it all, we are out there in that plant as a part of the organization because we can save the company money. I worked my head off for one year preventing accidents and my sole thought was keeping men from getting hurt. Do you know that a year had gone by before it occurred to me to ask the treasurer one day if our savings had been material; and what do you suppose he told me? That our cost for accidents during the year just past was more than \$50,000 less than the previous year.

Now that gave me this slant that I am trying to present to you this morning. There is a money saving. My friend Coster says we must be careful of what we say in the presence of certain groups. That is very true. We must remember that our kit bag is full of tools and we have got to pick out the particular tool for the particular nut that we are confronted with at the particular time. As safety engineers let us keep in mind that we do have an economic basis on which to stand and we can convince the management of that, and then, as I said, when the first clouds appear on the business horizon, we will not be the first ones to go out of the gate.

CHAIRMAN HASSE: The meeting is open for any type of discussion. Has anyone else something to say?

WILLIAM P. COSTER (American Sugar Refining Co.): Mr. Chairman, I hope that I am not monopolizing this discussion but everyone in the Food Section has problems which are more or less related. I wonder if there are any here who have the problem of having employees report promptly for medical treatment for the purpose of keeping down infection? That, to my mind, is rather a bothersome proposition in the food line and we have all been through it, and, as one of the gentlemen said yesterday in analyzing accident reports, they get after the fellow who makes frequent trips to the medical department. If we are fighting to have employees report promptly for treatment in order to guard against infection, it is unjust to get after the fellow who makes frequent trips to the medical department, because, at one end you are undoing what you are trying to do at the other end. I would like to hear some experiences from those who have had the problem and who use some measures, not expensive and not elaborate, which helped them or in which they were able to succeed in overcoming the proposition of getting the men to the medical department promptly but not too often.

WILL COOPER (Hotel Stevens, Chicago, Ill.): Mr. Coster brings up a subject that I think is a very serious one. When the gentleman from the Ralston Mills was talking at the luncheon yesterday about a badge or some kind of award for accident prevention or for accident immunity, I was tempted to make some remarks. I think that it is a very bad thing to offer any reward of any kind or any insignia for anybody to wear for not having any accident reports against him. If you do that, you are encouraging the employees to cover up minor

scratches and injuries and not go to the medical department and get them treated. There is a decided tendency on the part of employees to avoid the red tape and the trouble and the humiliation of having to go to the foreman and get excused and go up to the medical department and have a cut bandaged or have it iodized or whatever you call it. I have not been up there myself yet—I have been very fortunate. But I do think that it is bad policy to give out buttons or badges of any kind to employees who have never had occasion to go up to the medical department.

C. A. NOXON (Ralston Purina Company, St. Louis, Mo.): Mr. Chairman, of course we like to defend the things we believe in. I think it is possible to consider a middle ground here. I suppose a good many of you heard me speak yesterday of the badge that we give for six months' service without an accident. Now, on the other hand, if a man gets hurt in our plant and does not report to the first aid department, that man is subject to a lay-off and, after about the second time, he is subject to discharge. I think that is the other side of giving them an award for going through a certain period without an accident. I would like to hear a little more discussion on this as I think we have got on to a thing here that a good many men would be interested in.

WILL COOPER (Stevens Hotel, Chicago, Ill.): I would like to say in answer that it does not save you any money to lay a man off for not reporting a case, after he has developed a case of blood-poisoning in his arm, and you have had to give him extra medical treatment and he has made a claim for compensation. I can cite two instances at the Stevens Hotel—one was the chamber maid. A guest had spilled something on the floor and the maid took a cleaner and in rubbing it, she skinned the ends of her fingers. She did not pay any attention to it and did not report it and in about a week her whole hand had swelled up and I forget how many days she lost. Under the Illinois Compensation Act, we do not have to pay anybody who is off less than eight days, but it is the policy of the house to be very lenient in those cases and anybody who is off on account of an injury suffered in the service receives full time right along.

Another case was that of a man who scraped the back of his hand on the wire in the fan housing in the engine room and he paid no attention to it, and we almost had to take that man's arm off. He was off about six weeks. His whole arm was swelled up and he had it in a sling. The doctor had to make three or four incisions in it. Now, if either of those people, according to the teaching of the medical department, had gone up for immediate treatment, we would not have had that expense. Would it have saved us that expense if we had laid that man or that maid off? It would not.

CHAIRMAN HASSE: I am afraid that we will have to discontinue this discussion because it will be necessary for our next speaker to leave us as soon as he possibly can on account of other engagements. I now take pleasure in introducing David L. Lindquist, Chief Engineer, Otis Elevator Co., New York City.

Elevators—Their Care and Safety

By DAVID L. LINDQUIST

Chief Engineer, Otis Elevator Company, New York City

The total number of passenger and freight power elevators in operation in the United States is at present 165,000. Of this total number a little more than 50 per cent are freight elevators. It has been estimated that all elevators will make in a year 20,000,000,000 passenger trips, equivalent to carrying the same number of passengers. In comparison with this figure, it may be mentioned that the total number of revenue passengers carried by all the railroads combined in this country

annually, is only 830,000,000. The Borough of Manhattan has about 30,000 more elevators than the other four boroughs. While the elevator accidents are comparatively few in number, as compared with the number of passengers carried, due to the fact that elevators seem to be one of the safest means of mechanical transportation, if not the very safest, nevertheless, the number of accidents that occur every year is more than sufficient reason to give this matter serious consideration. This matter is all the more important because most of the accidents that occur are what may be classified as "preventable" accidents.

A very careful analysis of all of the elevator accidents on record has been made for the last four years, and not only have the various kinds of injuries been classified, but the primary cause has been determined in the large majority of cases. The accidents have been tabulated in relation to types of elevator machinery, method of operation, door and gate equipment, etc.

While statistics are the order of the day, and while these detailed statistics are very interesting, it would take entirely too much time to give anything but the "high spots" of this investigation.

There are over one hundred fatal accidents per year that can be directly or indirectly attributed to elevators. Out of the total number of accidents, the large majority are accidents that occur in connection with shaft openings, and out of those more than 50 per cent were fatal. Only about 5 per cent of the fatal accidents are due to failure of the elevator equipment furnished by the elevator manufacturers. Practically all of the failures of equipment are caused by antiquated equipment, as well as poor maintenance, and the old electric drum type elevator seems to be the worst offender, particularly in connection with hand rope control.

Perhaps it may be permissible to give just a few statistical figures of a typical year:

Number of elevators of all makes and types in the United States, October 1, 1928, 163,000; of which passenger elevators constituted 45 per cent and freight elevators 55 per cent.

Average accidents of all classes reported in the United States per year, 271, resulting in 111 killed and 208 injured, or a total of 319 persons affected. Of this number those caused by unguarded openings, improper shaft and platform guards and carelessness were 148, resulting in 84 killed and 64 injured:

Those occurring in connection with derangement of elevator equipment were 88, of which 5 were killed and 83 injured.

Of this 83 injured, 25 were merely cases of hysteria, etc., where no actual injury resulted, the balance were chiefly due to mechanics working in shaftways and to unknown causes.

The parting of ropes in connection with drum type elevators has been the cause of most of the accidents, due to failure of the elevator hoisting equipment.

It is a generally known fact that the introduction of the traction type elevator has eliminated accidents due to parting of the hoisting ropes, as up to the present time there is not a single case on record where a set of hoisting ropes has parted in actual service, and there is no doubt that the traction type elevator is inherently the safest elevator and that its introduction has done more to increase the safety of the hoisting apparatus than anything else.

Marked improvements in interlock and hatchway construction have been worked out, but when it comes to safeguarding the hatchway openings, as well as the elevator car openings, there seems to be great difficulty in getting the known safeguards adopted, in spite of 10 per cent reduction in insurance rates.

For example, hatchway door interlocks which prevent the opening of the hatchway door unless the car is at that landing and also prevent the car from leaving that particular floor until the hatchway door has been closed and locked, are not always used. In many cases the interlocks are furnished, but as they always reduce

the volume of service of an elevator, particularly in connection with manual control, they are often deliberately rendered inoperative. The same condition exists in connection with car gate contacts on passenger elevators, as well as door contacts on freight elevators, which prevents the movement of the car in case the car gate or hatchway door is open.

To a considerable extent this serious condition is due to the lack of laws or regulations compelling building owners to provide interlocks and gate and door contacts, and, in some instances, due to lack of proper enforcement of existing laws and regulations. In certain sections of this country it is true that there are no laws or regulations whatever governing the installation and operation of elevators, except the safeguards demanded by the insurance carriers. In some cases, even the insurance carriers seem to be a little lax in demanding proper safeguards, as in the city of Chicago, for example, passenger elevators are permitted to be operated without interlocks or gate contacts, and, as a matter of fact, even without gates.

Principally due to the manufacturers' and fire underwriters' endeavors, grille cars and grille elevator fronts have been replaced by entirely enclosed cars and enclosed hatchways. Only quite recently has the dangerous collapsing gate been, in a few installations, replaced by the roll type gate, and only in certain high class buildings, employing full automatic control, flush cab doors replace gates of any type.

As power operation of hatchway doors, as well as car gates, is becoming more common, the car gates are becoming increasingly dangerous and their replacement by doors becomes all the more important. Unfortunately, cab doors without any vision grilles are not practicable to other than installations employing full automatic control.

It is obvious that flush hatchway construction in front of the cab opening would practically eliminate the shearing or squeezing hazard existing between the hatchway and the car platform, but up to the present time no serious attempt has been made in this direction, in spite of the fact that almost 50 per cent of the accidents occur at the entrance of the elevator is due to persons getting jammed between the car platform and some part of the hatchway opposite the car opening.

The present hazards of elevator transportation are to a large extent due to entire lack of any laws governing the installation and operation of elevators in certain sections of this country and insufficient and antiquated laws in other sections, as well as the fact that when new regulations are put into effect, it seems almost impossible to make them retroactive. This means that when new regulations are put into effect, the installations made prior thereto are permitted to continue to operate under hazardous conditions, as referred to before.

Several years ago the American Society of Mechanical Engineers realized the necessity for a National Safety Code for elevators and appointed a committee for the purpose of formulating such a code. This work was later continued by a Sectional Committee of the American Engineering Standards Committee and a Safety Code was formulated and issued by this committee. The sponsors for this code were the Bureau of Standards, the American Institute of Architects and the American Society of Mechanical Engineers. This Code was intended as a guide to law-making bodies and while some states and municipalities adopted its provisions in the form of laws, many states and municipalities have no laws or regulations, and those who have seem to prefer their own antiquated regulations rather than to adopt a more up-to-date code. It almost seems the principal reasons for not adopting the National Safety Code were of a commercial nature, as there was apparently a fear that the adoption of this code would increase the cost of elevators.

There is hardly any doubt but what the adoption of the National Safety Code for elevators would materially reduce the hazards of elevator transportation and

it is reasonable to expect that the additional cost for better safety guards would substantially, if not entirely, be offset by reduced cost of standardizations. At the present time standardization of elevator equipment is impossible, as existing rules or regulations differ widely.

The National Safety Code has further the advantage that there is a standing committee of interpretations and recommendations as well as another standing committee for the purpose of making revisions to keep the Code up-to-date as nearly as possible. The Sectional Committee of the A. E. S. C., as well as the standing committees, are made up of men most familiar with the requirements as well as the present status of the elevator art. It may also be mentioned that the Sectional Committee is carrying on a great deal of fundamental research and investigation of elevator apparatus. Most of this work is done at the Bureau of Standards in Washington, but is also being done in the field.

While in certain sections of the country there seems to be a tendency toward a slight increase in the number of accidents per year, such increase is not so much due to a large increase in number of elevators from year to year, although the number of new elevators is many times the number of abandoned or replaced elevators, but is principally due to the fact that the existing old elevators are becoming older and in poorer condition generally.

It may be stated in justice to the elevator manufacturers that the improvements made in elevator operation and increased safety in passenger transportation are mostly due to the efforts of the elevator manufacturers themselves, and particularly those that have real financial responsibility, as well as a definite feeling of moral obligation.

The foregoing statements are not made in the spirit of criticism, but for the purpose of bringing out some of the salient facts before this Safety Congress, with the hope of bringing about, if possible, more effective cooperation between the parties concerned and interested, in order to eliminate the majority of preventable accidents, thereby making Vertical Transportation by elevators even safer than at present.

The gearless traction elevator eliminating gears was not only a great step forward in improving and simplifying the machinery, particularly for high speed elevators, but it was also a marked improvement in the direction of safety.

The automatic leveling device which makes the car stop level with the landing and maintains that level irrespective of the stretching of hoisting ropes, either when loading or unloading, was not only a great convenience, but was also an improved safety feature, as it eliminated the tripping hazard and it permitted the use of full interlocks without materially reducing the quantity of service of the elevator, eliminating the tendency to deliberately render interlocks inoperative.

There has been a steady tendency toward more and more automatic operation of elevator apparatus, thereby eliminating dependence upon the operator to provide proper and safe operation. The development of full automatic control for high speed elevators is not only economically sound, but it is, without question, in the direction of increased safety.

Experience has shown the necessity of providing better protection at the door openings than has previously been the practice in connection with automatic elevators used particularly for modern apartment houses, and decided changes in hatchway construction to insure better protection have lately been inaugurated.

Marked improvements in automatic car safety devices have lately been made. At the present time safeties are available of the gradual stopping type that are able to apply the full retarding force on the face of the guide rails almost at the instant excessive speed is reached; whereas the old safety device of the sliding type did not apply the retarding force before the car had descended from six to ten feet after the tripping speed of the safety governor was reached.

At the present time safety devices are available which will stop the elevator car smoothly and gradually in practically the same distance, independent of the load on the car. With the new device, in no case will the retardation need to exceed gravity, whereas with the older type, if the retardation with full load in the car was as low as gravity, which, however, was seldom the case, the retardation with only the operator in the car would frequently exceed two and one-half times gravity.

CHAIRMAN HASSE: Gentlemen, the meeting is now open for discussion. Have you any questions to ask Mr. Lindquist?

J. J. SHERIDAN (Supervising Engineer, Royal & Eagle Indemnity Insurance Companies): Have you any data showing what kind of material cables were made of—that is, those that were broken in accidents?

MR. LINDQUIST: Yes, we can in practically every case tell the material used. In many cases, it was so-called iron cables, but, frequently, steel cables were used. It does not matter whether you use iron cables or steel cables. They simply have to part when there is an accident. The ropes are directly attached to the winding drum and that continues to move or wind—something has got to break, and, as the cable fastenings or cables used are usually the weakest part of the machinery, they snap. If you put more cables on or stronger steel cables, some other part of the machinery would break and you would have an accident just the same. As a matter of fact, there is a distinct safeguard in having the cables part in those cases, because, if they did not, you might so strain your car, due to excessive pull of the cables before something gave way, that the car safety device would be put out of business. Therefore, it is my opinion that it is a distinct advantage to have the cables the weakest link, and, as a matter of fact, looking at it from a material viewpoint, the cables are the cheapest and quickest to replace.

MR. SHERIDAN: Would you consider the fully automatic elevator safer than the hand-controlled elevator, Mr. Lindquist?

MR. LINDQUIST: It all depends upon what type of automatic elevators you refer to. If you refer to some of the older type push-button elevators in apartment houses, etc,—

MR. SHERIDAN: Suppose we restrict our discussion to the modern elevators, installed within the last three or four years.

MR. LINDQUIST: The modern type that is turned out is much safer than any of the former types of elevators employed or operated.

MR. SHERIDAN: Have you any statistics showing what safety devices were lacking, so that they would not function properly?

MR. LINDQUIST: Yes, we have.

MR. SHERIDAN: Available?

MR. LINDQUIST: Yes, but I think it would be very embarrassing to most of the elevator manufacturers to inform the public fully on this subject.

MR. COOPER: I understood Mr. Lindquist to say that he believes that there are more casualties through the application of safety devices than otherwise—through their acting than through their failing to act. I would like him to explain that statement. If that is true, why not leave off the safety devices? What particular safety devices did he mean?

MR. LINDQUIST: I referred to car safety devices, in making that statement. I think it is true.

MR. WILL COOPER: The automatic stop?

MR. LINDQUIST: Yes, more people have been injured by the application of car safety devices than lives saved by those devices. Those safety devices used in the past have been of such a nature that, particularly with a light load in the car, retardation effect has been altogether too strong. In other words, the re-

tardation has affected the passengers so that they simply could not withstand it; the safety device may go on from some real cause or may frequently be applied inadvertently, without any reason for it whatsoever. We have had a number of accidents where people were injured due to application of safety devices; they have not been killed, but they have injured backs, sprained ankles, broken bones, etc.

GEO. G. MEAYNS (Standard Accident Insurance Co. of Detroit, Mich.): What solution would you give to the traction light elevator, Otis gear drive, with the compensation and other cables, V groove, 23 passengers, single wrap, of course, I am referring to. There was approximately 29 got on, six more than 23. The elevator first stopped at the fourth floor, approximately 18 inches to two feet above it. The operator reversed his lever, not gently but in the manner that they do today. They went down and she did not stop when he put it on level again but kept on sliding—that is, the cables slid through the sheaves. It did not gain speed enough to throw the car safety. Had it been up higher, say at the 22nd floor, they might have gained momentum at the 15th floor, but, being at the 4th floor, they did not gain momentum enough to throw the car safety in until they were down between the first floor and the bumper. There they gained enough momentum to apply safety and to prevent the car from landing on the bumper springs. We know the car was overloaded. In this particular case, they all claimed they were injured, more or less; one fellow had varicose veins; he said he was badly injured; another fellow had a game arm, but there was no one particularly injured. This type of accident has happened so frequently on this particular type of elevator; is there no way of preventing that? Of course, a single wrap is not as good as a double wrap. I feel that the manufacturers of elevators should do something, even though no serious accident has happened—something should be done regarding the single wrap type of machine.

MR. LINDQUIST: The condition just pointed out is not an unusual one at all, and I do not see any way of stopping overloading, except by demanding proper rating of elevators in proportion to the car size, because, after all, the size of the car, if a passenger elevator, determines its loading. As long as we have the old rule (in some cases still in effect) that loading of an elevator should be figured at 75 pounds per square foot of the car area, we will have overloads and very serious overloads; because it is quite possible to obtain the loading of 150 pounds per square foot by selecting your passengers, and 110 and 120 pounds per square foot is not uncommon in large elevators. As the size of the car goes down, the loading per square foot also goes down, but, in no case, is 75 pounds per square foot sufficient rating.

WILLIAM F. SCHAEDEGER (Safety Inspector, Edgewater Plant, Corn Products Refining Co.): What causes an elevator to slide? Is it the fact that the cables did not grip into the grooves of the sheaves? They tell me they are making a change in the groove; that when the cable slides they have a round, circular groove; and are changing it into a V so that the cable would grip better, and this thing could not happen.

CHAIRMAN HASSE: Mr. Lindquist is going to explain that. He will draw us a sketch of it on the blackboard.

MR. LINDQUIST: Gentlemen, there are two distinct types of traction machines. I think the best classification probably is to say that one has double wrap and the other single wrap. There are various forms of single wrap and I want to call attention to that a little later. In the double wrap traction machine, the hoisting cable starts from the car, runs over the driving sheave once, then over and back again over the driving sheave. In the single wrap traction machines, the hoisting cable passes only once over the traction sheave. Now the double traction machine has a circular or half-circular groove. In other words, if a cable with six strands rests in a groove, of course, the next cable comes here (indicating.) These cables

rest in a half-circular groove, and, in order to get sufficient traction to operate it within the full capacity of the loads, it is necessary to wrap the hoisting cables around the driving sheave twice.

Now, what do we do with the single wrap? Well, the V groove was mentioned. In order to get additional traction, it was a question of pinching the rope. A V groove was made; the cable was put in, and that gave sufficient pinching effect so that the traction obtained was the same as that obtained in this case with the double wrap. The trouble, however, was that wear always occurred with this type of driving. It did not matter with the double wrap how the groove went down, because we still had the same contact in the rope and the traction did not change. With the same amount of traction there was the same amount of wear. But with the single wrap traction machine, you see, as the cable wears into the sheave, after a while the cable eventually reaches the position where you have just the same effect as the single circular groove; so that, with the V groove, if you start with sufficient traction, you know that eventually you may wind up with traction only equivalent to a single groove. In other words, less than half. Now that was a serious defect in the single wrap traction machine, and, of course, in order to make these elevators safe, some way had to be found by which the wear would not affect the traction of the single wrap machine.

Therefore, we resorted to a different construction. (I will draw it on a little larger scale so as to show you what was done.) This is the cable that lies in a half-circular groove. With a single wrap we could not get enough traction because it rests too nicely in the bottom and does not get enough pinching effect. Therefore, we cut down the under cut in the groove. This changes the construction of the sheave. We started with a certain pinching effect, due to the fact that the bottom of the groove was cut away, and, as the cable wore down, we maintained the same pinching effect. Of course, it is true that if you let wear occur long enough, you will eventually land at the bottom, but that is what is expected. Now, the machine that Mr. Schaediger referred to probably had a V groove of this type or was one of the older machines. It might not necessarily have been of this type, because with such an overload there was an extra force of gravity.

GEO. G. MEAYNS (Standard Accident Insurance Co. of Detroit, Mich, New York City): Is there the same possibility of slipping through the double wrap?

MR. LINDQUIST: Even a double wrap can slip, if there is sufficient difference in load between the car's normal capacity and the actual number of passengers in the car, but, in ordinary practice, I do not know of a single case where we have, with the double groove, reached a condition of slipping. That would mean an overload in the car of at least double the full rated load, and, in some cases, considerably over that before slipping would occur. The double wrap is mostly used for high speed elevators. You have to have such a surplus traction in order to accelerate the elevator and make it go fast, so that any slipping—continued slipping—due to overloading is hardly possible, unless you have the car full of cast iron or something like that, but not with passengers.

C. M. FINCH (Superintendent of Inspection, Mass. Bonding and Insurance Co., Boston, Mass.): For the last four or five years, I understand that cables are built of iron outside and steel inside for strength. I would like to ask if you recommend that cable and what has been your experience with it.

MR. LINDQUIST: The sealed cable consists of wire strands. We start with six small wires on the inside and six of same size on the outside, and then you put a wire on the outside of that, the outside wire of somewhat different thickness, but finally making up nineteen wires. The single wrap, however, is different. To start with, you have a large wire and you put in a number of smaller wires, and then the large wires outside of the small wires; in most cases, there are nine wires in a strand. But in a sealed cable, you have a certain number of wires on the

outside, equal in diameter, and much larger than in the regular way and every wire here has two underlying wires. This construction is called the "sealed construction," and has proven to be quite advantageous. The obvious reason for this is that the outside wires are larger in diameter and can stand a good deal more wear before they get down to about the center, because, after the wires are worn down to the center, they inevitably break, so that the sealed construction now is getting more and more universal in use. Attempts have been made to make the outside wire of somewhat softer material with less resistance and to make the inner wires of steel and consequently have greater strength.

While there may be some advantage in having a great surplus of strength in elevator cables, it is very much of a question whether this is of real advantage, because, after all, with old traction machines, at least with the prevailing type of past years, the cables were never subjected to forces coming anywhere nearly up to the latest equipment or even approaching it; as a matter of fact, they could not. Under ordinary operating conditions, therefore, a great surplus of added strength is of so very little advantage and it may under certain conditions be a distinct disadvantage. In traction machines, the wear of the outside wires determines the life of the cable and, when the outside wires are worn down considerably, there is usually plenty of strength left in the cable, even after it is worn to the point where it looks bad on the outside; because with high speed traction machines particularly, the safety seldom is under fourteen and frequently exceeds twenty, so that the cables are anywhere from fourteen to twenty times greater than the maximum loads imposed upon them under normal conditions. There may therefore be a distinct disadvantage in having too-strong cables. I pointed out before in relation to safety devices in connection with the drum type, the drum over the car may eventually become wound up or hoisted up against the overhead structure, the machine keeps on winding because the operator has not cut the power; something must give way because you have the power in the D. C. motor at least ten times greater than normal at its extreme maximum, plus the momentum of the motor and the momentum of the machinery; and, therefore, you have a terrific force to control, even if you had twenty times as many safety wires. Something has to go, and therefore I said I prefer to have the cables go or the cable fastenings, rather than the car frame or the top pieces. You have the drum machinery over you, and if the car hits the overhead, something has to go, and if the car safety is not there to prevent its falling all the way down to the bottom, then it is a serious thing.

JOHN FULLER (Aetna Ins. Co., New York City): Mr. Lindquist, will you tell us something about "Tru-Lay" cables?

MR. LINDQUIST: I rather hesitate to enter into a discussion or make any statements, particularly as there is just now such an advertising campaign going on in favor of "Tru-Lay" cables. Under those conditions, perhaps, you may think that I am on one side or the other of this advertising movement.

DAVID J. GITTO (Aetna Life Ins. Co., New York City): With a car rating 2,500 pounds capacity, how many pounds above that will it go before the slipping takes place?

MR. LINDQUIST: Well, there is no definite figure that can be given; because that may vary anywhere from 3,500 to 4,500 pounds, depending upon various conditions. But it is almost criminal to not rate the elevator's capacity in relation to the size of the platform, as the size of the platform determines the load and that should determine the capacity of the elevator. If you have an elevator platform that can only take 2,500 pounds, there is no possibility of overloading with passengers; but if you have an elevator car platform that may be rated for 2,000 pounds and can take 4,000 pounds, then, of course, you may exceed the load at which slipping occurs. This is something that elevator manufacturers have been fighting for a long time and so far we have been unable to put it through, except in a few

cases. Most cars are comparatively large because they have to be or to make room for a stretcher, as in hospital cars. There are in existence today several that are rated at fifty pounds per square foot for hospital cars. Now you can realize that, if you put in equipment to take care of fifty pounds per square foot and let in 120 pounds, something is apt to go wrong.

R. W. MACADAMS (Engineer, Columbia Casualty Co., Boston, Mass.): Getting back to the straight V type groove on the single traction wrap, and that combination semi-circular design and the V groove at the bottom of it, you stressed the fact that the objection to the straight V groove is the ultimate loss of the traction of the cable and, therefore, you preferred the other type. Is there any other objection to that V type with regard to the life of the cable?

MR. LINDQUIST: Yes, there is a decided difference in the cable life with a V groove and the under-cut circular groove. It is quite obvious that, when you start out with a new V groove, with perfectly straight sides, you just have points of contact between your two sides and the cable; therefore, you have very high pressure. In many cases, the pressure is sufficiently high to crush the material of the sheave which is usually cast iron. The first wearing process (if I may call it such) of a plain V groove is not wearing but a crushing down of the same material. The pressure is so high because the cable does not touch over the whole length or contact only on certain spots and that pressure is sufficient to crush the material of the sheave.

It is rather interesting to know that that crushing process may continue down to the point where insufficient traction occurs and still the crushing keeps on. After a while you have a regular shell worn or, rather, crushed down in your V groove. Then you have not only got this condition but you have the whole lot of wires behind that also making contact and you have apparently a convex surface.

The result is that the surface pressure at those points of contact may frequently be higher than the surface pressure of the few wires in contact with the smooth surface. Therefore, we have had the experience in a number of cases with V groove machines, where the crushing effect continued until they were almost down to the bottom of the V and did not stop. The indication of that was simply that the groove did not polish up but merely kept on crushing down. The instant you get wear, then you find that the surface polishes up. That is wear, otherwise, it is crushing and the surface remains dull. With a microscope you can readily see those mountain tops just like a mountain landscape. If you start with a smooth round groove, after a while you get a shell and you have these wires in contact with a concave surface, a smooth surface to start with. Therefore, this shape causes a pressure on the cables with very slow wear, but the V groove wore down to a point where the V remains the same, as the undercut would not stand the pressure at all.

HENRY J. POTTER (Supt. Eng. and Insp. Dept., Hartford Accident and Indemnity Co.): In reference to the automatic elevator as used in apartment houses, manufacturers have made quite some changes in the last few years to eliminate the inoperation of the car due to the operator or the tenant not closing the car gate. Some have taken care of that by the floating platform and other arrangements. I would like to ask if the elevator manufacturer considers the safe operation of that car. We have had cases in the city here, both fatal and non-fatal, where children have been caught between the shaftway door and the car gate. Does the manufacturer look into that part of it in designing the equipment or is it a case of the architect, in designing the building leaving that door in the wrong position?

MR. LINDQUIST: The movable platform and those other devices are employed for the sake of convenience generally. An automatic elevator in an apartment house, for example, is inoperative unless the hatchway door and the car gate are closed. It cannot move because the car gate is provided with contact and, if that contact is not closed, due to the fact that the gate is opened, the elevator cannot

move: If any of the hatchway doors are open, the car cannot move.

Now, here is what happens. Somebody takes the car from the ground floor, for example, gets into it, closes the gate—the hatchway door usually closes itself. He presses the button, goes to whatever floor he wants to go, gets out of the car and forgets or does not care to close the car gate. Sometimes he may do it deliberately for the purpose of insuring that the elevator is going to be at his floor when he comes back again, and that, of course, is quite an inconvenience to all the rest of the persons that want to use the elevator. Therefore, the movable platform was introduced for the purpose of permitting the car to operate or to be operated with the car gate open providing nobody is in the car, because the car gate is for the purpose of protecting the passengers in the car. It is very important to the people in the car that the gate be closed, particularly on account of the accidents that I have referred to. Practically 50 per cent of the accidents in elevator operation are caused by squeezing in between the car and the platform. With nobody in the car, it does not matter. Therefore, the movable platform was put in so that, if somebody was in the car and the platform was depressed, operation could not be obtained, without closing the car gate. With nobody in the car, you could operate the elevator whether the car gate was closed or not, providing, of course, that the hatchway doors were closed.

Now, there are other devices, such as the self-closing gate, for the purpose of insuring operation of the elevator whether the passenger closes the gate or not. In other words, the gate closes itself. They have to hold it open until they get the hatchway door open, and, when they get out, both car gate and hatchway door close themselves. The self-closing gate is, however, not so convenient. It requires a good deal more effort and, in many cases, the movable platform seems to be preferred. It offers, besides, certain other operating advantages, but, whether you employ one or the other, the accidents that you refer to do happen; for instance, the accidents that happened up in the Bronx. None of the seven fatal accidents that occurred in the Bronx within the last year and a half would have been prevented by any means that the elevator manufacturers could provide.

In other words, it was not the fault of the self-closing gate. It was not the fault of the movable platform; it was the fault of the building construction and arrangement of hatchway doors. The landing door in every case of these accidents that I mention was sufficiently far set back from the landing sill edge that it was possible for a child to stand between the door and the gate with both door and gate closed. Sometimes this space was comparatively small, so that a child had difficulty in getting in between and slightly pushed out the car gate, in which case, the motion of the car pushed him up against the door and he was killed. The hatchway construction itself and the door for the hatchway is ordinarily no part of the elevator equipment or is not included in the elevator contract, and the elevator manufacturer has no jurisdiction about the hatchway doors. He may make suggestions and all that, but it is merely inconvenient to put the doors in certain positions and out at the edge and very frequently we have as much as fourteen or fifteen inches between the car gate and the landing door. Unfortunately, the existing building laws in New York are not sufficiently definite to make it possible for the District Attorney to prosecute these cases.

Now, what should be done, of course, is obvious. Put the hatchway door right out flush with the hatch and make the whole hatchway perfectly flush. Have your car platform come close and then you have practically eliminated all squeezing. You may have some squeezing you may get your finger between, but you could not get your foot down, and while children may get their fingers in between—that is possible, but, then, it would not be so very serious. They may lose a finger. You might have to go to quite some effort in order to get into it.

Now the manufacturers are prepared to furnish doors that can be set flush with the hatchway and I strongly recommend a perfectly flush hatchway construction

Now, on existing information, we have put metal back of the door to practically build out the door to the hatchway line and that suggestion may be adopted by you but I am not so certain of that, either. The building out of the door, of course, is a rather crude way of providing safety, because, when this swing door opens, you reduce the door opening space by the amount that you build out the door, but it would at least provide safety and make this type of elevator practically safe, as far as children are concerned. If you use solid doors instead of gates, they could not even get out to put their hands in. I recommend doors instead of gates.

J. F. HENNESSY (State Insurance Fund, New York City): The first thing that I would ask Mr. Lindquist would be this: What would he suggest from his own experience as a manufacturer that the food products manufacturer, whether he is a tenant or has a building of his own, should do in the interval between elevator inspections to prevent accidents?

MR. LINDQUIST: I really do not know how to answer that question because how to properly take care of elevators and maintain them is quite a long story. You have got to consider every different kind of equipment. One thing that can be said is that you ought to start with good equipment to begin with. Start with equipment as nearly fool-proof as money can provide. I believe, however, that the insurance carriers could probably do more than they have done in the past in order to help the manufacturers in demanding safer and better equipment. I appreciate that the insurance carriers did a wonderful thing when they gave 10 per cent reduction in premium for fully approved interlocks. I think, however, that the time has come when the insurance carriers could go further than they have done so far and the manufacturers certainly would appreciate any action along those lines by the insurance carriers.

GEO. G. MEAYNS (Standard Accident Ins. Co. of Detroit, Mich., New York City): The automatic elevator has been installed to a great extent in apartment houses. The old time automatic elevator has changed considerably. In regarding the fatal accidents that have happened, it has not been to my knowledge the fault of the manufacturers; it has been due to faulty construction, poor layout, and not looking to conditions, but I do believe that the manufacturer should have pointed out to the architect wherein that certain danger existed, because it has given, as I may say, a black-eye to the manufacturer of this particular type of elevator. Regarding the floating platform, it has its good and bad points. The good points you have drawn here, but, between the floating platform and the hatchway door, there is a space of two to three inches; standing space on the landing is six inches, which makes eight to nine inches for a child to stand there very readily. That is where all of the accidents today have occurred—from a child being able to stand there. A grown person has not been injured on this particular type of machine.

Now, to overcome that, they have put on the doors a bevel piece to eliminate that six inch space, so that no one can stand there. The Otis Elevator Company today eliminated the frame in front. The two and three-quarter inches has been eliminated now entirely. The floating platform hazard has been eliminated, and that condition has been so far corrected that I believe, with the installation of the bevel piece on the swinging door, these elevators are perfectly safe.

It would be well to note that all of these accidents have happened where they have swinging doors. There has not been one where there was a sliding door, because they can be built so close that it eliminates that danger; in fact, the entire equipment of the interlock can be better placed with the sliding door than with swinging door. It is where you have the swinging door that you get the condition that one is liable or can stand on the saddle. Today some manufacturers are installing gates that are self-closing. They also have their good points and bad points, but I believe that it would be well for the elevator manufacturer to see to it that there is nothing done in the construction of the shaftway doors that would

be a detriment to the name of their elevator. It is only a matter of time when these elevators will be installed in all mercantile and commercial buildings. We are talking about saving money; there is a saving element here. So it is up to the manufacturer of the elevator to see that the conditions are such that the danger regarding the shaftway doors which is the principal cause will be eliminated.

WILL COOPER (Stevens Hotel, Chicago, Ill.): This discussion is resolving itself into a technical discussion of the construction of elevators which is way over the heads of most of the people here. We started talking about accidents in industrial plants. I think it is the sense of Mr. Lindquist's paper and the remarks that he has made that this is largely a matter of supervision. I used to be mechanical assistant to the general superintendent of Motive Power on the Chicago Railroad, and I heard a roadmaster say that no side track was ever long enough. I think I came to the conclusion myself that no engine tender ever held enough water; and I think that Mr. Lindquist would probably say that no elevator was ever built that could not be overloaded. He hit the nail on the head when he was talking about the drum type—that, if the cables do not give, something else has to give. That is one of the mechanical rules—there is an irresistible force that comes in contact with an immovable object. As long as you have elevators and you allow the operators or people that use them to overload them, you are going to have accidents. It is one of the plainest cases of accident for lack of supervision that I know of.

ADJOURNMENT

October 3, 1928**F. A. HASSE, Chairman**
Safety Director, Corn Products Refining Company, Chicago

The Wednesday session was called to order at nine-thirty o'clock by the Chairman, F. A. Hasse.

CHAIRMAN HASSE: As you read from time to time, there are various industries throughout this country which experience serious dust explosions. We have with us this morning a man who has devoted a good deal of time and study to the hazard of dust explosion. In addition, he is also going to show us some of this dust in the act of exploding. I take great pleasure in introducing to you Mr. Hylton R. Brown, Associate Engineer, Bureau of Chemistry, Dept. of Agriculture, Washington, D. C.

Fighting Dust Explosions

By HYLTON R. BROWN

Associate Engineer, Chemical Engineering Division, Bureau of Chemistry and Soils, United States Department of Agriculture, Washington, D. C.

It is no longer necessary to open a paper or a discussion on dust explosions with a definition of the subject, because the terrific blasts which have occurred in recent years in many industrial plants have left no doubt in the minds of owners and operators of such plants concerning the explosibility of dust in suspension in air. The publicity given such explosions in newspapers, magazines, and trade journals has also served to impress upon all those connected with the operation of dusty industries the fact that they have a serious hazard with which to contend. The need for self-protection gives impetus to organization, and accordingly the representatives of various industries have banded together in a spirit of cooperation in order to obtain or exchange ideas which will enable them to combat successfully this menace in their plants.

For years cleanliness has been the watchword in the battle against dust explosions, and the elimination of the dust cloud is still the most effective weapon at our command. In many cases it is possible to prevent explosions by controlling the dust, and much progress has been made in reducing losses by installing dust collectors, pneumatic cleaning apparatus, and dust tight equipment. The elimination of sources of ignition can also be accomplished in some cases and, this method of explosion prevention has proved of value.

There are, however, a number of places in the modern industrial plant where the dust cloud cannot be eliminated, and it is difficult, if not impossible, to prevent the presence of sources of ignition. In such places as grinding machinery, mixing and conveying equipment, and spray driers, the dust cloud consists of the product being manufactured or handled, and its collection or removal cannot be considered as a possible means of eliminating the explosion hazard. Heat, friction, and the possibility of metallic or static sparks being produced during the operations render them particularly hazardous. Dust explosions in such places must be fought, and in this hand to hand encounter unless we have sufficient power and strength to withstand the attack or employ strategy to defeat the enemy our plants will be destroyed.

If you choose to depend on your power and strength then you must indeed pro-

tect yourself with strong walls. It is of course impractical to attempt to confine an explosion within walls. In one sugar dust explosion it was estimated that a brick wall 30 feet thick would have been necessary to resist the pressure produced. In a grain elevator explosion a group of concrete storage tanks filled with grain and estimated to weigh 300,000 tons was lifted from the foundation. It is possible, however, to choose a well defended position and ward off an attack by building walls sufficiently strong to divert an explosion or limit the enemy's power by dividing his forces into a number of small detachments. Our purposes are best served by supplementing power with strategy. Draw your maps and plan your defense in advance, and then when the attack occurs let the enemy assist in his own defeat.

Just as general attempts to split up the enemy's forces, so should a hazardous process be segregated and split up into small units. If it is necessary to have the unit located within the plant proper then it should be separated from other parts by strong walls with a light outside wall, roof, large window area or automatic sash equipment arranged to permit the venting of an explosion before dangerously high pressures are developed. The wall separating this unit from your plant then becomes your fortress, and all openings through that wall must be carefully guarded. A screw conveyor with several flights removed to form a choke can be used to carry material to or from the machinery in which the hazard exists, and a revolving paddle wheel or damper can be used to seal effectively any spout openings through your wall of defense.

All the above-suggested measures have been adopted and found effective in fighting dust explosions, but at best they are measures of protection only. They do not rout the enemy but serve only to reduce or scatter the losses.

But now a more effective weapon has been developed and we can render our plants absolutely immune to attack. Dust explosion losses are prevented because no dust explosion can occur. It is now possible to take the offensive instead of being always on the defensive, because inert gas has come to our aid and with it we can render the enemy's ammunition useless for any attack on our plant. It has been found that of the requisites of a dust explosion, namely, dust in suspension in air and a source of ignition, it is the oxygen of the air which serves to support combustion.

By introducing an inert gas like carbon dioxide or nitrogen until the percentage of oxygen is reduced below that necessary to support combustion it is impossible for an explosion to occur or a flame to propagate. There is, however, a restriction on the use of this method of fighting dust explosions. It is impractical to consider flooding an entire building or even a room with inert gas. Workmen would be unable to breathe in such an atmosphere of low oxygen content. Inert gas, however, lends itself readily to use in inclosed units and is particularly well adapted to use in grinding equipment. It is with this phase of the subject that investigators have been dealing recently, and as a result of experimental work and factory tests the value of inert gas as a preventive of dust explosions has now been so well demonstrated that its use should be seriously considered wherever an explosion hazard exists which cannot be controlled through the elimination of the dust cloud or the source of ignition.

When planning the installation of an inert gas system the first consideration is of course a source of supply from which sufficient inert gas can be obtained. Where a steam power plant is operated in connection with a mill or factory, designing and installing inert gas equipment for explosion protection is comparatively simple. Where no power plant is located within a reasonable distance of the mill, gas producing equipment can be installed. In either case there are seven factors which should be determined before attempting to design a satisfactory system:

- (1) Quantity of air which normally enters the machine or equipment,
- (2) reduction of oxygen necessary to prevent explosions of the material being handled,
- (3)

percentage of oxygen, if any, in the gas used to create the inert atmosphere, (4) quantity of gas required, (5) availability of the required quantity of gas, (6) type of gas conditioning equipment, if necessary, and (7) the type of gas distributing system best adapted to the plant.

By giving careful consideration to these important points and planning the protective system accordingly it is possible to eliminate from the most hazardous points in industrial plants all danger of dust explosions and win through strategy a victory which we have been unable to accomplish with the weapons previously at our command. The Chemical Engineering Division of the Bureau of Chemistry and Soils will render all assistance possible in your fight against dust explosions and will be pleased to send on request available publications on dust explosions. Anyone interested in the use of inert gas, the newly developed method of explosion prevention, should write for "Technical Bulletin No. 74—The Value of Inert Gas as a Preventive of Dust Explosions in Grinding Equipment."

WILL COOPER (Stevens Hotel, Chicago, Ill.): You spoke about the explosibility of aluminum dust. I have heard about that. I have tried to get some information on it as to why an inflammable material like that would explode.

MR. BROWN: There are three metals the dust of which we consider explosive—aluminum, magnesium, and zinc. Aluminum and magnesium have already proven their explosibility in their use as flashlight powder and photograph flashes. The explosion of so-called metal dust is just a little different from grain dust. In the so-called carbonaceous dusts, the explosibility is probably partly due to a generation of gas. When heat is applied, a reaction takes place in this dust which we believe produces a gas and renders them, we will say, quickly explosive. They are quick on the trigger. They explode much more readily than the grain dust or the wood dust. Grain dusts are fairly slow. In other words, in a large tunnel, you can start a dust ignition at one end and see it progress through the tunnel. Men working in plants where explosions occur have time to throw up their hands and protect their faces; it comes in rolls of flame from one room to another.

But, with aluminum dust, we have a quick explosion produced which gives us a loud report and we account for that, as I say, by feeling that a gas is produced. We are not sure on that point. Investigation is under way. There is another feature that enters in there—the application of water to an aluminum fire renders it far more explosive than it was before. We have to smother our aluminum fires. In carbonaceous dusts, the explosion is simply a burning of material. Aluminum dusts and metal dusts are somewhat out of our regular line; we have been directing our efforts primarily toward grain dust and cereal dust explosions. Being in the Agricultural Department, the feeling has been that we should direct our efforts first toward the agricultural industries. We have had several aluminum explosions recently. I have some aluminum dust with me today. I can probably give you a demonstration here which will give you a chance to compare it with some of the cereal dust.

CHAIRMAN HASSE: Mr. Brown, here are a few samples that we will ask you to test first. *(Mr. Hasse indicated certain jars.)*

MR. BROWN: The cereal we have here is cornstarch. We will see what results we get with this first. We have some aluminum powder here. We will attempt to give a demonstration with the aluminum following the starch.

I might explain the construction of this little elevator to any of you who have not witnessed the demonstration before. In the front part of the elevator we have the workhouse—in other words, the combustion chamber, open from top to bottom. The storage tanks contain an ignition coil—small sheet metal tanks which we fill with air under light pressure sufficient to throw the dust into suspension. A pipe-line leads from this tank into the house and is directed down into the center of a cup. The dust sample (a spoonful in size), is placed in

the cup. When the trigger is thrown back, the air valve is opened, the air rushes in, throws the dust into suspension and the dust is supposed to be ignited by an electric spark. We have an electric connection here in the wall. The explosion is vented through the weakest point in the apparatus, the paper covering on the roof. This is an example of what can be accomplished in the protection of your plant by putting on a weak roof, large window area, or a light curtain wall. This releases the pressure and prevents destruction or damage to the other part of the structure. *(Cornstarch dust exploded.)*

Here is a sample of aluminum powder which we will use in comparison with the starch dust demonstrated. This is our test with aluminum powder used to show the comparison between it and the dust on which we have a little more information. *(Aluminum powder exploded.)*

W. P. PENTRY (Foreman, Kellogg Company, Battle Creek, Mich.): Mr. Brown, what kind of dust was that just used in this last demonstration?

MR. BROWN: That was aluminum powder. Now here we have some Kellogg company dust which we will try next.

MR. PENTRY: I would have brought more of a sample but that was all I could find in our plant.

MR. BROWN: I have my doubts about this Kellogg company dust exploding. It is a dust which conglomerates readily or forms small balls and lumps, and, in this small unit, we have to obtain a fairly uniform dust suspension. In other words, we have to have the particles separated. To demonstrate this dust we should have a screen or sieve that we could use to form the dust cloud a little more readily. We will make an effort to explode it and see what luck we have. *(Kellogg powder exploded.)*

MR. PENTRY: Mr. Brown, here is some hickory wood dust that a firm in Jacksonville sent me to have tested.

MR. BROWN: We will attempt a demonstration, if any of you are interested in wood dust. It is outside of the food industry line. *(Dust did not explode because paper used as roof covering had become torn and allowed the air to escape.)* That shows the advantage of having a small window opening or damper which will release the pressure and prevent any serious damage from dust explosion. *(Wood dust exploded on the second attempt, new roof being used.)* That was hickory wood dust.

We have here a sample of wood dust from the Hercules Powder Company. That sounds bad, doesn't it? At least, the man says it is wood dust. *(Wood dust exploded.)* We have another sample here of corn sugar, 2 per cent cereal through Meade Mill.

CHAIRMAN HASSE: I will ask that, if any of the members have any questions to ask, they hold these questions until after the demonstration has been concluded, please. *(Corn sugar exploded.)*

MR. BROWN: In this last demonstration, we used a smaller amount than usual. I considered the dust explosive and, rather than take any chance with the apparatus, we cut the amount down to about half. We have a sample here from the Postum Cereal Company. It is a material which floats to the top of the corn elevators; gathered from conduit box and eye-beams.

VERN D. SUTTON (Postum Cereal Company, Battle Creek, Mich.): It might be of interest to explain that I did not scoop this dust up out of a bin. I went around the plant, looking for dust; and with a paint brush, I swept this up from the conduit box and eye-beam in the top of the corn receiving tanks. That is where the shell corn is received; it has not been ground but, in the first process, it goes through a cleaner and also through the elevators, and this dust is up at the top of the elevator. The rattling of the corn has dislodged an accumulation of dust from each kernel and that has floated up to the very top of the elevator,—an elevator very much like the one you are using in this demonstration—so that,

if we should have a vibration that would jar that loose and a spark of ignition, we would get the kind of an explosion you will get there now. It is a test of our safety as well as the explosibility of the dust. *(Dust exploded.)*

MR. BROWN: Our test is somewhat limited here. I see quite an array of samples. If we do not get to your particular product, I will ask you to send a sample to Washington where we can make a complete test and give you a report. We have a sample of dust here which someone tells me is explosive, but we will demonstrate it and see. It is pyroxylin of lacquer, another dust outside the field of food industries, but I hope it will serve to demonstrate the purpose. It is in powdered form; it is the dried powdered dressing from the lacquer sprays; seems to be a mixture of all colors apparently. *(Dust exploded.)* In this last demonstration, we used less than half of what one of these cups holds.

MR. SUTTON: Mr. Brown, how much does that cup hold—about a teaspoonful?

MR. BROWN: Possibly a little more, if heaped up. We have a sample here of flour from the Minute Tapioca Co.

MR. SUTTON: This is not wheat flour, but tapioca flour, isn't it?

MR. BROWN: Yes. *(Dust did not explode because the paper roof became torn, as in a previous demonstration.)*

H. P. WARREN (Prod. Mgr., Minute Tapioca Co., Inc., Orange, Mass.): Mr. Brown, would you say that this dust is not very explosive?

MR. BROWN: No, there was a leakage in the paper. Our ring has broken and the wire is cutting the paper when we clamp it on. The hole in the paper releases the pressure before it is built up sufficiently to break through. Possibly it is less explosive, but any leakage in the enclosure which will permit the pressure to be vented will prevent the report. *(Several attempts were made with the tapioca dust, but it did not explode.)* Let us try a sample of wheat flour. *(Several attempts were made with the wheat flour, but they were unsuccessful on account of the paper tearing each time.)*

CHAIRMAN HASSE: I am sorry, but we will have to discontinue the demonstration. The ring for paper roof is broken and keeps tearing the paper. Mr. Brown is now going to give a demonstration that will only take a minute to give you an idea as to just how a dust explosion will travel.

MR. BROWN: This is to indicate the way a flame will propagate through a dust cloud. I have a small cloud of dust in a piece of cloth. By shaking the cloth, I will sift through enough dust to be ignited by a match. *(Sifted cloud, ignited by match, traveled a short distance across the floor and then exploded.)* I am sorry we did not get around to all these samples. If you did not get in on this demonstration, and will be good enough to send a sample to Washington, we will make our test there and give you a written report on it.

CHAIRMAN HASSE: We have about eight minutes for discussion. Have you any questions that you would like to ask?

THOMAS STROBBER (Vice Pres., Wagner-Taylor Co., Philadelphia, Pa.): Mr. Brown, what is the chemical form of inert gas?

MR. BROWN: Inert Gas is simply ordinary air in which a portion of the oxygen has been replaced with an inert gas such as carbon dioxide or nitrogen. In other words, ordinary air being made up of approximately 21 per cent oxygen and 37 per cent nitrogen, changed by the addition of additional nitrogen or carbon dioxide to a form where it contains approximately 10 to 12 per cent oxygen, 10 or 11 per cent H_2O , and the balance in nitrogen. There are a few rare gases, of course, present in air. The oxygen is necessary to allow combustion of the carbonaceous materials. If that oxygen is limited, the combustion is prevented.

CHAIRMAN HASSE: Are there any other questions? If not, we will proceed to our next subject on the program which will be presented by Mr. James H. Baker, Vice-Pres., Franklin Baker Co., Hoboken, N. J. I take pleasure in presenting Mr. Baker.

Safety Contests of the Food Products Group of the Merchants Association of New York

By JAMES H. BAKER

Vice-Pres., Franklin Baker Company, Hoboken, N. J.

The Merchants Association of New York had long felt the pressing need of some influence to reduce compensable accidents, the cost of which, including loss of time, loss of production, machine shut down, etc., was amounting to huge sums. So a year ago they inaugurated an accident prevention campaign among their industrial members in Metropolitan New York.

A General Committee of experienced men was appointed and they formulated a program, splitting the various industries into groups, among which was the Food Products Manufacturers, and it is on the accident prevention campaign of this particular group that I have prepared my report.

Committees were appointed for each individual group and a contest planned under the supervision of the General Committee. The winner of the contest was to receive an appropriate trophy, with other trophies to be given to those winning second and third place. The Merchants Association agreed also to give a certificate of award to all companies having perfect records.

The Food Products accident prevention contest was arranged to run for a period of four months—Feb. 1 to May 31 of this year.

The plan of reporting accidents was made as simple as possible for it was soon quite apparent that few of the industrial organizations in New York had given serious thought to a safety program. They did not keep data on accidents nor seem to understand the purport of this work, feeling that it was too much trouble.

It was therefore only after considerable effort that sufficient members were interested to become participants but we finally secured 53 entries, all of whom remained in the contest until the end.

Reports were sent in weekly by the different contestants giving the total man hours of operation and the number of lost time accidents. Severity of accidents was not taken into consideration; only the frequency and a lost time accident was deemed one in which the employee could not pursue his regular work on the day following the accident.

This method, of course, did not give a true picture of the safety condition in any particular plant but we felt it was the best that could be accomplished in the first contest and the chief idea after all was to stimulate interest in safety work.

The first few reports showed quite a few companies with perfect records; that is, no lost time accidents. But many reports were late in arrival and we did not seem to be securing enough interest and cooperation to obtain any real lasting benefit in accident prevention.

So the committee arranged for the services of a safety engineer to visit the various plants; to give safety talks with motion pictures; and stir up interest.

We further provided posters pertaining to the contest and after another month's progress the contact man had the following report to make.

Report of Contact Man

The following is a résumé of 29 visits to contestants, analyzing in percentages the following points:

- (1) 100 per cent in favor of the plan of the contest.
- (2) 25 per cent entered the contest passively—felt no particular benefit would accrue—entered as a courtesy.
- (3) 75 per cent feel that the benefit to be gained is worth-while.
- (4) 100 per cent favorable to, and pleased with a contact man.

- (5) 90 per cent favorable toward suggestions and recommendations of contact man. Other 10 per cent feel that their present safety organization is handling matters ably, and needs no such assistance. Merely want contest statistics.
- (6) 40 per cent asked what program and publicity the association was presenting. Had received inadequate literature, and had received no reports
- (7) 90 per cent could use safety-posters and safety letter bulletins, 10 per cent had no use for poster service or payroll inserts.
- (8) Only 5 per cent in favor of rallies.
- (9) 50 per cent in favor of foremen's safety meetings to be attacked through contact man.
- (10) 50 per cent of having informal contact with department heads, foremen, etc.

This showed rather conclusively that we were on the right track and that it was essential to have this personal contact with the various organizations if we were to gain worthwhile results and stimulate sufficient interest so that each organization would really give serious thought to the safety program.

Previous to this contest I am inclined to think that the utmost in safety work carried on in about 90 per cent of the plants was that amount sufficient to obtain the insurance credits for so-called safety or inspection committee, first aid equipment and physical condition of the plant.

When the contest was about half completed we sent out questionnaires to each of the contestants, receiving only 20 replies, which in itself is a further indication of lack of interest. The replies were interesting although in some cases contradictory.

Analysis of Questionnaire Sent to Contest Participants

Number of questionnaires mailed.....	53
Number of replies.....	20

The questions asked and the replies of contributing companies are as follows:

1. Has the participation of your company in The Merchants' Association Accident Prevention Contest assisted you in reducing accidents and costs?

Yes	10
No	5
Uncertain	2
Gave no answer	3
2. Do you think that such contests are valuable and worthy of continuance?

Yes	17
No	1
Questionable	1
Gave no answer	1
3. Has the work of our contact service man been of value to you? In what way?

Yes	7
No	3
Gave no answer	4
Had no calls from contact man	6

One company stated that the personal contact was far more effective than writing and entirely responsible for their entering the contest.

Helping its newly appointed Safety Director to meet others interested in Safety work, was the expression of another company.

"Presenting a well worth while cause to us" was the statement of a third company.

Several other companies, while not availing themselves of the contact man's services, firmly believed in it and stated that they received a similar service from their insurance companies or from their own Safety organizations.

4. Which of our contact man's services have you found to be the most valuable? (Plant Inspection, Talks to Employees, Safety Suggestions, etc.)

Safety Suggestions	4
Tips on Posters	2
Safety Talks	2
Plant Inspection and Personal Contact	1
Information on Conditions in Kindred Industries	1
Gave no answer	10

5. Do you think that this contact service should be continued and extended to other contest groups? If not, why?

Yes	17
No	1
Gave no answer	2

Two companies answering "Yes" stated that service should be extended to other groups unless similar service was supplied by insurance companies.

6. Please state below any suggestions or criticisms that may be of value to the committee in charge of The Merchants' Association Accident Prevention Movement.

7. Have you a man on your pay roll who is officially charged with the responsibility for safety?

Yes	11
No	7
Gave no answer	2

8. Approximately what proportion of his time does he spend on safety?

Full time	2
Fifty per cent of time	2
Thirty-three and one-third per cent of time	1
Ten per cent of time	1
Five per cent of time	1
Portion of time—not definitely stated	4
Gave no answer	9

9. Have you an organized Safety Committee?

Yes	11
No	7
Gave no answer	2

Final results of the contest were gratifying in that 18 out of 53 companies had perfect records. The winning banner was presented to D. Auerbach & Sons who had the greatest total man hours work, this being some 550,000 with no lost time accidents. The 18th on the list had a total man hours worked of 4,304 but likewise had 100 per cent record, in that there were no lost time accidents. Certificates of award were presented to each of these organizations.

There were some six other companies who had very commendable records, as for example one organization with 561,000 total man hours work and only one lost time accident. To these companies the Merchants Association presented letters of citation.

The summary of all contestants showed some 17 million man hours worked with 314 lost time accidents or 54,000 man hours of work per accident. This gives a frequency of 18.44 accidents per million man hours.

Careful records were kept showing the causes of accidents and it is interesting to note that 27 per cent of the accidents, occurred in the handling of materials. The next most serious hazard was stumbling or slipping which caused 17½ per cent of the accidents and following this was falling objects totaling 11½ per cent.

Accidents from machine hazards were something less than 10 per cent which

would indicate that the majority of the plants were well provided with the necessary safeguarding equipment.

Most of the accidents were therefore largely due to failure of the human element; were in most instances preventable, and unquestionably a big reduction in the total number of accidents could be accomplished by a carefully planned program of safety.

We will, without doubt, start another contest among The Food Products Manufacturers in the very near future. I think in this contest we should take into consideration the severity of accidents as well as the frequency, and if we are to make the contest a real success we must have more posters, more safety letter bulletins, more frequent reports and closer personal contact with each and every contestant. These plans have already been discussed.

According to reports of our contact man, rallies among our contestants were not particularly popular, presumably because they interfere with production but most companies were favorably disposed toward foremen safety meetings; to safety posters and to suggestions and recommendations for the betterment of their safety organization.

I might add that there was real interest displayed at the meeting in June when the awards were given and we had a large gathering present, so we feel very hopeful that in the next contest we can arouse greater interest and have a larger number of entries.

THOMAS STROHBAR (V. Pres., Wagner-Taylor Co., Phila., Pa.): I am interested in the view point of trade associations to which the members must belong. I would like to know what percentage of the members of the Merchants' Association who were in this contest are members of the National Safety Council.

MR. BAKER: No, I do not know that. That could be readily obtained but I doubt if there are so very many in New York because in New York City there is no local safety council.

MR. STROHBAR: There is a New York Safety Council.

CHAIRMAN HASSE: Not in New York City.

MR. BAKER: We have one in Hoboken—a rather active one, too. But that is not in the Metropolitan District.

MR. STROHBAR: The view point that I think the Food Section of the National Safety Council would be particularly interested in is having more of the members of the Merchants' Association who participated in the contest become affiliated with our campaign; and, therefore, if that is going to be a benefit to the Food Section, perhaps, it would be well to encourage other organizations to take up similar campaigns such as you have had.

CHAIRMAN HASSE: Are there any further questions? If not, we will proceed to the third subject on the program, which is the election of officers. I will ask Mr. Prouty, Chairman of the Nominating Committee, to kindly submit their selection.

Report of Nominating Committee

RALPH E. PROUTY (Aetna Life Insurance Company, New York City): Mr. Chairman, Ladies and Gentlemen, the Nominating Committee presents for the consideration of the Section the following nominations for the ensuing year:

Chairman: Alex. Dienst, National Sugar Ref. Co., Long Island City, N. Y.

Vice Chairman: Wm. P. Penty, Kellogg Co., Battle Creek, Mich.

Secretary & News Editor: Gerald L. Gore, Casualty Reciprocal Exch., Kansas City, Missouri.

Chairman Poster, Lantern Slide and Safety Kinks Committee: H. P. Warren, Minute Tapioca Company, Orange, Mass.

Chairman Membership Committee: J. A. Powers, Pillsbury Flour Mills, Minneapolis, Minn.

Chairman Program Committee: Thomas S. Strobhar, Wagner-Taylor Company, Philadelphia, Pa.

Chairman Engineering Committee: Ralph E. Prouty, Aetna Life Insurance Co., New York City.

Chairman Statistical Committee: Will Cooper, Stevens Hotel, Chicago, Ill.

Executive Committee: Officers, and

Vern D. Sutton, Postum Company, Inc., Battle Creek, Mich.

A. C. Lewis, Detroit Creamery Co., Detroit, Mich.

F. A. Hasse, Corn Products Corp., Chicago, Ill.

G. A. Noxon, Ralston Purina Co., St. Louis, Mo.

Signed: Ralph E. Prouty, W. H. Cunningham, Wm. P. Penty.

CHAIRMAN HASSE: We have heard the report of the Nominating Committee. What is your pleasure?

(Motion to accept nominees made, seconded and unanimously carried.)

CHAIRMAN HASSE: We will now throw the meeting open for any discussion that you many care to have. Perhaps we cut the dust explosion discussion a little short this morning, and, if any member has any further questions to ask, we still have Mr. Brown in our midst and I know that he will be more than pleased to answer any questions.

A. E. WINDLE (Plant Engr., Wilbur-Suchard Chocolate Co.): Mr. Chairman, I would like to know how Mr. Brown rates the explosibility of cocoa in more or less confined places, compared with other things.

HYLTON R. BROWN (Associate Engr., Washington, D. C.): I would say that cocoa is about one of our average dusts, giving between 10 and 10½ pounds pressure per square inch when tested under what we call our uniform testing conditions—that is, a given quantity of the dust in a given quantity of air compared with our standard Pittsburgh Coal dust. All samples are sifted and a given quantity is exploded in a given quantity of air in order to obtain uniform results. Cocoa is classed as an average explosive dust.

MR. WINDLE: Mr. Brown, how do you rate pulverized can sugar?

MR. BROWN: Cane sugar is somewhat more explosive, giving us around 12 pounds per square inch compared with the standard coal dust sample which we have regulated so that we obtain 10 pounds per square inch pressure for coal. The pressure is between 12 and 12½ for sugar dust. That will depend somewhat on the moisture content; the condition of the sample, in other words.

WILLIAM GATES (Peters Chocolate Co., Fulton, N. Y.): Does the butter fat in the cocoa make any difference in the explosibility?

MR. BROWN: Yes, I believe it does with the cocoa dust.

MR. GATES: In the different makes of cocoa there is a different percentage of butter fat. Does that make a difference?

MR. BROWN: All samples vary somewhat according to their composition, just as in sugar dust and some of the starch dust.

G. A. NOXON (Ralston Purina Co., St. Louis, Mo.): I notice that Mr. Brown spoke of the use of inert gas to prevent explosions but he did not say anything about the use of magnetic separators to take out the metal which really causes the spark. I am particularly interested in what is best type of magnetic separator to use. In our business we use numerous types but, naturally, some of them are going to be more efficient than others.

MR. BROWN: Of course, we cannot single out any particular make of magnetic separator and advertise any one company's product over another. We simply recommend efficient magnetic separators in order to remove any metal which may enter grinding machinery. I am afraid that I could not go into any details in answering that question. There are several different types of separators on the market. All of them are comparatively effective but you still have the chance of stones or non-magnetic foreign material entering the mill with the feed, so that

it is not 100 per cent protection. Some companies prefer to use both the magnetic and non-magnetic separators and obtain somewhat better results in that way. Inert gas is 100 per cent protection. By removing all foreign materials that you can and using inert gas, if a spark is produced, you still have non-combustible atmosphere which gives you the protection desired.

VERN D. SUTTON (Postum Co., Battle Creek, Mich.): Some of these explosions that might be attributed to metal in the product are sometimes caused by stones striking the metal of your rollers. Of course, you cannot separate the metal from your rollers, and stones will sometimes get in and magnetic separators will not remedy that condition. Of course, static electricity caused by broken electric lights and many other forms of ignition are present or prevalent. Can you tell us what percentage of the serious explosions that have occurred in our industry might be attributed to the possible presence of metal in the materials?

MR. BROWN: Our records for a twenty-year period show that in feed grinding plants alone there were thirty principal explosions, and the fact that eighteen of these thirty explosions originated in the grinding equipment gives us some idea of the percentage due to foreign material entering with the feed, as practically all explosions originating in the grinding machinery are due to metallic sparks or, as you say, the stones or foreign material in it striking the metallic plates. I would say eighteen out of the thirty.

MR. SUTTON: Of course, there is no knowledge as to what percentage of those explosions were caused by metal and what were caused by stones?

MR. BROWN: No.

MR. SUTTON: My personal experience is that a greater number were from stones than from metal.

MR. BROWN: I felt that way about it, too. We have no figures which would indicate any definite percentage.

FRANK MORRIS (Asst. Chief Engr., Liberty Mutual Ins. Co., Boston, Mass.): I want to tell the Section about our experience with motion picture equipment.

We started making motion pictures about twelve years ago and we had some very interesting experiences.

It might interest you to know that the accidents that are staged in motion pictures like the kind that we have produced are not, of course, real accidents. For instance, we show a man who loses a leg under a locomotive. Of course, we have to find a man with a wooden leg and get him to lie down and let the locomotive run over him. When the locomotive hits the man, however, the man simply stands up in front of the locomotive and the locomotive backs up and he falls down. Then the film is reversed and, as you see it, the locomotive comes the other way and hits him and knocks him down. We used, of course, the old 35 millimeter film. We had a lot of difficulty until the safety stock came on the market, then we were able to show the film anywhere. We have had films catch on fire.

There is something basically logical about the motion picture where you can take it out to a plant and get a picture of the present safety conditions. Then you can take a film that applies to that particular industry, whether it is that particular plant or not, and by sticking in a title or two and the pictures of the manager of the plant and the president of the safety committee, you can make it practically a film for that particular shop. Now there is no trick to taking a picture with a 16 millimeter camera; all you have to do is load the thing, aim it, press a button and shoot. You cannot imagine how much you can get on half a dozen feet of this millimeter film. I have forgotten the proportion, but I would say that six feet of this narrow film is equal to probably twice as much of the standard size. The making of titles to go with the pictures is a very simple matter. There is a board with celluloid letters comparable to the kind you see in restaurants announcing the meal for that day, and you just merely have to

make up the title, put it on that board with your little celluloid letters and go ahead and shoot. Just a foot or so will give you all the film you need for a single plant.

In going into a plant, of course, you have to experiment to find out the proper lighting and in order to get the right effects. You can pick up hazardous situations, careless practices, and, as I said, pictures of the safety committee and of the safety inspector on the job; of the bulletin board that is itself good or bad; and piece them together and, with the proper title, you can make the most interesting film for the employees in that plant. Our idea is to present a picture here today that was taken at the Congress, simply to prove the adaptability and the usability of this machine. It is not expensive. I cannot give you the figures on the cost but it is very small compared with the old style machine.

CHAIRMAN HASSE: We will now proceed with our fourth subject on the program. I take pleasure in introducing to you Mr. Robert Clair, Chairman of the Taxicab & Fleet Owners' Section, National Safety Council.

Amateur Motion Picture Equipment as an Aid in Accident Prevention

By ROBERT CLAIR

Highway Safety Engineer, Liberty Mutual Insurance Co., Boston, Mass.

No one can deny the widespread appeal or the educational advantages of which the motion picture is capable. The professional "Movies" have become one of our great national institutions.

As average citizens, there are very few thrills which can be compared with those experienced in seeing ourselves in the movies for the first time. We bring bundles of snapshots back from our vacations with us and are able to obtain a great deal of pleasure in looking them over frequently to review and renew the good times of which they are a record. But if you have not heard, perhaps in your own parlor at home, the literal screams of delight which are uttered by your neighbors, your friends, or members of your family, upon witnessing the projection of an amateur film which you have taken of them, you have not as yet realized the undeniable enthusiasm which pictures in motion can arouse. *There is magic in motion.*

The last two years have witnessed a most remarkable growth in the development of amateur equipment for the taking of motion pictures. A number of well known photographic concerns have perfected so-called "hand cameras" to a point where their operation is practically foolproof and the expense surprisingly low. I say "foolproof" because even I have had some fairly good results along this line! This means that you and I, as ordinary laymen, have had placed in our hands perhaps the most effective safety medium which has ever come to us. Without any particularly intensive training, without any professional instructions, and with no other specialized education, other than the reading of a few brief pamphlets and the observance of a demonstration or two, we may become producers of effective accident prevention motion pictures. Best of all, these pictures can present what is perhaps our most intimate and direct appeal to the individuals which make up the groups on which we are working.

The 16 millimeter sized safety, or non-inflammable, film has become standardized for use in practically all the latest amateur cameras and projection equipment. At any location where there is an electric socket handy we are ready for safe projection within five minutes.

Let me tell you of what is perhaps the most surprising stunt yet performed by this comparatively new amateur moving picture equipment:

Last summer a group of amateur community players in Rochester, N. Y., produced a comedy film drama in three reels, on this 16-millimeter stock. The interesting facts concerning this production are as follows:

The scenario was written and produced and directed by amateurs. It was photographed in three weeks at times convenient to the cast. No make-up was applied. No sets were built. No tripod was used. No properties were rented. No artificial light was employed. All shots were taken with a hand-held amateur movie camera. Exclusive of the cost of the film, the total production expense was \$1.35.

The title of this unique picture is "Fly Low Jack and the Game."

To view this picture is to wonder that so many professional-like thrills and that so much good fun could be filmed with the aid of such modest material and at such a surprising low cost.

I am not on the payroll of any photographic concern nor is my purpose to sell you or to endorse any of the different types of equipment on the market. My purpose is to tell you what we have learned from a year of experience with this amateur moving picture camera and projector.

We have found in them a new adaptation of a comparatively old medium which possesses peculiar effectiveness for the spreading of our safety messages. We are enthusiastic over the experiments which we have made and yet more so about the future possibilities. It is hoped that these remarks may lead you to result-bringing experiments of your own along similar lines.

We can now make our own moving pictures which are, in reality, nothing more or less than animated bulletins. We can exemplify safe practices and immediately thereafter illustrate unsafe operations with their consequences.

Due to the low cost of amateur picture production, our material can be kept fresh, up to date and abreast of the latest hazards. We can afford to change our programs often. Thus we become rid of the annoyance of depending on out-of-date professional film material. If we cannot borrow, buy or rent a special safety movie to fit our needs (and these are usually tragically scarce) we can now solve our own program by making one ourselves.

Through the binding effect of our titles, we are able to offer progressive thought by which we see an accident through all its stages—its cause, the actual manner of happening, and its effect. Through our continuity we may weave otherwise segregated events into a story unit. This arms us with those human interest factors which are always so effective.

Perhaps best of all, we can localize our subject matter both as to setting, situation and characters. I am sure we have all heard a bulletin criticised by the expression, "That's a good bulletin but it doesn't apply to our plant. Our machine is built differently." With our own camera, we can depict our own machines in our own plant, operated by our own workers.

Just in passing, consider the interest value of a home-made "industrial news reel" for our rally purposes. There are many interesting things which take place in our plant almost every week which are worth recording. For instance, here are some of the things which could go into the making of such a local picture of current events:

1. Foreman Jones is pictured being congratulated by fellow employees upon the arrival of Jones, Jr.
2. A new packing machine has been installed in one of the departments. The superintendent of the plant is shown inspecting it. In this, some of the machine's interesting safety or mechanical features may be shown.
3. Three or four new employees are pictured with their foreman, who is explaining to them the safe way to perform their new duties.

4. The plant manager congratulates Foreman Brown on having the best departmental accident record for the month.
5. Employee White is shown having a piece of steel removed from his eye by the plant doctor. White agrees that he will wear his goggles the next time!

The statement is almost unnecessary that a few shots, such as the above, would certainly put an added "kick" into any safety rally program. I have not been extremely thorough in listing the possibilities of the local "industrial news reel." With very little thought you can develop this into a most important part of any safety program which you may be developing.

Should a number of you become interested enough to work out and "shoot" some accident prevention picture stories in your own plants, there is at once the interesting possibility of exchanging these reels among ourselves. You are in closely related industries—much of your machinery is similar—many of your hazards are common. Perhaps such interchanged films would not be as effective among your workers as those taken by yourself in your own plant because of the absence of "local color" interest, but at least the appeal of the animated bulletin would be present.

With an f 1.9 lens equipment, surprising results may be obtained with these hand cameras in very cloudy days or even during a rainstorm. With a lens of such high speed, an apparently weak diffusion of daylight will give clear and accurate pictures.

For the taking of interior scenes, even in the darkest corners of your plants, very efficient portable artificial lighting units are obtainable. Most of these are light weight, compact and easily transported by hand.

It is a very easy matter to make your own titles for the pictures which you take. No changes in the regular camera lens equipment is necessary. This complete lettering equipment for titling may be obtained, with detailed directions, at any large photographic shop.

You might be interested to know a few facts concerning the developing arrangements for these 16-millimeter films. The film may be obtained in rolls of either 50 or 100 feet. The initial price of these reels includes the developing cost. As soon as the reel of film has been exposed, you return it to your photographic shop and it is sent away for development. The finished film will be returned to you usually within two or three days. The time necessary for development all depends upon how far you are away from one of the developing stations.

The developing of this film is what is known as the "reversal" process. This means, instead of receiving a negative film, that a positive is returned to you. This positive film is the actual film which was exposed in the camera. Instead of appearing as negative, it has been "reversed." Should you want another copy of it, such may be obtained for a given cost. In addition to this regular "reversal" film, which comes back to you as a positive, there is also a "negative" film on the market. We believe that this film is priced at about one-half again as much as the regular "reversal" film. The reason for this is that when this film has been developed and returned to you, you receive both a negative film and one positive copy. This gives you a permanent negative record for your file, which at any time may be copied positively at the standard price rate.

Hand camera motion picture films in natural colors are now realities. I have filmed a test reel of this new process and assure you that it gives remarkably life-like effects and is rich in possibilities. Bright sunlight, a special filter which is inserted in front of the regular camera lens, and a specially prepared roll of film are the only three requirements for the taking of these pictures in natural colors.

I came down here to the Congress last Sunday with no definite idea as to what I would have to show you.

In order that we might show you something in the nature of a home-made news reel, we got busy and shot a reel of film in and around New York on Monday, October 1, which was the first day of this Congress. This film we have prepared especially for this session of the Food Section. It has not yet been shown publicly. We have reason to believe that this is a real "scoop." You will be the judges as to whether or not it proves interesting.

I shall be glad to answer any questions which you may wish to ask after the showing of the pictures.

(Following the address, Mr. Clair showed a moving picture illustrating his subject.)

CHAIRMAN HASSE: Are there any questions that anyone would like to ask?

VERN D. SUTTON (Postum Co., Battle Creek, Mich.): Mr. Clair, you referred, I believe, to the use of the motion picture camera in preparing posters. What is the advantage of the motion picture camera over an ordinary camera in getting poster pictures?

MR. CLAIR: Perhaps I was not clear. My thought there, was, not that the motion picture camera picture itself be used in taking pictures for bulletins; I tried to bring out the point by telling you that pictures in motion from which you can make an animated bulletin present a much better appeal than merely looking at a snapshot.

MR. SUTTON: I think, however, that there is an advantage in using a motion picture camera in taking poster pictures. If you have tried to do that work very extensively, you will find that, when you want to take a hazard, especially if you are going to pose people in that picture, when you have developed your picture, you find the people have lost their pose. Sometimes, I have to try three or four times. If you take a motion picture of a person going through this hazardous operation, you can select one of them for your poster.

MR. CLAIR: That is a very fine thought. Only there is a limitation. Of course, you realize that these pictures are very small and you are more or less restricted as to enlarging them. I can't tell you off-hand the maximum size. Perhaps you might be able to get it up to about 2 x 4 inches, but I doubt very much whether you would be able to get a bigger picture on this size stock.

MR. SUTTON: Mr. Clair, if you should happen to get a real sharp picture, it could be enlarged to sufficient size; if your large picture were made up to 4 x 5, even if your picture were not as perfect as it might otherwise be, I think the boys in the plant would not criticize the picture so much, and still it would portray the hazards. I think there would be a decided advantage in using a motion picture camera.

EDWARD H. FARNAN (Standard Acc. Ins. Co. of Detroit): You cannot get a good enlargements from the 16 millimeter film. I tried to get it up to 3 x 4 inches but they are very poor.

MR. CLAIR: That was my impression. I thought that, if you could get it up to 2 x 4 inches you would have gotten to the limit in size.

C. M. FINCH (Supt. of Inspection, Mass. Bonding and Ind. Co., Boston, Mass.): I think, perhaps, that Mr. Clair has in mind a short film that depicts a man falling down an elevator shaftway. I think a great many of the members here have seen this bulletin; it shows the different stages from where the man falls, all the way down, showing him turn over and over and over, till he reaches the bottom.

MR. CLAIR: You mean just a strip of film?

MR. FINCH: Yes.

ADJOURNMENT

October 4, 1928

F. A. HASSE, Chairman
Safety Director, Corn Products Refining Company, Chicago

The Thursday session of the Food Section was called at nine-forty o'clock by the chairman, F. A. Hasse.

CHAIRMAN HASSE: Our first subject this morning will be covered by Dr. Louis I. Harris, Consultant, National Dairy Products Corporation, New York City. Dr. Harris was also formerly Commissioner of Health of the City of New York, where I understand he made quite a reputation. It gives me great pleasure to introduce to you Dr. Harris.

The Value of Physical Examinations

By DR. LOUIS I. HARRIS

Consultant, National Dairy Products Corporation, New York City

The value of medical examination should require no labored explanation at this stage of our scientific and general educational development. For fourteen years it has been my privilege to watch rather closely the development of industrial medical service, and I am disturbed by the fact that in a country that is so tremendously given over to the promotion of efficiency methods and to the development of machinery which has come to play a dominant role in industrial life, that the human machine has not been conserved adequately.

Possibly this is because it has been felt that it can be replaced, practically speaking, with least difficulty. I have seen industrial organizations lavish no end of care and no end of solicitude on machinery, and, on the other hand, I have seen the workers scrapped for want of adequate protection from accident and health hazards associated with industry. Waving questions of an ethical or humanitarian aspect, I will regard the worker only as an industrial asset.

I recognize the splendid industrial hygiene work done by many, such as the General Electric Works, the Metropolitan Life Insurance Co., the Endicott-Johnson Company, and others. But aside from a relatively small number who are interested in conserving life and health of workers, there has been little progress in medical examination service in industry and the associated activities.

Medical examination is to be considered from two points of view; first, in relation to the benefit it offers to the individual; and, second, to the benefit that accrues to the industry.

May I first speak, parenthetically, of a subject that I cannot discuss at proper length, namely, the sale of a Life Extension Service. I don't know how many of you have read this month's *American Mercury*, in which Dr. Logan Clendenning writes on "Health Audits" and speaks, without mincing words, about the Life Extension activities. If you haven't read it, let me commend it to you as a very sane article, which, while I do not wholly agree with it, scores most excellent points about this miracle which, like Ponce de Leon's fountain of youth, is held out to a great many who read the glamorous promises of the Life Extension Institute as a means to the prolongation of life.

Dr. Raymond Pearl has stated that human beings are very much like clocks that are wound up, through inherited characteristics and qualities, to run for greater or shorter periods. Some are forty-year clocks, some seventy and some perhaps

eighty or ninety, to a doddering old age with second childhood as a feature that marks the running down of the clock.

The Life Extension ballyhoo is unfortunate in that it gives the impression that what you have to do to live long enough is to be medically examined. But scientifically it is utterly inaccurate. A man of forty or forty-and-more, or a woman—and women are by no means immune—if they have high blood pressure, are not going to be benefited in many cases which doctors designate as essential hypertension, or, putting it in plain language, unexplainable high blood pressure, by examination. Advice may be helpful to avoid certain dangers, but it will not, in the majority of instances, be serviceable otherwise; and if advice is given tactlessly and in a routine fashion, it may create a most unfortunate state of mind.

This is not meant to minimize the importance of medical examination and preventive service if aimed to eliminate environmental hazards to health in industry so far as concerns captains of industry as well as the hewers of wood and the drawers of water; those who man the commanding positions or the humble servitors in the industrial organization.

Medical examinations are most useful among pre-school age children; that is, in the group who are under five years of age. In the older age groups, and in industry in particular, they are of value to discover disease tendencies, or diseases that are established, in order to prevent further progress, or to eliminate the industrial factors that may be causing damage to health. There are frequent conditions that one cannot do a thing for at the age of forty; and so I say advisedly that we have to change the system of medical examinations, if they are to do the individual good, by inaugurating such medical examinations as early as possible. A vast fortune is being expended in school medical examinations, many of which are made too late. Children who already have rheumatic affections that have damaged the heart, are a reproach to those of us who are responsible for their protection.

In industry you are particularly concerned with two great features—the feature of safety to those who are working in industry, that is, medical examinations to guard the health of the public who consume food products. So much safety work has been done, that everyone knows that you cannot admit into a plant an epileptic who is likely to have an attack of epilepsy, where just a moment's unconsciousness or loss of control may do untold damage to life or to production.

A worker suffering from heart disease, or with a blood pressure of 200 or 220 or more cannot safely be entrusted with some vital and responsible job upon which the lives and safety of others may depend. This is not to say that persons with heart disease cannot be employed with mutual benefit in industry. The individual who is color blind, and who ought to be able to distinguish colors—the engineer, for example—cannot be permitted to control the throttle. A great many drivers who are now given licenses to drive cars do so without being able to discern colors. The observance of color signals may be most important from the standpoint of personal and public safety.

Parenthetically, may I say, that there are a host of men and women who drive cars, some of them having a mental age of six years, though they shave and have the outward appearance of maturity. These are morons who have no sense of responsibility. There are drivers who have nervous diseases that should disqualify them. There are those who have high blood pressure who are permitted to sit at the wheel of cars that are potential man-killers. There are drug-addicts whose sense of responsibility and intellectual faculties are dulled by frequent use of the needle, and then there are a goodly number of people who are deaf.

Continuing this parenthesis, I should like to urge that there should be an utterly different system of licensing those who drive—whether they be taxi drivers or owners or chauffeurs who drive pleasure cars or other vehicles. I should like to see a medical examination as a requirement to make sure that those who apply for a driver's license are not suffering from such diseases that are recognizable by

medical examination which would disqualify them. I have known instances where men have driven cars who have suffered from this new disease that we are now learning about, a disease that obliterates the arteries of the legs or arms—thrombo-angiitis obliterans—cutting off or shutting up blood vessel canals, which frequently cause amputations to be performed. An annual medical examination would here prove a valuable thing. As to those that are arrested for violations of traffic laws where there is any element of negligence involved, it ought to be required that such persons submit to a mental and medical test, carried out by psychiatrists, to determine whether it is safe to permit such offenders to drive cars.

To return to my main theme, medical examinations are of value to prevent the huge labor turn-over that occurs, particularly in hazardous occupations. I have found that when you provide medical examination, and watch for signs that point to industrial hazards, removing workers who are exposed to lead poisoning for example to another department of work upon the signs of blood disturbances such as anemia, and not waiting for the occurrence of marked and unmistakable trouble, labor turn-over is diminished. Employees come to know and appreciate when they are watched over with medical solicitude and foresight. But, above all, medical examinations throw light upon factory conditions that menace health and safety.

Doctors in industry who merely treat bruises and injuries and have neither the social vision or professional interest to ask "Why do I get so many injuries or cases of sickness to care for?" are narrow and lacking in real value to industry. When girls employed in a factory suffer from persistent headaches in certain departments of a shoe factory, for example, it should arouse medical curiosity whether there is an excess of benzene or naphtha to which they may be exposed.

I am offering random examples and I trust that you will bear with me because I have not had the time to prepare, nor the time to present a well-rounded and full statement of this subject. The doctor in industry, I hope to make it clear, should not only serve to prevent accidents, and to save losses through compensation suits, but he or she should also aid to discover the precise places in the factory where damage to life and limb as well as to health threatens; and it seems to me he ought to be able to sell the idea of prevention with greater persuasiveness than that of patching up injuries. They must bring industrial managers to recognize such service as an absolutely essential thing that pays dividends. If a doctor cannot show that he has saved a company many times more than they pay him, it indicates a serious lack of efficiency, that he is a "bandagist" chiefly. As a doctor you must know how to treat patients intelligently in industry, but you must do far more, you must have a clear idea as to the processes of industry as they relate to safety and health.

I come to medical examinations as they relate to establishments. There is a double relation, so far as food is concerned. If you manufacture food you have a peculiar relation to the public. One cannot tolerate in the food industry a food handler who may have had typhoid fever or who is suffering from a communicable disease. Those who serve company cafeterias or restaurants must be free from communicable disease. In this age of democracy even your captains of industry and company managers may be exposed to disease if the man or woman who serves food has a septic sore throat, tuberculosis, is a typhoid carrier or otherwise infected. But the danger of employing diseased food handlers as it relates to the general public is of greatest importance.

You may remember that in Lee, Massachusetts, a few months ago there was a septic sore throat epidemic that caused about 700 to come down with the disease and about 36 died. We do not know how many more whose cases did not come to public notice were affected and who were carriers of the germs of this disease. We do not know how many were left with damage to the heart.

When I speak of medical examinations I don't mean a casual routine consisting of the hurried use of the stethoscope which makes such a tremendous impression

upon the laity. I also plead for the greatest regard for sanitation in the manufacture of the food-stuff.

A medical examination once a year is a mere entering wedge, an indication that people have come to recognize that medical examinations are necessary. The week or month after a man is examined he may acquire, syphilis, gonorrhea, or show signs of tuberculosis with a positive sputum. It means, that if industry is going to protect itself, there should be something akin to military routine, namely, frequent and thorough examinations. I mean to indicate to you that industry has a great opportunity to promote public confidence by a sincere and thorough system of medical service that adequately protects the public.

The soda fountain is now the source of food supply to millions throughout the country. What sanitary sins are committed at practically all the soda fountains? Most are infested with flies, food is exposed to dust, counters are sloppy, salivated spoons, glasses soiled with saliva are swished around in a little tub of water that is luke-warm instead of being 180°, or 212°F. preferably. Reform of soda fountain practices are urgently needed in most places.

The food industry must realize its obligations to the public, and it must provide medical examination of those engaged in food-handling, whether it be the soda fountain, the restaurant or the bread counter. They must provide for thorough and frequent examinations so that the public may be protected and that industry may be saved from being discredited by attacks that are justified when it is negligent.

There are comparatively few establishments that have shown any great interest in guarding the health of workers. If these lessons are taken to heart, I make bold to say that if you have a Congress ten years hence you may celebrate the fact that a doctor is of the greatest value to industry, that he is not a "bandagist," that he will help tremendously to conserve man power and promote sound business through the protection of the public health.

CHAIRMAN HASSE: I am sure that we have all enjoyed this splendid address by Dr. Harris. I think we have been indeed fortunate that we were able to hear a man of his type present this subject to us. I am sure a number of you have a question in your mind about physical examination, and in talking to Dr. Harris before our meeting started he assured me that he was ready to answer all those hard-boiled honest-to-God safety men. So, if you have any question that you want to ask Dr. Harris, I know he will be more than pleased to answer your question.

MR. COLEMAN (Continental Bakeries, Inc., New York): I would like to ask the doctor—in a company where we employ one hundred, is it advisable to recommend an examination where we have to take a chance on doctors we do not know? Would they not recommend such things as tonsils, etc? Do us more harm than good?

DR. HARRIS: The examination of food handlers has been made a very difficult thing by the fact that private physicians have frequently been allowed to make the examination of the food handler and have given the opinion that the food handler is free from disease. Being interested in bakeries, I take it that you are interested that the public should not suffer from any person who is affected with a communicable disease. A private doctor may be in an embarrassing position. The food handler represents a family whose good-will he desires to retain; therefore he is between the devil and the deep sea, for if he helps the company by saying that a food handler is suffering from tuberculosis, and recommends his exclusion, he loses a patient. If the food handler suffers from scabies (the itch), or something that is ever more dangerous (let us say syphilis in an active stage) and I want to warn you that there are several people who have suffered from syphilis who are free from active infection and should be allowed to work in industry—if you leave that to the private physician he is embarrassed, and in a sense restrained from

divulging such facts to you. So I think that companies that depend upon private physicians are handicapped.

They ought to engage those who are on the company's payroll. Such physicians must be imbued by a public health ideal. They must not be told by managers, "I have had a hard time getting these men in my employ and I don't want you to tell me that six out of the ten I have engaged are not fit for work." They should be free to express the truth, and the truth only. They ought to make frequent inspection, instead of one examination a year. I know of one ice cream company that has a daily morning inspection and the men and women line up. If any man or woman comes to work with black fingernails or unshaven or signs of dirt or carelessness as to person, they are not allowed to go to work; they are sent off for the day. They can't work in that place unless they are really clean.

MR. COLEMAN: Just another one, doctor, if you please. Our bakeries being so widely scattered, if we try to get a doctor to handle them we would just scratch the surface, otherwise the expense would be tremendous.

DR. HARRIS: A part-time employment overcomes that difficulty. If I wanted to do that I would go to the local Health Society—you have a Tuberculosis Society in most cities. Give me a panel of twelve doctors. Let me interview them. I would say in effect—"Doctor, we wish to engage you. We have only twenty people. We would like you to give us periodic help. We want you to come in once a week, and to instruct somebody what to do in an emergency." You wouldn't expect him to make a diagnostician of that person—you can't make a layman a diagnostician—but you can go far. You cut your cloth according to pattern. Where you have hundreds of workers you can indulge yourself and get a man who gives you a half-day every day, or two hours every day, and then you could have a nurse.

H. P. WARREN (Manager, Production Department, Minute Tapioca Co., Inc., Orange, Mass.): I was interested in Mr. Coleman's suggestion. You take your part-time doctor to come up to the factory and he may give you examinations, but he holds recourse to the town just the same. All the people in the small town, he knows them all; they are his patients. So, in a sense, even though he is in your industry he is working in the town, and the arguments that you say about the local doctor apply, and you can't have a doctor for \$5,000 in a factory for fifty employees, and if you have that doctor come in and teach someone in your employ you have limits. Your district nurse does not want to be the doctor and you are still dependent upon the local doctor; you might just as well build up your own organization in your factory. I think you must build up the spirit in your organization and think that you have done the best you can.

DR. HARRIS: I should hate to be a doctor in a small town, dependent upon a community of 5,000 people. I would find myself in a very embarrassing position, and yet I would be willing to say that if I were engaged to do this for an organization, I would value them as a steady, all-year clientele, but in any case, I would not hesitate in my choice between the steady client and the small client. Your nurse can assume a very large burden. Of course, you are badly handicapped there and you are not going to achieve wonders. I agree with you entirely, but I was not speaking of the very small place.

W. H. COOPER, (Stevens Hotel, Chicago, Illinois): I would suggest as a way out, that we could profit by the methods of the life insurance companies—where the head office employs a medical director and he doesn't say anything to the person he examines as to what he finds. In that way, he is completely out of the picture.

DR. HARRIS: May I say that is being done by the foremost industries that have scattered branches? That very idea is a very sound one, but I didn't dare mention it until you submitted it.

MR. ASHBUR (Liberty Mutual Insurance Co., Boston, Mass.): May I ask the

doctor as to periodic examinations of employees, whether it would be possible for a doctor to develop from a man's physical condition or appearance at the time, whether it would be possible to discover a man who is unfitted to do hard, laborious work that would in time cause back-strain, etc., and cause a great deal of concern as well as lost time to the employee?

DR. HARRIS: If the examination is conducted with thoroughness and intelligence, it should to a large degree lead to that. However, if I am a doctor in an industry and remain in my office and just get the victim to come to me and never leave my office to see the plant, I never would accomplish what you say. As a matter of medical backing-up, I would say, "Out of this department I get such and such cases." If you study your back-sprain conditions you will find that same conditions cause that defect. But that is why I advocated before that medical service must be coupled with a knowledge of what goes on in the plant. If the doctor is not examining the plant conditions and sort of checking up the patients with the plant from which they come and the department that they work in, then he is not going to be producing anything of real substantial value to the organization. Does that answer your question?

MR. ASHBUR: Yes and no. Would you be able to discover that from the examination of the man's condition?

DR. HARRIS: The applicant for work, you mean?

MR. ASHBUR: An applicant or a man who is performing that same duty three hundred and sixty-five days a year or so. Would it be possible to discover at the time of your examination whether the man would be possible to continue that work?

DR. HARRIS: I think so. There is no such thing in medicine as holding out a universal promise, but a large number of cases could be discovered.

CHAIRMAN HASSE: If there be no further discussion, I wish to extend to Doctor Harris a vote of thanks.

V. D. SUTTON (Postum Cereal Co., Battle Creek, Mich.): I suggest that we have a minute to rest after each speaker, and that those who are not interested in the next speaker leave the room now rather than when the next speaker is talking.

CHAIRMAN HASSE: Our next subject on the program this morning is one that I believe concerns every man in industry. This subject will be presented to us by Mr. A. L. Brower, Vice-President and Director of Insurance, Bakeries Service Corporation, New York City. I take pleasure in introducing Mr. Brower.

Plant Cleanliness as an Aid to Safety

By A. L. BROWER

Vice-President and Director of Insurance, Bakeries Service Corporation,
New York City

The topic on which I have been asked to speak is rather limited in its scope and I find has been pretty well covered in addresses made before some of the previous meetings of your organization. I am, therefore, going to confine myself more particularly to certain angles of plant cleanliness as an aid to safety which, while they may be rather radical, are the results of my own experience.

Cleanliness is natural to the more civilized races and with most of us is a matter of habit. We take pride in keeping our persons, our homes, our factories and our business places clean. For about fifteen years my duties as special agent for different fire insurance companies necessitated my making thousands of inspections of manufacturing plants of various kinds. My experience proved to me that, generally speaking, the condition of the entrance hall and the office of the manager or superintendent who had charge of the plant I was about to inspect, was indicative of the degree of cleanliness I would find in the plant itself.

While there were some exceptions of course, I found in the majority of cases that a slovenly entrance hall and office indicated a slovenly plant. In addition it was impressed very strongly upon me that the man who did not keep his plant clean was very seldom interested in safeguarding his property against fire and other hazards.

Every man knows how to keep a plant clean. It does not require special instructions or education, except in rare instances, as does the guarding of various machines, etc. If the manager or superintendent of a plant does not do the things that he knows how to do, he is a poor subject to educate to do the things about which he knows very little, if anything. It would seem to me, therefore, that before we can hope to interest a man in safety work about which he knows comparatively little, we must first arouse his pride and interest in cleanliness with which he is familiar. In other words, it is my humble opinion that cleanliness is the greatest aid to safety because it is the nucleus about which other safety habits must be built.

Speaking strictly to my subject, I believe that plant cleanliness as an aid to safety can be divided roughly into three topics: first, fire; second, injuries to employees and others; and third, foreign substances in manufactured products.

Fire

My experience doing inspection work and in connection with my present position has clearly demonstrated to me the importance of cleanliness from a fire prevention standpoint. Loose paper and rubbish in corners and out-of-the-way places, scattered paper, crates, barrels, etc., to be used for starting furnaces and ovens, oily waste thrown in piles of rubbish, ashes carelessly piled against wooden partitions and walls, and similar conditions, have caused many fires to my knowledge although I have been told thousands of times that there was no danger from them.

There is no doubt in my mind that in plants which are not kept clean you will find a great many more fire hazards which are not properly taken care of than you will in the plants which are. Uncleanliness, I can safely say, is a prolific source of fires.

Injuries to Employees and Others

All of you who have occasion to visit or inspect plants of various kinds have undoubtedly had the same experience that I have had in falling or stumbling over debris, broken boxes and barrels and slipping on pieces of pipe or other round objects, grease, dough or other materials dropped on stairs and floors. I might state one instance in this connection which nearly cost me my life. I was inspecting a plant in Syracuse, N. Y., with my agent who fortunately was familiar with it. In advance of him I stepped from a fairly lighted room on the third floor into a dark passageway. Thinking that it ran straight ahead I stepped forward, tripped on a piece of broken box and had it not been for my agent who grabbed me would have fallen and plunged head-first down an unguarded elevator shaft.

I appreciate that the piece of broken box did not indicate of itself that the plant was unclean but my inspection showed that it was. If persons walking through a plant are likely to stumble or fall or slip, there are many more chances that employees hurrying about their work or carrying burdens which prevent their seeing the floor will do so, and experience has proven this to be the fact. There is no doubt that uncleanliness is the cause of many accidents.

Foreign Substances in Manufactured Products

All food manufacturers are faced today with a serious problem in the claims resulting from the alleged finding of foreign substances in their products. The prompt and oftentimes too generous settlement of these claims in the past in order to avoid the undesirable publicity which might be given them if suit were brought and the cases tried, has increased the number as well as the amounts of these claims very materially in certain sections of the country. They have reached the stage where every food manufacturer realizes that a firm stand must be taken and every legitimate claim which cannot be settled for an amount in keeping with its worth, and all fraudulent and doubtful cases must be fought, settlements delayed as long as possible and the resulting suits tried if necessary to cause the claimants just as much trouble and expense as is possible and make their net returns so low that it will discourage further claims by them or similar ones by others.

While there are many fraudulent claims there are also enough legitimate ones to make us realize the danger of serious injury from glass, nails, tacks, etc., in food products, to say nothing of the very undesirable publicity which may result therefrom and from the finding of bugs and other vermin, pieces of string, wood and metal, and other foreign substances. It is important that every precaution be taken to eliminate the possible sources by means of which foreign substances are liable to get into food products. Of these sources I believe that uncleanness is the greatest offender.

A few instances should be all that are necessary to prove that statement. If milk and other bottles are allowed to accumulate in the various process rooms, sooner or later one of them will be broken either as a result of horse play among the employees or from some other cause with the possibility always present of the glass getting into a batch of the food product in process of manufacture. If packages are opened in the stock or ingredient room and nails, pieces of string and wood are just thrown on the floor or allowed to accumulate on shelves or the barrels or boxes next to the containers which have been opened, it is only a question of how often some of this debris will find its way into the raw material and eventually into the finished product. Certainly you will agree with me that scrupulous cleanliness is absolutely necessary to keep a food manufacturing plant free from bugs and other vermin. In the elimination of the dangers from this source I do not hesitate to put the need of cleanliness first as you will find that where a plant is not kept clean the other conditions which should be guarded against for the elimination of foreign substances are not taken care of.

All employees of the right type appreciate a clean, light place in which to work. Everybody agrees that a clean plant improves the morale of the men who work in it. You all undoubtedly have had the same experience that I have had of starting to enter some plant which was so clean that subconsciously you looked around for something on which to wipe your feet. Surely a clean plant is an inspiration to the employees to help keep it that way, and a fertile field in which to sow the seeds of other safety habits.

Perhaps I am over-estimating the value of plant cleanliness as an aid to safety but I am frank to say that I do not believe I am, and that to procure the proper interest and cooperation of the manager or superintendent of any plant in safety it would be well to determine whether he kept his plant clean and if not, to first arouse his pride and interest in cleanliness before attempting to educate him in other safety work.

CHAIRMAN HASSE: You have all heard the paper presented by Mr. Brower, and I am sure that it is going to give us a little discussion. Has anyone any questions that they would like to ask regarding this subject?

C. F. STODDARD (U. S. Bureau of Labor Statistics): I would like to make a

statement regarding visits to various plants. I have had occasion in field work to do this and I have visited several in this city and in other cities, and I want to take occasion to say a word in regard to plant cleanliness in some of the plants I have visited here. I have visited those plants, looked at them pretty critically, and I couldn't see anything to condemn—one was the National Biscuit Company plant, and one was the General Baking Company plant. I wish you gentlemen would visit those plants if you haven't, and possibly get some pointers from the way these things were carried out. I was very much impressed by the very large amount of space devoted to the work. Operations are not confined to a crowded section. The men are not crowded at all—lots of room. I want to mention that in the General Baking Company plant the superintendent took me around and he didn't say a word or call my attention at all to the condition of the plant. He didn't need to, the facts spoke for themselves. I want to mention also another plant of the same calibre—the Ford Motor Company in Detroit. We know more or less about the efficiency methods of the Ford Motor Company. The plant man took me around and he said "Mr. Ford is a perfect crank on cleanliness," and it was very evident that he is something along that line. While I was going through there a man was mopping up a floor that was so clean that it didn't look as if it needed to be mopped up.

CHAIRMAN HASSE: We will now proceed with the third and last number on our program this morning. This subject will be presented by Mr. H. P. Warren, Manager, Production Department, Minute Tapioca Co., Orange, Mass. I take great pleasure in presenting to you, Mr. Warren.

Safety Problems in the Small Sized Food Factory

By H. P. WARREN

Production Manager of the Minute Tapioca Company, Inc., Orange, Mass.

The essence of the safety movement is the same, whether in the large or the small factory. As I see it, it is to effect a safety organization adequate to the needs of the industry and to make this organization function as nearly 100 per cent as possible, to reduce the number of industrial hazards, educate workers to safeguard themselves against accidents and to take proper care of the injured and teach hygiene. The difference, if there is any between the safety problem in the large and the small factory, lies in the size and effectiveness of the organization. I shall attempt to outline a safety organization that I believe any small sized food factory, let us say one of less than 100 employees, can and should have. I shall then state a few methods or mediums that are most effective in getting the safety program across to the employees and shall close with a suggested method of exchanging safety experiences regularly between members of the Food Section.

In most small sized food factories whatever is accomplished with a safety organization must be done through the superintendent's department; that is to say, the industry is too small to afford a specialized safety department. If the superintendent is far enough removed from the ranks and has been in touch with the work of the National Safety Council, in all probability an effective safety organization is at work. In too many small factories the old methods still persist. The superintendent does not get much interested in anything that smacks of an organization where some of the men will be telling him how to run his factory. In such industries questions as to how many accidents they have and what the scope of the safety organization is bring discouraging replies. Fortunately, such industries are few and growing fewer.

In the small factory, just as in the large factory, the successful safety program must have the force of a sympathetic, understanding company policy behind it.

(Example: superintendent leaves safety work to master mechanic, who, in relation to his fellow workers, resents suggestions. When the factory is rushed master mechanic is busy with production problems and equipment not up in shape as regards safeguards. Employees use defective equipment many times because they are afraid to say anything for fear of getting someone in wrong.)

No industry is too small for a safety committee. The committee may be composed entirely of those of foreman rank or below, or it may have the superintendent as one of the members. While the personnel of the committee is important, the essential question is, how effectively is it doing its job? The safety committee should meet monthly. This may seem commonplace, but the tendency in the small factory where everyone sees each other several times during the course of the day is for members of the committee to exchange ideas and the secretary of the committee to make out the monthly report as a result of these daily chats. The value of the meeting, with discussion and leadership in safety matters, is thereby lost. First, then, a safety committee of at least five members, meeting monthly and discussing the recommendations of its members.

In the factory with which I am connected, this committee consists of six members. It is organized and functions as follows: Three men of the committee are known as the "Inspection Committee." At present they happen to be the power engineer, one man of the repair department, known as the "trouble man," and the boss carpenter. Their job is to actually make an inspection once a month and to report their recommendations monthly to the safety committee, which consists, besides them, of the master mechanic, my assistant and myself. We go over their recommendations. The secretary takes full minutes of the meetings and the master mechanic is given job tickets covering the recommendations to be carried out. The secretary presents weekly a follow-up report as to the suggestions complied with and those outstanding.

It has been our custom for some time to hold group meetings for our employees. These are held usually at the close of the day's work, the company providing a supper, which is followed by an hour's discussion. At such times some one of the safety committee states what is being done, asks for suggestions and gets over any special safety appeal. Such meetings are not safety rallies.

They are a part of our factory organization. Right here let me say that in the factory with which you are connected, especially if it is a small one, if such meetings are not being held, the most effective means of publicity is being passed up. At such meetings, if you will discuss any questions affecting the quality or quantity of production, working conditions or the various personnel problems in a frank, honest, friendly way, attempting to create in such groups an interchange of personal confidence, you have gone a long way towards getting your operating problems, including your safety program, across to the men. Your problem then becomes one of leadership in safety matters, rather than in selling the idea. So much for the safety organization.

Let us now consider what equipment is necessary to properly take care of those injured. There should be a central first-aid room with a person in charge. This is possible and desirable even for the small factory. A small factory may not be able to have a graduate nurse in charge, but this is not necessary. It is possible to have a girl in charge who has an aptitude for such work, and to see that she is properly instructed. Depending upon your local conditions, perhaps all that would be necessary would be to have this girl take a course in first-aid which your local district nurse is usually very glad to provide.

I shall not dwell upon the elaborateness of the first-aid equipment. All that is necessary is a stretcher, couch or bed, hot and cold running water, with the usual first-aid supplies and whatever instruments experience has shown are necessary. Anything except the minor cases are taken to a local doctor.

It is important, even in the small factory, that there should be established a

central first-aid room, and a continuous and most energetic campaign should be aimed to put into disrepute the habit of employees being their own doctors, together with its attendant evils. With a first-aid room, providing the spirit of the person in attendance is of the right sort, it is possible to get over the idea to the employees that it is a convenient and safe measure to have even minor injuries attended at this central place.

So much for the organization and equipment that is needed for a safety program. It is not elaborate. Any factory not only can but must have a similar set-up if it is going to get the best compensation insurance rates.

Now, what are the mediums of publicity to use to drive home the safety message? I have already mentioned probably the most effective one, the group meeting of factory workers.

In talking safety to this group, the economics of industrial hazards should be thoroughly discussed. Injuries mean reduced earning capacity with its train of consequential effects on the family. With this group and with the safety committee we try to teach, if you please, because after all, the safety program is only an educational program, that to guard machines, keep the aisles clear, take precautions in handling materials are all fundamental, that the safety movement has progressed far beyond these things which are now taken for granted. Those responsible for the installation and repair of machinery should be instructed that they are to consider the proper guarding of the machine just as essential as to bolt the machine to the floor. We have no sympathy for a foreman who has an accident in his room caused by a man using a defective step-ladder, for example. By stating our policy in such matters to the group, not only the foreman but the men know where we stand.

The result of such an attitude is that foremen watch out so that equipment in their rooms will not be found sub-standard. In a small sized factory, those that I may here refer to as foremen may only be persons in charge of an operation, with just a few helpers. Be that as it may, they are your key men just the same and they are the ones that must thoroughly understand what is expected of them.

The second medium of publicity for a safety program is the use of safety posters and other literature on the bulletin board. Not all posters will apply to your particular factory or its problems. We cull out from the posters received those that to our minds have the message that fits in with our local conditions and then change the bulletin boards frequently to keep that message fresh. Just a word about the necessity of keeping fresh material on the safety bulletin board. I realize what I am saying is "old stuff," but it applies to the small factory much more than to the big one. Just as we do not care to buy shop-worn articles, so does a safety program fail to give the proper "kick" if the posters are dusty with age. If no posters are available that exactly hit the mark, it is far better to have some of your company's advertising displayed, or some other poster of general interest, rather than to keep old stuff on the board.

Posters should be selected from time to time that cover the common points of carelessness in public, attempting to get over to the man in the shop the idea of personal safety when outside the plant. In carrying the gospel of safety beyond the factory walls you are not wasting effort, from a strictly business standpoint, because any employees carrying out the idea of safety during the sixteen hours of each day that they are outside the shop are certain to have caught the habit and will naturally be more careful during the eight hours spent at work.

The next medium of appeal is by the distribution of the safety calendar, which is distributed by many factories to their employees. One has to carry this method of appeal on for a few years in order to really get full benefit, but we have found that employees now look forward to getting each new safety calendar and many of them make novel use of the safety first and health hints that appear on the back of the calendars.

Before we leave the subject of publicity, let me speak of the problem of the careless worker. Experience has shown that the greater number of accidents are of the non-machine variety. This is true in the small shop as in the large. In other words, thanks to the effective educational campaigns carried on by such agencies as the National Safety Council, great improvement has been made in the guarding of machines. The great problems now are those of non-machine hazards and the careless worker. We believe the approach to the problem of the careless worker is first to attempt to show him the common sense of being safe. Some see the light while others do not. The careless ones must be taken in hand personally by the foreman, by a member of the safety committee or by the factory executive.

Those who will not or cannot work safely should be asked to find another place of employment, not so much because they may injure themselves as because their fellow employees can do more and better work when they are not fearful of their companions. If you are going to make the importance of safety sink in and give your safety program the proper backing, this action must be taken when necessary.

Now as regards a suggestion for the Executive Committee of this Section. The National Safety Council compiles statistics having to do with the standing of the member companies as regards frequency and severity of accidents. This information comes out once a year and is worth while, but to my mind it only points the way to the real job that should be done.

I feel quite sure that each month the members of this Section would be willing to send data pertaining to accidents for the current month to a statistical department of this section. A simple method of supplying this information would be to forward to this department a copy of the accident report. If for any reason this was not feasible, blanks could be provided by the statistical department. The essential data which we would be interested in would be the cause of the accidents noted for the month and where possible, the precautions taken against a recurrence of the accident. The information from all members of the section could be assembled periodically throughout the year, say quarterly, or whatever time is agreed upon, and each member, under a key arrangement, could get the net results of all members, with a résumé of the accidents and the safety precautions taken.

This would provide a system to obtain effective material which members could use in discussing safety with their safety committees, or any group meeting of employees. I can well imagine that appearing on some quarterly bulletin would be an account of an accident that occurred just the way that same executive had maintained might occur in his own plant, but which idea was scoffed at as being of remote possibility by employees who have not caught the real significance of the safety movement. If the accident happened in some plant, it would be an effective argument for other plants having like conditions to put their house in order to make impossible the occurrence of the same accident.

To sum up, then, the small sized food industry cannot afford to have a specialized full-time safety department. It can, however, have a factory safety organization worked into its regular factory production set-up. This might well involve, as I have stated, an inspection committee making regular inspections, reporting to the safety organization and getting the results of this meeting over in the larger factory group meetings, if they are held. Safety posters, safety calendars and other forms of literature pertaining to safety displayed upon the bulletin board, if properly managed, are all that is necessary to do an effective job of publicity. A central first-aid headquarters is a necessity. Few employees make close personal contacts possible, and this is probably the most effective means of driving a safety program home.

Foremen, or men in charge of operations are the key men, even in a small factory. It is all a matter of education. If the key men are properly instructed, what is taught to them will be caught by others and the safety program, even in a

small factory, is out of the "hit or miss" class and is conducted as an integral part of the plant operations.

J. J. SHERIDAN (Royal Indemnity Co., New York City): I believe Mr. Warren was a little too modest in his opening remarks. This is one of the most interesting talks I have listened to. Do you have any difficulty with your type of men? Have you any foreigners? Can you get close to them?

MR. WARREN: Your group meeting is effective just the same. We have a 100 per cent American factory. I appreciate that you have your foreign type that cannot understand and then you have more of a problem, and I think because you have more of a problem it is all the more reason you should do it. If you will pardon the first part of this, I would like to just give you a brief sketch as to the conditions that existed before and after we started the group meetings.

One of the most persistent evils of factories—I don't care if it is where you have 100 per cent Americans or not—someone gets an idea and gives it to the foreman and the foreman passes it to the superintendent and they think it is a good idea and it is put in and the fellow down there says, "They get the credit for that and what did I get for it?" That happened in our place. When the foreman said, "You know I think maybe I will do so-and-so. We have had a lot of trouble and I think we should do so-and-so." I listened to his story and then I said, "Is that your idea?" He said, "Yes," and I said, "You know that is Alfred Johnson's idea, and if you had come to me and said that was Alfred Johnson's idea I would have thought more of you, particularly if you had told me it was his idea and that you thought it was worth while," and I said, "Don't you think I am right?" and he said, "Yes." Then I said, "Go and get Alfred Johnson and we three will talk it over."

V. D. SUTTON (Postum Cereal Co., Battle Creek, Mich.): I would like to ask Mr. Warren if he considers it advisable in his plant to have a permanent Safety Committee or rotate the members?

MR. WARREN: I am glad that you asked that. We have done both ways. We have had the rotating members, and I am making a point when I say that we have had the rotating members to try to create interest, but we have found it is better to have one standard Safety Committee. In other words, it is a thorough-going part of our organization. There is the cooking room; there is the packing room, and then there is the room that has the three men of our Safety Committee. That illustrates the point that we have it as a standard part of our industry. When they won't do the job, take that Safety Committee out and put another in.

MR. HAMPTON (Franklin-Baker Co., Hoboken, N. J.): In a larger organization, say four or five hundred, where you have six or eight departments, should a Safety Committee be drawn one from each department or should you have an organization of men, say the master mechanic or the assistant superintendent, who are present in all of the departments? The point is, if you don't take a man from each department, the men will be backward in another department.

MR. WARREN: You know far better about your larger factory than I do. I think you could answer that question far better than I could. I don't know anything about the larger one, but it would seem to me that your organization ought to have representation down to each room, so that carrying the thought, that idea in mind, of carrying the company policy along, then you should have representation, so that there would be a contact man for that particular room—but I would rather that men in the larger factories would answer that question.

CHAIRMAN HASSE: Before adjourning this final session of the Food Section of the Seventeenth Annual Congress, I should like to make just a few closing remarks. The first one is that the attendance at our meetings this year was far beyond our expectation. It has been a pleasure for me to act as chairman. We have tried in preparing this program to give subjects that would closely cover

as many industries as would be interested. Perhaps we covered it—perhaps we didn't. However, I would suggest that when consideration is given to our 1929 program and when you receive a questionnaire asking you what you would like to have discussed at the next congress that you sit down and answer it, because when the questionnaire for this program was sent out we received so very few replies that it was more or less discouraging. We want to keep away from criticism, but we do want to give our membership what they are entitled to, that is, give them subjects that will be of interest and from which they will receive information that will be of value to them.

We take memberships in the National Safety Council because we feel that we can get information that will be of assistance. We have a membership at the present time of one hundred and forty. Our membership is diversified. In order to cover all the subjects that we need, I would like to impress upon you all here, and on all of you that might read these remarks, that when the questionnaire is sent around next year that you will answer it fully so the committee will know what you desire. Another thing—I would like to ask that you cooperate with your officers that were elected the other day to the fullest extent. It is only through cooperation that we will all succeed, and unless there are further remarks I move that this meeting be adjourned.

W. H. COOPER (Stevens Hotel, Chicago, Illinois): I wanted to offer a resolution. Monday, I think it was, I started a discussion here about the uniform accident report plan, and Mr. Sutton stated that he thought that the place to handle that would be in our *Nexus Letter*. I sat down and didn't say any more because I felt I didn't have all the facts for the necessary discussion, and since then I have ascertained from some of the members of our organization that that matter of a uniform report blank has been agitated from time to time and let die down and then nothing has been done about it. If you are to bring that up in the *Nexus Letter* it will be a very satisfactory method of handling it as far as this section is concerned, but in order to have it properly taken care of all the sections should take it up. I would like to offer the resolution and we might have a discussion on it. Here is the resolution. It is my personal view on the thing and you won't any of you hurt my feelings if you get up and say, "That is rotten":

"WHEREAS comparisons are necessary for the proper carrying on of accident prevention work, and

"WHEREAS to obtain these comparisons similar data are necessary regarding all accidents, which data cannot be obtained without a standard form for reporting accidents, and

"WHEREAS there is at the present time no standard form in use,

"BE IT RESOLVED that the Food Section hereby requests the National Safety Council to submit this matter to all other Sections during the coming year with the object of submitting at the next annual convention a standard accident report form for the use of all members of the National Organization."

CHAIRMAN HASSE: You have heard the resolution that has been offered.

H. P. WARREN (Manager, Production Department, Minute Tapioca Co., Orange, Mass.): That hits right along my idea, and I am very happy to second that resolution because it seems to me that the Food Section would make a contribution to the National Safety Council by lining this thing up. I attended the meeting when Mr. Heinrich questioned what the causes of accidents were. This is the Seventeenth Annual Meeting and if we are not educated, if you please, to distinguish between accidents and the cause of them, we have to get right down to the fundamentals. I am very glad to second the resolution.

CHAIRMAN HASSE: All those in favor of the motion say "Aye." ("Aye" by majority of those present.)

ADJOURNMENT.

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Marine Section

New Section Officers

- General Chairman*—ARTHUR R. BUSH, The Barber Asphalt Co., Maurer, N. J.
Vice-Chairman (In Charge of Publicity)—ARTHUR M. TODE, The Texas Company, New York City.
Vice-Chairman (In Charge of Posters and Slides)—ROBERT F. HAND, Standard Shipping Company, New York City.
Vice-Chairman (In Charge of Information and Service)—CAPTAIN R. C. BRENNAN, Oceanic Terminals, Portland, Oregon.
Vice-Chairman—F. P. FOISIE, Waterfront Employers' Association, Seattle, Wash.
Secretary—CAPTAIN W. P. KAIN, Shipowners' Claims Bureau, Inc., New York City.
Program Committee Chairman—JOHN S. HUNTER, The Atlantic Refining Co., Philadelphia, Pa.
Membership Committee Chairman—W. E. WELCH, The Travelers Insurance Company, New York City.
Research and Statistics Committee Chairman—CAPTAIN IRVING L. EVANS, Munson Steamship Lines, New York City.
Stevedoring Committee Chairman—FRANK A. FRITZ, T. Hogan and Sons, Inc., New York City.
Engineering Committee Chairman—CAPTAIN G. BARTLETT, Cosmopolitan Shipping Company, Hoboken, N. J.
Executive Committee: THE OFFICERS AND
E. F. DALY, Morse Drydock and Repair Company, Brooklyn, N. Y.
R. F. EDWARDS, The Prudential Insurance Company, Newark, N. J.
CAPTAIN REGINALD FAY, The New York Central Railroad Company, New York City.
CHARLES H. FLATHERS, Eastern Steamship Lines, Inc., Boston, Mass.
W. A. KIGGINS, JR., A. H. Bull and Company, Inc., New York City.
ELLIS KNOWLES, C. D. Mallory and Company, Inc., New York City.
CAPTAIN C. A. MCALLISTER, American Bureau of Shipping, New York City.
D. J. MURPHY, Murphy, Cook and Company, Philadelphia, Pa.
CAPTAIN C. H. POTTER, Potter Transportation Company, New York City.
W. E. STEWARDSON, Colombian Steamship Company, Inc., New York City.
C. STORY, JR., Cities Service Transportation Company, New York City.
FERN WOOD, Williams Steamship Company, Inc., New York City.
J. WRIGHT, Export Steamship Corporation, New York City.

Retiring Officers

- Chairman*, A. R. BUSH, The Barber Asphalt Company, Maurer, N. J.; *Vice-Chairman (In Charge of Membership and Publicity)*, ARTHUR M. TODE, The Texas

Company, New York City; *Vice-Chairman (In Charge of Posters and Slides)*. ROBERT F. HAND, Standard Oil Company (N. J.), New York City; *Vice-Chairman (In Charge of Information and Service)*, CAPT. R. C. BRENNAN, Pacific Steamship Company, Seattle, Wash.; *Vice-Chairman (In Charge of Stevedoring)*, F. P. FOISIE, Waterfront Employers Association, Seattle, Wash.; *Secretary and News-Letter Editor*, W. S. WELCH, The Travelers Insurance Company, New York City; *Program Committee Chairman*, JOHN S. HUNTER, The Atlantic Refining Company, Philadelphia, Pa. *Executive Committee*, THE OFFICERS AND CAPT. G. BARTLETT, Cosmopolitan Shipping Co., Hoboken, N. J.; R. F. EDWARDS, The Prudential Insurance Company, Newark, N. J.; CAPT. REGINALD FAY, The New York Central Railroad Co., New York City; CAPT. W. P. KAIN, Shipowners' Claims Bureau, Inc., New York City; ELLIS KNOWLES, C. D. Mallory and Company, Inc., New York City; EUGENE F. MORAN, JR., Moran Towing and Transportation Co., New York City; CAPT. C. H. POTTER, Potter Transportation Co., New York City; C. STORU, JR., Cities Service Transportation Co., New York City; FRED WOOD, Williams Steamship Company, Inc., New York City; J. Wright, Export Steamship Corporation, New York City; D. J. MURPHY, Murphy, Cook and Co., Philadelphia, Pa.; W. A. KIGGINS, JR., A. H. Bull and Company, Inc., New York City.

October 1, 1928.

A. R. BUSH, Chairman

Personnel Manager and Safety Engineer, The Barber Asphalt Company
Maurer, N. J.

The first session of the Marine Section at the Seventeenth Annual Safety Congress, was called to order at one-thirty o'clock by the chairman, Mr. A. A. Bush.

CHAIRMAN BUSH: Gentlemen, as Chairman of the Marine Section, National Safety Council, it is my pleasure to greet as our special guests the members of the Propeller Club, who today participate with us as joint sponsors of this luncheon meeting.

Keynote Address

By A. R. BUSH

Chairman, Marine Section, National Safety Council; Personnel Manager and Safety Engineer, The Barber Asphalt Co., Maurer, N. J.

As Chairman of the Marine Section, National Safety Council, it is my pleasure to greet as our special guests the members of the Propeller Club who today participate with us as joint sponsors of this luncheon-meeting. I bid you welcome. With equal cordiality do I invite you to attend any or all of our Section sessions, or indeed, to those of any Section which may arouse your interest. The Congress activities are of unusual diversification, with entertainment liberally interspersed. An opportunity to acquaint yourself with the world's outstanding safety organization—its accomplishments and its aims—is afforded. I urge you to take advantage of it.

Naturally, the meetings of this Section hold for most of you the strongest appeal, for there the problems of maritime safety will be fully presented and freely discussed.

For sixteen years industry ashore has recognized and accepted safety as an integral part of operations, as a fundamental of management, declaring that

maximum production is dependent upon accident reduction to an irreducible minimum: 13,898 plants contributed data to the American Engineering Council's report, "Safety and Production," which sustains the fundamental. The records consistently show that those plants and industries which have the highest production performance also have the lowest accident rates.

The direct cost, however, is only a part. The indirect cost staggers the imagination. May I again refer to "Safety and Production," the American Engineering Council's report, the most recent contribution, which sets forth some startling figures on "productive time lost by injured and non-injured." As an example, "The productive time lost by injured employees was reported for 688 accidents: 22,403 hours were lost by the injured, or approximately 33 hours per accident. When 76 accidents occurred, 689 employees, other than the injured, gathered around the point of the accident or were otherwise distracted from their work. The number averaged 9 men per accident. The 689 non-injured workers were away from their work 447 hours. This means that each accident cost the company approximately 6 hours of productive time other than the time lost by the injured."

These figures, of course, pertain to manufacturing enterprises. Comparable tabulations covering the maritime industry are not to be had. Diligent inquiry was made and of sources believed able to satisfy requirements. But to no avail. Indeed, one company informed me that the maintenance of accident statistics was too expensive. They paid their insurance premiums and with that their interest in accidents terminated.

Yet the underlying principles of safety are everywhere the same. Only in specific applications do variations occur. That procedure which is feasible and practicable in one industry will be found, with perhaps minor adaptations, equally so in another. For guidance, then, we needs must turn to where experience beckons.

Organized safety is a term frequently encountered and rarely defined. It sounds formidable, yet actually there is nothing forbidding about it. Organizing for safety signifies no more than the formulating of a practical, balanced program for accident reduction and prevention and providing the machinery for continued and complete functioning. Many ship operators have evinced interest in accident prevention, yet hesitate to initiate it because of a belief that effective safety work calls for an enlarged personnel and an elaborate technique. Such is pure surmise entirely out of line with the facts.

Fundamentals of the Safety Plan

What then are the essentials of a workable safety plan?

1st. Sincere promulgation by the executive head. Unless officially launched by the management the movement lacks needed impetus or direction and soon will perish of neglect or mal-nutrition.

2nd. Selection of a competent man as supervisor who embodies all those personal attributes demanded of a leader. Upon the possession of these qualities will largely depend the success or failure of the undertaking.

3rd. The keeping of adequate, accurate and accessible records. Remedial measures may be applied only when analyses of causes reveal their character. Without statistical records no accident prevention campaign can be intelligently organized.

4th. The establishing of a safety committee or committees—the very back-bone of any accident prevention effort. Among veteran safety engineers there is unanimity of opinion on the value of safety committees. To them is assigned that part of management which has to do with the minimizing of accidents. They

assist in locating hazards; investigate and report on all accidents; have immediate contact with the men whom it is desired to reach and enlist their co-operation for safety. They also form a link for the securing of co-operation in many other directions and it cannot be gainsaid that more cordial relations between employer and employee exist than where safety committees are part and parcel of the safety set-up. Their importance cannot be over-stressed.

5th. Inaugurating and promoting the educational features of the campaign. Here the program must be modified to meet special conditions. Certain basic considerations, however, are common to all. Regular committee meetings; display of appropriate posters, frequently changed, on attractive boards, prominently located. For effectiveness the value of home-made posters photographically depicting local hazards, especially cargo-handling, should not be overlooked. The distribution of printed matter; occasional group addresses, etc., constitute standard practice according to the specifications which good policy or precept may prescribe or suggest.

Within brief compass, I have tried to outline the cardinal principles of safety organization with especial reference to maritime operations, whether afloat or ashore. Personal injury claims are a besetting evil which afflict the shipping industry. In consequence insurance rates have soared to unprecedented heights. High premiums impose an oppressive burden which is reflected in excessive operating costs and in lowered net operating revenue. The economic aspect is indeed disturbing, but the humanitarian, involving as it does a wanton and needless sacrifice of human life, beggars emotional description.

Thorough Organization Essential

What means are at hand to correct these conditions? There is but one—the adoption of measures for accident reduction and prevention.

Already such measures are being developed. Within the month the Eastern Steamship Co., of Boston, perplexed by the problem of stevedoring accidents, held their first safety meeting at which President Eugene E. O'Donnell presided. A safety committee was created and is now at work. The American Export Line has recently devised a system of ship safety committees. Competition between individual ships of that line has been carried on over a considerable period with bonus payments awarded to contest winners. An important petroleum company has just designated one of its marine department officials to shoulder full responsibility for accident prevention and to assign to subordinates many of his present duties that safety may have his undivided thought and attention. The Lake Carriers' Association for years has stood in the very forefront in matters of marine safety on inland waters. They have published information on their scheme of ship safety committees which may be had for the asking. You will find it well worth careful study.

Thus the movement advances. Surely, it is to our own advantage that we keep in step with the march of progress. Shore industries fell in line only when the bugle call of legislative mandate compelled. They saw themselves the victims of an avalanche of laws which they did not want. The passage by Congress in 1927 of The Longshoremen's and Harbor Workers' Compensation Act denoted governmental interest in existing abuses. Governmental intervention will be the next step, which only the co-ordinated efforts of all allied groups in shipping can forestall.

It is now my pleasure to present to you, Mr. Ernest M. Roberts, the President of the Propeller Club.

Address

By **ERNEST M. ROBERTS**

President, Propeller Club of the United States, Port of New York

It is a great pleasure and privilege to have the Propeller Club open the annual sessions of the National Safety Council's Marine Section. Never before in maritime history has the trend toward safety through accident prevention been more pronounced than at present. It is bound to expand in the future and with increasing success as safety affects the financier, the shipowner, the shipbuilder, the ship repairman, the equipment manufacturer, the supply man and all those affiliated with or dependent upon them.

The Propeller Club is vitally interested in the prevention of accidents. Every person or firm doing business in the marine field should be. You are all more or less familiar with the risks necessarily involved in the shipping business. The building, operation and maintenance of ships successfully, so far as accidents are concerned at least, requires the exercise of eternal vigilance in all departments and no one can deny that the persistent campaign being carried on by the National Safety Council is having a good result.

Accidents Can Be Prevented

Accidents will not happen when each man is wholeheartedly "on the job," but the frailties of the human element are difficult to overcome. It is to the credit of the National Safety Council that it is constantly appealing to the human element and we, as a club, should cooperate wherever consistently possible to prevent the loss of life and limbs, the suffering and misery which are the results of carelessness.

For the benefit of the National Safety Council members present, let me say that we feel highly honored in having been chosen to open the Marine Section meetings. Any legitimate cause having for its purpose the saving of lives and the prevention of sickness and injuries deserves the recognition of every one.

The Marine Section of the National Safety Council may well have a just pride in their joint successes. The Council should be equally proud in having the Marine Section as an integral part of their organization.

Your association is one of the best examples we have before us today, of what systematically organized effort, having a worthy objective, honestly and aggressively administered, can accomplish when minds are set to succeed.

The Propeller Club's Attitude

The Propeller Club has always been and always will be an advocate of the promotion of good will among the fraternity and we are happy to be a part in the activities of this week.

The club congratulates you on your achievements and wishes you continued success in your work, with the assurance that it can be depended upon at all times to support any movement tending toward promoting the best interests of the American Merchant Marine.

CHAIRMAN BUSH: Gentlemen, we are all naturally interested in the operation of the Longshoremen's and Harbor Workers' Compensation Act. We are fortunate in having with us today the Deputy Commissioner in charge of this District, Mr. Jerome G. Locke who will now briefly address you.

Address

By JEROME G. LOCKE

Deputy Commissioner, W. S. Employees' Compensation Commission
New York

I was born out in the Great North West, at a spot that was then nearly a thousand miles from a railroad. As I grew from childhood to young manhood, I saw three great transcontinental railway systems span this virgin territory from the Great Lakes to the Pacific Coast. That was in the days before compensation acts and before there were safety organizations.

I think I can well illustrate some of the changes that have taken place in the intervening time by relating an instance that occurred during the construction of one of these trans-continental railways.

A large construction firm had taken a contract to build some 400 miles of road-bed. It had stretched an improvised telegraph wire along the right of way and had established construction camps every ten or fifteen miles. Each one of these camps was in the charge of a foreman who had one or more sub-foremen or straw bosses.

One day the main office of the construction company received a telegram from some one who was a sub-foreman or straw boss out in one of the camps. The telegram read:

"Boss hurt to dead. What to do."

The main office wired back:

"Be sure whether the boss is dead. If so, bury him. Will send a new boss."

The next day they got another telegram reading:

"Made sure boss dead. Hit him on head with shovel. Ready for new boss."

The incident was typical of the times. Life was cheap and personal injuries were unknown. There were many workmen in those days who went back too soon and were buried on the railroad grade and the incident was closed. There were no reports, no investigations, no damage suits and no compensation awards.

In the thirty-five or forty years that have intervened times have changed. The practices and methods of the employers of those days would bankrupt the employer of today and send him to the penitentiary. With the advent of damage suits and compensation acts, safety work has become a necessity, not a fad.

From the standpoint of the money involved, we are driven to this work because it pays in dollars and cents. From the standpoint of humanity, we are seriously engaged in the work, because we know that we can no longer regard the loss of life and limb as incidents in the day's work, that cannot be avoided, as was true twenty-five or thirty years ago.

We know now that thousands of lives are saved every year and that tens of thousands of anatomical members are kept whole through the continued spread and increasing effectiveness of safety campaigns.

And, gentlemen, may I say here, that from the standpoint of the workman, from the standpoint of the employer, from the standpoint of society as a whole, the work which you safety engineers do is of vastly greater importance than the work that we compensation administrators perform. You may not get much commendation. You may get no commendation at all. But when through your efforts there has been prevented an accident that would have severed a man's arm, or his leg, or a fracture of his skull, you have performed a service that is ten times better than any service we can perform when we adjust the loss under a compensation or liability law.

I take it that the luncheon here today is for a specific purpose and that purpose

is to lay the foundation for a more widely spread, better coordinated, and more effective work toward accident prevention among the maritime workers of this country.

The meeting here is not to inaugurate safety work. Many of the employers have already done that. It is, I take it, rather to get this work on a basis that will make its place more nearly universal and more uniform and that will give it greater efficiency and bring a larger result.

I need not argue with you gentlemen on the humanitarian benefits of greater safety. You are in the business and you know what can be and is being accomplished toward the alleviation of physical pain by accident prevention.

If, however, some of you are obliged to deal with managers or presidents or directors who do not have the same mental picture that you and I have, I invite you to bring them to the Compensation Office for a few hours any day, and there hear some of the hundreds of tales of tragedy that are unfolded, each one of which is the aftermath of an industrial accident.

Neither need I argue with you gentlemen that greater safety pays. You who are in the business know it pays. You may have, however, to present the financial side of a program to men who are not so well acquainted and who are more concerned with overhead costs. If so, may I suggest that this port alone furnishes, under the Longshoremen's and Harbor Workers' Compensation Act, more than a thousand industrial accidents every month. I don't know how many accidents occur outside this act and still on navigable waters.

Now, gentlemen, each one of these accidents costs money. It costs, under the Federal Compensation Act, maybe only a few cents or a few dollars, or it may run to \$9,000 or \$10,000. If the accident is under the Admiralty Laws, the cost may go up to several times \$9,000 or \$10,000.

Every accident has a cause. There is nothing that happens in this world for which there is not a cause.

The problem that is presented, I take it, is a problem of deciding how, when and where to apply preventive measures to these causes.

It occurs to me that aside from the so-called acts of God, such as sunstroke and lightning, all accidents originate in either one or the other of two great causes. Either there is a mechanical cause or there is a human cause. By mechanical causes, I mean slippery floors, open hatches, unguarded piers, unprotected work places, improper equipment, faulty tools, and dozens of other things and places that might have been protected by mechanical means so as to foreclose most of the possibilities of accidents.

By human causes, I mean carelessness, lack of foresight, slovenly work, unnecessary rush, improper training, physical imperfection such as impaired vision or loss of hearing, and dozens of other elements of the human equation. These human causes may be and generally are due to the workman himself. But sometimes they may be and are due to some lapse of the human equation in his superior hatch boss, foreman, or a superintendent.

I can think of but one way in which to combat the mechanical causes of accidents, and that is by continually improving and safeguarding all the mechanics of the various operations until imperfection is largely eliminated.

That is much easier said than done. Nobody hopes for the attainment of such mechanical perfection that there will be no accidents, because there are no mechanical imperfections. But it is possible, gentlemen, and it is profitable as well to gradually raise the mechanical standards and to fix a minimum of safety below which work shall not be performed.

This can only mean, to me at least, the working out and adoption on the part of all concerned of a safety code, governing maritime work. I doubt whether such a code should be drastic at the time of its adoption. It is better that it be a moder-

ate code, a reasonable code, not a code that will fly a red flag in the face of the employer who is prone to look upon all changes with skepticism.

This world was not made in a day. It will not be revolutionized in any one movement. But once employers generally have adopted a code and the results begin to flow, as they surely will, they will then voluntarily and gradually raise the standards as the desirability becomes manifest.

Now the adoption and enforcement of a code which standardizes and fixes to some extent minimum safety requirements in mechanical operation will not solve the entire problem. There will still be the human causes and no one can control or even largely affect these human causes. There is the ever-present human equation.

I can think of no way to combat this side of the problem, except through the organization on the part of employers generally for the purpose of spreading the safety propaganda of an educational nature. Men must be taught to avoid accidents. It is a difficult task, I know. But it is not an impossible task.

The elimination of yellow fever and typhus appeared as impossible tasks twenty-five or thirty years ago. Those things are accomplished facts today, and the solution of those problems involve not only mechanical control of the causes but education of masses of people to the point where they naturally avoid the causes. What has been done in the way of education of Central Americans can certainly be done with harbor workers in these ports.

I presume that the purpose of inviting me here today was to obtain some expression relative to the program and policy of the United States Employees' Compensation Commission on this act. I am not going to attempt to define the Commissioners' program and policies, for the very good reason that my superior, Commissioner Smith, is here today. He can and will, I am sure, tell you of their interest in the work in the way that is more effective than I can possibly do it.

What I have said today has been said from the standpoint of a compensation administrator who has abundant opportunity to learn of the pressing need for greater safety, but who has under the law no power or authority to act. Such power and authority is vested in the superior commission in Washington.

Deputy commissioners generally are interested in this movement to the extent they may further where possible the policies of their superior commission and to the extent that they may render where possible service to the workmen and the employers in the respective districts.

In conclusion, let me congratulate the employers on the start that has been made toward preventing accidents and toward a reduction in compensation costs. May I also thank the National Safety Council for the very whole-hearted way in which it appears to be tackling another difficult problem. I do not believe that beneficial results of greater safety will follow over night. Safety work is like music or advertising; it takes months, sometimes years, of never-ending, painstaking, intelligent effort to get the desired results.

"The constant drop of water wears away the heart of stone,

The constant mastication eats away the toughest bone,

The constant cooing lover carries away the blushing maid,

And the constant advertiser is the one that gets the trade."

And so, gentlemen, it will be with the greater safety campaign that is organized and launched as a result of this meeting.

CHAIRMAN BUSH: I was unaware of the presence here today of Commissioner Smith. I would be glad indeed to have him rise and say a few words, if he would care to do so.

H. A. A. SMITH (Commissioner, United States Employees' Compensation Commission, New York): Mr. Chairman, I didn't come here for the purpose of saying anything, but the Commission is very much interested in this subject of safety. It has certain duties under the Longshoremen's Act. Those duties require

it to make studies and investigate and to make recommendations to Congress and employers. What is included in those recommendations to Congress ultimately will depend very largely, if not entirely, upon whether or not this Council follows the concluding recommendation of your Chairman.

If the coordinated efforts of those interested, those most vitally interested in the safety problem, result in the adoption of all the proper safety measures that can be asked for, I don't think there is much doubt that as far as the Compensation Commission is concerned, no action toward drastic recommendations will be made to Congress.

We prefer, we ask, that this body and other bodies interested in marine safety will take such action as may be necessary to adopt safety measures, including such a thing as a marine safety code, which is practicable, which does not go to the extreme but which will insure that the very best thought of those interested is given to the subject.

If you will do that, then as far as we are concerned, we will simply stand by and urge you to go as far as you can in extending throughout the broad scope of the Longshoremen's Act, the benefits of safety measures.

Of course, the National Safety Council, as I understand it, does not, possibly, take into its body the foreign lines. I may be mistaken on that, but you have got not only the American lines, you have the foreign lines, you have the employees, and others, that are subject to the Longshoremen's Act. All of these should be considered, and when the National Safety Council, following the plan outlined by your Chairman, has adopted the proper measures, then all we can say is that we will simply ultimately if necessary urge the adoption of those measures upon Congress in some form, not in final legislative form, but some means whereby we can get at the recalcitrant operator, the one who is not willing to go the fullest extent the owners are willing to go. That is all we want and all we ask for.

ADJOURNMENT

October 2, 1928

New York Maritime Exchange Day

A. R. BUSH, Chairman**Personnel Manager and Safety Engineer, The Barber Asphalt Company
Maurer, N. J.**

The second session was called to order at ten o'clock by the chairman, A. R. Bush.

CHAIRMAN BUSH: I think we will dispense with the first item of the morning's business,—the reading of reports. There being no objection we shall defer calling for the reports until a later time.

I am sorry that our first speaker has not arrived. In consequence it will be necessary to rearrange our program somewhat. Mr. D. N. Hoover, the Supervising Inspector General of the U. S. Steamboat Inspection Service, was here yesterday fully intending to deliver his paper this morning. Unfortunately he was unexpectedly recalled to Washington last night and we must therefore forego the pleasure of his presence.

I will ask Mr. Flathers, of the Eastern S. S. Lines, to read Mr. Hoover's paper entitled,—“The Human Equation in Safety.”

The Personal Equation in Safety

By DICKERSON N. HOOVER**Supervising Inspector General, Steamboat Inspection Service.
Department of Commerce, Washington, D. C.**

We live in a mechanical age. Our efforts are directed toward the devising of machinery that will enable us to live in ease, enable us to do a given task with less effort, and that will relieve us, if possible, of all worry or anxiety or the necessity of thinking about what the machine is supposed to do. I do not mean to give the impression that this development of modern life is to be cast aside, or to say that it is not a success; but I do wish to point out that in this mechanical age we have, in a large measure, become the slaves of things, and I wish to show, if I can, what the remedy may be in connection with this condition.

In this country, probably more than in any other, we have come to believe, almost unconsciously, that all things can be corrected by legislation. Without going into the merits of the case, I do not think that I am wrong in saying that the prohibition legislation is an example of this effort to make people moral by law instead of by teaching and instruction. The law has its place. The rules and regulations that are made by bodies properly constituted and which are intended to carry out the provisions of the law have their place. But laws and rules and regulations all have their limitations, in this, that no matter how intelligent the human mind may be, no such mind has yet been discovered that will not overlook some detail or condition which should have been foreseen, and was not, and which brings about the well merited criticisms of laws and rules and regulations that they are not adapted, in every respect, to meet the conditions that they are supposed to correct.

The result is that there has been a marked tendency in this country toward paternalism, and anyone who looks back over the last 25 years can himself see the many respects in which the Government has sought to control and direct many of the human relationships that our fathers and grandfathers adjusted for themselves. If a disaster occurs, the first thought is to pass a drastic law, to pass

rules and regulations even more drastic, and then to go to bed at night and sleep, feeling that everything has been done that is necessary to be done, and that, in some mysterious way, this inanimate thing that we call a rule or a regulation will correct the condition which animate beings have failed to correct.

I wonder whether, when we indulge in such slumber, we are not doing a dangerous thing? That is to say, are we proceeding wisely when, no matter how excellent the apparatus may be, we, in our effort to make it foolproof, also convince our foolish selves that it needs no attention? May it not be that the very perfection of the apparatus becomes, in the last analysis, its weakest element, because we look to that very perfection to do all of the things for us, when there must always remain something for us to do ourselves?

Some years ago, it was decided to place placards upon steamers, subject to inspection, reading:

SAFETY FIRST
Department of Commerce
United States Steamboat Inspection Service
TAKE NO CHANCES

Some wag suggested that the sign meant that no one should take the chance of riding upon an inspected steamer under any conditions; but an amusing incident occurred one summer day in front of the Commerce Building, and, remember now, that this building was the home of that safety first placard to which I have referred.

An automobile, on fire, came slowly along Pennsylvania Avenue. The operator of the automobile wished to stop the car, but was apparently unable to do so. He concluded, however, that if he could bring the front wheels of the car at right angles with the curb in front of the building the car would stop. The car slowly approached the curb; slowly, but nevertheless surely, climbed that curb; it proceeded across the pavement to a coping in front of the building; it climbed that coping and then proceeded across the lawn right up to the walls of the Commerce Building, where, the building being some eleven stories high, the automobile found it could go no farther. I happened to see the progress of that automobile from the tenth floor of the Commerce Building, and immediately phoned down to the watchman at the door to get a fire extinguisher and go out and extinguish the fire. The watchman acted upon that suggestion. Six or seven extinguishers were brought out of the building, but only one really functioned effectively—and this from the home of safety first, and all of these extinguishers were of an approved type, not only by the Underwriters but by the Board of Supervising Inspectors. They were all really good fire extinguishers, but the difficulty was that apparently they had not been tested periodically with a view to determining that they were actually in working order.

Here comes in "The Personal Equation in Safety." The device could be invented, it could be made of the very best material, but it required the human supervision to see that, when the moment arrived that it was needed, it would function properly.

Take another illustration. Some years ago, I was making an examination of a western river steamer. As I went aboard that boat, I was impressed with the fact that there was a large fire hazard, due to the manner in which the package freight was being stowed. I spoke to the inspector of the district who was accompanying me, and asked whether there had been any fires on that steamer. The inspector spoke to the master, who promptly stated that they had had a fire the preceding week, but, pointing proudly to a handsome mechanical fire extinguisher, he said that with that extinguisher they had extinguished the fire and that he

would, under no circumstances, be without a supply of such fire extinguishers. The inspector asked the captain whether the extinguisher was now fully charged, ready for action. He stated that it was not. The inspector asked the captain if he did not know that he was required to carry extra charges. The captain stated that he did know it but that he had not obtained extra charges. So there before the eyes of the inspector and myself, we had brought home to us again the personal and human equation in safety; and while the master of that boat was compelled immediately to put that extinguisher into condition, and carry additional charges, yet it is possible that a fire might have occurred and the vessel been destroyed, simply because some one had failed to do his duty.

We require that on certain classes of steamers so-called releasing hooks for the lifeboats be carried, and many are the efforts that have been made by inventors to get foolproof releasing hooks, to get releasing hooks that need no attention whatever, to get releasing hooks that combine in themselves, not only all of the elements of machinery, but of able seamanship as well. And I have sometimes thought that in the effort to develop such releasing hooks, a dangerous condition has been brought about, that leaves too much to this innocent looking little releasing hook to do, and takes away too much from the human responsibility, because the responsibility of the men who must handle the lifeboats cannot be taken away. In other words, it may be that the best releasing hook is that one which would not release when water borne, but would require manual action to cause it to be released, even when in the water. The European nations have, I understand, been moving toward the direction of not requiring releasing hooks, such as are required in this country.

All of you have read the story of the efforts of the Dutch people to reclaim the land and hold back the sea. In so doing, they have built great dykes and dug canals. And you recall the story of the little Dutch boy who, on one occasion, noticed a tiny stream of water seeping through near the bottom of one of these great dykes. The dyke grew out of the imagination or mind of man. It served a good purpose, yet if that little Dutch boy had not had the initiative to put his finger in that tiny hole, the Low Countries might all have been inundated with great loss of life.

What is the conclusion of all of this? It is very simple. It is not that we shall cease to continue to invent devices, but it is that, no matter how perfect we make these devices, we must remember that we yet must discipline ourselves. We are told that man, before he can rule others must rule himself. We can continue and say that man must also control these inanimate slaves that he has made to serve him, and this can be done by eternal vigilance, by constant supervision, by constant drills of employees, as well as of people who are not employees, though in the drilling of people who are not employees, one must not go too far and introduce the possible element of panic. What it means is that we must have competent men. We must first of all have real *men* and when I say real men, I do not only mean animate beings that have two eyes and a set of teeth and ears and feet and who breathe. Many such things may be seen upon the street every day but they are not the kind of *men* of whom I am speaking. I mean men who are disciplined, and who under the direction of competent authority are taught absolute *obedience*, for it is by obedience and by self-discipline that we shall come to have that greater freedom and real liberty which is sought by all intelligent human beings.

CHAIRMAN BUSH: Gentlemen, the meeting is open for discussion.

CHAIRMAN BUSH: Gentlemen, we will proceed to the consideration of the next paper.

I am personally very much disappointed that Mr. Henry Heberman has been called to Washington. He is one of the outstanding pioneers of the safety move.

ment in the maritime industry. The American Export Line has gone into the subject of safety whole-heartedly and what is of vastly more importance, they have actually accomplished real results.

In the absence of Mr. Heberman, Mr. E. R. Kraetzer of his company will deliver the paper.

Making the Safety Movement Attractive to the Personnel

By HERBERT HEBERMAN

President, Export Steamship Company, New York City

It is quite unnecessary for me to go into the early history of "Safety First" when it was looked upon as an "unnecessary evil;" this is an old story to you; but I do believe you would be somewhat interested in hearing what a Steamship Company is doing to prevent accidents on its vessels in port and at sea, and the results obtained.

You are quite familiar with the practices in large plants ashore for the prevention of accidents, and the procedure followed when an accident does occur. Now the situation on a vessel is somewhat different in that we do not have access to all facilities such as doctors, nurses, appliances, ambulances, etc., but nevertheless the seagoing personnel are amply protected and cared for. When an accident occurs, or an illness develops, at sea on a freight vessel, the master becomes the doctor and nurse, as well as comforter of the patient. The master, to secure his license as master, must have passed certain medical examinations, so you will see the patient is not entirely in the hands of an amateur.

"Safety practices" and the reduction of accidents and illnesses among the floating personnel have been uppermost in my mind, both as to the welfare of the men and efficient operation of the fleet. Believing that if our officers and crews were in perfect health before signing on for the foreign voyage, a great number of illnesses would be eliminated, and to bring this about, we have established our own medical department, under the direction of an experienced physician. Each officer and man applying for a position must undergo a most rigid physical examination to determine his fitness and upon the doctor's recommendations the applicant is either accepted or rejected. The medical office was completely organized and began operation February 11, 1927. During the year 2,246 examinations were made. Of this number 1,686 were original examinations and 560 were examined one or more times. Employed on all vessels as of January 1, 1928, there were:

- 779 men who had 1 examination
- 303 men who had 2 examinations
- 131 men who had 3 examinations
- 55 men who had 4 examinations
- 8 men who had 5 examinations
- 1 man who had 6 examinations

Of the 2,246 men examined there were about 10 per cent disqualified for physical defects. Some of the causes for disqualification were: heart disease, color blindness, hernia, cataracts, very poor vision, tuberculosis, dental cases and others.

Dental cases were largely responsible for over 50 per cent of the disqualifications. From this you can readily see that had these rejected men gone to sea in an unfit condition, the number of cases of illnesses would naturally have increased with resulting claims and other expenses.

During the year 1926 our statistics show 135 cases of illnesses and 189 injury cases. In 1927 statistics show 151 cases of illnesses and 186 injury cases. These

figures show an increase in 1927 over that of 1926 on illness cases of about 12 per cent, and a slight decrease on injury cases in 1927 as compared to 1926.

The expenditures, however, for the same period show really what can be done by consistent effort. Those for 1927 were less than 50 per cent of those for 1926. This proved very gratifying to us for we knew that although the reported illness cases had increased and the injury cases had remained approximately the same, that the reasons, therefore, were due to the increased efforts of the ship's officers in reporting all illnesses and injuries as we had insisted should be done.

In order to instill in our organization the necessity of safety on the piers and aboard the various vessels, we created a safety committee consisting of the heads of the various departments vitally interested in the actual operation of the steamers and the pier terminals. This committee consists of seven members, who meet once a month to discuss safety recommendations made by members of the committee or any other individual of our organization. While the recommendations, in some cases, have been quite expensive, we have not as yet disallowed any expenditure applicable to the common safety on board steamers or in the dock terminals.

Each individual vessel in the fleet has its own safety committee consisting of the master, as chairman, chief engineer, chief officer, and chief steward. Meetings are held during the voyage at the discretion of the master and recommendations and minutes of their meetings submitted, upon the return of the vessel, to the committee ashore for disposition.

Now, having what we believe to be a perfectly healthy crew, through the efforts of the medical department, and having formed a committee on board ship so that the members of the crew could be taught to take care of themselves and be protected from accidents as far as was humanly possible to do so, we felt that we must go further than this and consequently created a "Safety-First Bonus Program."

Although the safety-first campaign is a somewhat new departure amongst the sea going fraternity, it must be emphasized that it has achieved a marked degree of success in other walks of life. We, therefore, could see no reason why the results should not be equally successful aboard ship. To encourage the safety-first policy by men in the employ of the different ships, it was proposed that the vessel having the lowest expenditure for illnesses and injuries over a period of one year, which constitutes four consecutive voyages in our trade, would fly a "Safety Pennant," and all officers and members of the crew, who were part of the ship's personnel for that entire period would receive a bonus equal to two weeks salary, or a part proportionate to the number of voyages they made as members of the personnel of the successful vessel.

With a plan of this kind of course you realize it is necessary to place some restrictions on account of the floating personnel, and at the same time have the proper flexibility. Consequently it was decided that in order for the ship's personnel to take advantage of this bonus system they must be in the employ of the corporation at the termination of the fourth voyage. The officers and members of the crew of the successful vessel would be entitled, if they had completed four voyages, to two weeks salary; if they had completed three voyages to three quarters; if they had completed two voyages to one half of two weeks salary; and if they had completed one voyage to one quarter of two weeks salary. This plan has worked out even better than we anticipated and has created a spirit of friendly rivalry amongst the personnel which has been of great benefit both to the employees and to the corporation. It has further reduced the medical and hospital expenses, reduced injuries, and has eliminated much loss in time by men engaged in a business which involves a certain degree of hazard.

Our safety first scheme is somewhat a departure from the usual practice inasmuch as we have never engaged the services of a safety expert. This is in no way a reflection on safety experts, but was the result of very serious consideration on our part.

As you gentlemen well know the sea-going fraternity (particularly the "old salts") are very set in their ways and in many instances would resent suggestions from a person inexperienced in the ways of the sea. We, therefore, considered it better to use our own employees in developing our safety first measures rather than to introduce a stranger into our midst who would undoubtedly enter our organization with many radical ideas and would not in all cases understand the whims of many of our employees.

We inaugurated our safety first campaign as a matter of education, and felt that this could best be put over as a gradual process rather than an attempt to revolutionize the existing practices in the steamship business. It is a great pleasure to me to state that our scheme has worked successfully, and many whom we regarded as difficult subjects have taken hold of the safety ideas with considerable enthusiasm; and with all due respects to safety experts as a body I feel that our problems can best be dealt with by our own employees and such as are sufficiently familiar with our business to be able to know what can be done today and what could be required later.

Also we had to consider expenditures involved in developing this campaign, and as the steamship business, under the American Flag, has not been particularly lucrative in the past, we had to consider the financial aspect as one of the salient features. Therefore, we were not able to afford radical changes in design which involved a considerable expenditure, as all of our vessels were practically of the same type, and an expenditure on any one vessel meant a similar expenditure on the other twenty vessels of our fleet.

We have had considerable assistance in the form of safety recommendations from outside persons, and have availed ourselves of literature and posters from the Marine Section of the National Safety Council; and I am, therefore, concluding my brief remarks with an expression of thanks to the Marine Section of the National Safety Council and to the Marine Safety Council in developing safety first in the marine field.

CHAIRMAN BUSH: Thank you very much, Mr. Kraetzer. The meeting is now open for such questions as you may care to ask. I am sure Mr. Kraetzer will be glad to answer them.

W. E. WELCH (The Travelers' Insurance Company, New York City): There is one point that struck me quite forcibly in that paper. About six years ago, when this section was organized, some of the officers talking with Marine men in New York, the matter of ship safety committees was discussed. It had been done on the Great Lakes and the reply was that that could never be done on sea-going vessels. And in six years you see what has developed in that.

I think that is one of the most important things that can be done on any vessel—the Ship Safety Committee. That shows how this accident prevention work has advanced in the last few years.

W. T. DONNELLEY (Consulting Engineer, New York City): I wish to state a matter of appreciation of that paper, as being primarily that the organization is within. This man has the fundamental American spirit. He takes his men and materials as he has them and starts an organization of those for their own benefit.

It has been my opportunity to command men and material from far points and near, and I have always found that if you will approach them in that American spirit from within and ask them not to do what they are ordinarily expected to do but to do the best they can, you will find a ready response. If you will arrange, as this man has, that they have a record and shall be commended where

they have achieved, you will find that no one will follow you further or quicker than the American men.

I had occasion to start a piece of work within forty miles of Alaska, in the wilderness on the West coast. When we began everything was at sixes and sevens. The foreman came to me, and said, "Mr. Donnelley, we are going to do the best piece of work we ever did in our life."

Within a week it had gone around and the men did do a better job than they had ever done before. Men will do that anywhere, if you will put it up to them and build from the bottom up.

If we had many more men starting in to build up the American Marine on this basis, from the inside, from the ground up, we would make more rapid progress.

R. L. McALL (American Seamen's Friend Society, New York City): The crux of the handling of the physical health of seamen depends on the way in which it originates in the operating office.

What I mean is this: If a company is so physically located in the operation of ships with relation to its managing officers and so on that it can assign the problem as first business to a certain man, as his job and his first job, he will be able to do it on the lines of the paper just read.

I will be willing to bet one thing, and that is that in the Export Steamship Company there is more than one man who makes this thing his first business under the direct mandate of the operating management of the company. So it is put on the man as an enterprise which is at least worth the best attention.

This is not a new story. In a certain chapter of a certain old book, you will find a man saying that the whole of the ship was going to be lost and the whole of the cargo but none of the men, and his cargo was worth more than his crew to him; yet he came around and accepted that, throwing out the cargo, and they didn't lose a man. I have often thought that that is the same old problem we are solving today, by simply elevating the man question to the point where his care is absolutely first business.

To make this accident prevention and the care of injured seamen a matter of first business, to be intelligently handled, with no laxity anywhere in the operation, if you will only drive that home so there are no exceptions to the splendid rule, then you will really have won the day.

CHAIRMAN BUSH: There is one point I wish to stress and it can't be stressed too much. With the Export Steamship Company, it was President Herberman who promulgated the order officially establishing safety as an integral part of operations. You cannot assign safety work to a subordinate and expect it to get anywhere. This the Export Steamship Company recognizes.

Recently in Boston, the Eastern Steamship Lines held their first safety meeting at which President Eugene E. O'Donnell presided. A safety committee was organized and is now at work.

I repeat: It cannot be overstressed. It is fundamental. Unless the chief himself gives his whole-hearted support, the thing will not get across. That is the principal reason the American Export Line has had such distinguished success in the work they have undertaken.

E. R. KRAETZER (Attorney for Export Steamship Co., New York City): First of all, I am not really connected with the organization of the Export Steamship Corporation. But I do have very close contact with it, and particularly along the lines of *personal* injury cases.

I want to say first of all as to the personal element—and I think I can say this because I am not connected with the Export Lines—I know as a matter of fact that Mr. Herberman's day starts at somewhere around half past six or seven o'clock in the morning, over on his docks, watching the unloading of his vessels. That is just one phase of it.

The second phase is this: I have frequently, in examining reports of the accidents, found situations where the master of one of the Export Line boats, who had an injured seaman on board, put into a port rather than carry that man on, trusting to his own ability to minister to his physical injuries.

I know of one case, for example, where a ship which would not otherwise have made the port of Gibraltar, did run into Gibraltar at a considerable loss of time and money, in order that an injured seaman could have the best kind of professional assistance.

Throughout the course of all their work, I find exactly that spirit and that kind of treatment of the men.

JOHN P. MAGILL (Special Representative, Maritime Association of Port of New York, New York City): The paper just read is a very interesting one in many respects, as a way-shower and as a way-mark along a definite line of progress.

It is not only a question of dollars and cents. In fact, I believe—and I speak as a shipping man—that the question of the dollar is not the paramount issue with the owners of vessels. They have always at heart the thought of protecting the life and health of their men at sea, and no expense is ever spared, no expenditure is ever considered of vital importance when a crisis arises. And that is proven by the readiness with which our largest, most expensive vessels will deviate from their course and go way beyond to rescue and render aid to the members of the crew of some obscure tramp ship in distress.

The real actuating impulse to any movement is sincerity of purpose. If the management of the properties involved are seriously sold on the question of a systematic measure of safety, that will naturally develop into activity of their organization the same as any other activity, and if the policy of the management is defined along these lines and made known to the personnel, it becomes a part of their daily routine, just the same as keeping a proper pace on the engines.

All of these movements must of necessity have a beginning. We must have a pioneer, someone with greater vision than the rest of us, who sees these things and acts on them. Many of us see them but our minds will run in other directions.

I am sure that Mr. Herberman has done a very definitely beneficial thing in inaugurating this most systematic activity and carrying it out in the thorough manner in which he is doing.

GEORGE ACKERMAN (Personnel Manager, American Export Line, New York City): Mr. Herberman has recognized that in connection with any safety-first campaign, he must have first of all the men who can read English.

Before August 1, our ships carried a very large percentage of aliens, particularly Greeks and Spaniards, who could not read English. Since August 1, we have placed on board the ships of the American Export Company 100 per cent American citizens or aliens who have gotten their second papers, which requires that they can read English.

Before that, if we put a safety-first poster on the ship, the aliens could not read it. Mr. Herberman recognized that, and we do receive very whole-hearted cooperation from the various school ships in supplying us with intelligent, clean-cut, young, trained American men, whom we make every effort to place as officers in our company after they have put in a few trips as training for merchant service.

Since August 1, we have had a complete turn-around in this line. You will find that by having American boys aboard the American ships, you will go a long way to reducing accidents. In this way they can understand all orders given to them and read all descriptive literature on their own safety as presented to them.

CHAIRMAN BUSH: In the preparation of today's program, we were very fortunate in securing the cooperation of the New York Maritime Exchange. I have great pleasure in presenting Mr. John P. Magill, Special Representative, New York Maritime Exchange, New York, who will now speak to you.

The Interest of the Maritime Association in the Work of the National Safety Council

By JOHN P. MAGILL

Special Representative of the Marine Association of the Port of New York

The Maritime Association of the Port of New York, in the very nature of things, is vitally interested in and an ardent advocate of any movement, having for its object the extension and betterment of the marine activities in not only America's premier port, but the world's greatest port, New York.

This organization was incorporated April 11, 1874, and granted a perpetual charter, the objects of which are written in Section two, which reads:

"The object of this corporation shall be to acquire, preserve and disseminate valuable business information, and to do such other proper and needful acts as will tend to promote the maritime interests of the Port of New York."

The Maritime Association consists largely of ship owners, agents and operators, representatives of kindred interests, such as: Dry Docks, Construction and Repair Yards, Tug Boat Owners and Operators, Barge and Lighter Owners and Operators, Ship Chandlers, Stevedores, etc., and the question of accident prevention naturally receives the careful consideration and cooperation of all our members.

The problems affecting ship operation are of course of vital interest to our organization, and may properly be divided into two classes, each class having its various subdivisions: (a) those relating to the safety of vessels at sea; and (b) those having to do with the handling of cargoes while in port.

There is probably no subject affecting the welfare of life and property that has received more attention in recent years than that relating to safety at sea. International conferences have been held and international agreements entered into, looking to the closer cooperation of the various maritime nations in a movement to minimize as far as possible the dangers attendant upon ocean travel and transportation. The wireless telegraph, the radio compass, the fathometer, and improved aids to navigation have served to greatly reduce the perils which beset the navigator and endanger the lives and property placed in his charge. Great progress has been made in this respect, and while it is inevitable that just as long as men go down to the sea in ships, accidents must and will necessarily occur, we may well look with pride and satisfaction upon the results achieved in the promotion of safety at sea. In view of the fact that the Marine Section of the National Safety Council has been functioning for many years past, your organization has without doubt largely contributed to the attainment of the present high standards prevailing as affecting the conduct of the ship upon the high seas.

On the other hand, problems affecting ship operation while in port, particularly with respect to the loading and discharging of cargoes, do not appear to have been solved to the extent which has been possible as regards those affecting safety at sea, and this in spite of the fact that much consideration has been given to this important matter. I will therefore take the liberty of discussing one or two phases of the situation, which no doubt have been touched upon in former years, but which, I am sure, will bear repetition. I refer particularly to accidents to longshoremen, conditions aboard ship, also on lighters and on piers, when loading and discharging cargo.

Labor conditions, as applying to stevedoring work, in common with varied other industries, have changed greatly during the past twenty to twenty-five years. The men formerly engaged in this work were more familiar with ships and shipping than those of the present day. Many of them had formerly followed the sea, and by reason of this experience, were probably better qualified to satisfactorily perform the arduous duties devolving upon the longshoremen. They knew what to do and how to do it.

Twenty-five years ago, there was not the competition prevailing in the stevedoring trade that there is today. The rates received by the contracting stevedore enabled him to pay current wages, render a splendid service and receive a reasonable return for his initiative and effort, while the men on the job were interested in their work and satisfied with conditions. For their own protection, the men were careful to see that all equipment used, as far as possible to discern, was in good condition and their preparation for a job was thorough; slings, falls, rigging, staging, etc., were carefully looked after and the entire burden was not left on the shoulders of a hatch boss or foreman, the men themselves being competent judges.

It is apparent that under present day conditions, a much greater responsibility rests upon the contracting stevedore than was formerly the case, and it is gratifying to note that stevedoring operations, as carried on by the largely predominating element in the trade, indicate a full realization of this responsibility on the part of the contractor, and a sincere effort to meet it by throwing every possible safeguard around the lives of those employed in this work.

It must be further apparent, however, that the competition above referred to, coupled with increased labor costs, is not conducive to constructive achievement. The fixing of a price for stevedoring service below the actual cost of performing such a service can only result disastrously to all concerned. While we heartily concur in the necessity for reduced cost as much as is possible consistent with good business principles, our own experience has taught us that it is as difficult to get something for nothing in the shipping trade as in any other.

In an effort to break even, the party who undertakes to engage in stevedoring work at a rate actually below the cost of performing the required service, is compelled to resort to various extremities, such as the use of second or even third hand gear, the utilization of skilled or unskilled men who will serve him for the least pay, etc. The Ship Agent or operator who receives a tender for work on such a basis is placed in somewhat of a predicament, and (unless he is unusually alert and has sufficient support from his principals) he is forced to give consideration to such tenders, even though he knows the price named will not yield a decent return to the stevedore. If he refuses to consider the proposition, and the stevedore addresses his Superior or Principal, they are not only apt to accept the lowest bid, but censure their representative for not properly caring for their interest, and may possibly assume that there is collusion between the old stevedore and their representative.

I know of a concrete instance within a short time past, where an agent for a foreign line was tendered a bid by an organization of this latter type, which on the face of it would have shown to anyone familiar with the cost of handling cargo, that there could not possibly be an honest dollar of return in it to the contracting stevedore. Unfortunately, the agent had no discretion and was forced to accept the tender, fearing criticism should he fail to do so, and the work reflected the character of the bid; when an effort was made to secure competent service at a fair price, the management could not see what was involved and insisted that no change be made. This condition continued until two serious accidents occurred and the stevedore was compelled, by the nature of the accidents, to retire from the business.

This instance is but one of many, and we believe that the Underwriters can assist materially in correcting this if they will adopt and enforce rigid rules covering the moral as well as the financial standing of the applicant desiring coverage, also on the important question of experience, not only in handling goods but in handling men.

We also do not believe it good practice to work a gang more than ten hours, or at the utmost twelve hours, and think better work and fewer accidents would result if this plan was followed out. When the regular eight hour day has passed

and it is necessary to work overtime, fresh gangs should be substituted included hatch bosses, foremen, etc., as obviously a man who has worked all day and part of the night cannot be as alert as when freshly started and, therefore, more liable to accidents.

Strict sobriety should be insisted upon in all instances and no excuses taken from intoxicated or even semi-intoxicated men. They are a liability of the worst type.

The practice of smoking in the holds of vessels, frequently with the connivance of the hatch bosses, is indefensible and causes many serious accidents, and will, to some extent, at least continue until such time as the man in authority is made to feel his responsibility. One of the best ways to do this, is to properly differentiate as between his wages and that of the men under him, and in conclusion it is my belief that low-priced stevedoring is one of the chief contributing factors in the question of accidents around ships.

It is remarkable that, notwithstanding the fact that a ship is nothing more or less than a floating warehouse, practically no improvement is made and adopted in mechanical devices for handling general cargo. Surely a little thought devoted to this important item will aid materially in not only preventing accidents, but also in legitimately reducing costs and expediting transit.

CHAIRMAN BUSH: Gentlemen, the meeting is now open for discussion on this paper.

I might say that we are honored today by the presence of the Dean of American Shipping, Mr. John B. Seager. Mr. Seager, would you care to make a few remarks?

JOHN B. SEAGER (New York): I have been engaged in shipping for a good many years. But times have changed, and when I look at these new boats, I realize that the stevedore has to learn something about the machine he has to work with.

I didn't expect to be asked to talk here today, but I never was a talker anyway. I have been watching the shipping here in the last sixty years, and to be candid, it is remarkable the progress that has been made in shipping, as far as building is concerned.

Mr. Magill has given a good deal of attention to this, as you notice, but I think the stevedores ought to be around here today. I haven't seen very many of them. It is a lesson to them. They have to try to save life and I am sure they are all willing to do so. But I think if they go aboard some of these new steamers, with what they have to do with electricity and one thing and another, it requires a competent man to handle it.

I am very glad to be with you.

CHAIRMAN BUSH: I think Mr. Seager made a very good suggestion when he said we ought to hear from some of the stevedores. Captain Blanchard, we would be glad to hear from you.

CAPTAIN P. B. BLANCHARD (President, Turner & Blanchard, Inc., New York City): Mr. Seager didn't see me when he came in. He seemed to hit it right when he said there have been changes. I am not as old as he is, but I remember when we had a horse to hoist the guards in and eight competent men to store it after we got it in. We didn't have any accidents then.

Of course such men as Mr. Seager drove the horse and the eight men off the beach, because they brought steamers here. One gang increased to two, three, then four, and then day and night. I really think Mr. Seager is responsible for a lot of that speed.

Then, of course, the war came on; and we broke up the gangs, increased the number of longshoremen working, and we got a mob. Stevedoring changed from stevedoring to wrecking. That is about what it was. We are suffering now from

that war condition. We have not gotten down to our feet yet, and we are looking at the records of injury during that period.

After the war, California started to flood her lumber here. We didn't know much about lumber and the result was that some of our steamship men didn't know much about it, and sent it here in ships with little hatches and we had to hoist it out on end, and a lot of it slid out of the drop and the men couldn't dodge it, and we had another wrecking institution.

But that is about all cleared up now. We are putting lumber into the ship, bigger ships, bigger hatches. Our accidents have not stopped, but they have been reduced, and really I feel that a lot of the hazard of the past has left us. We are making better speeds and are not injuring as many employees now. We have fixed gangs. The mob is leading us. We are back again to the old longshoremen or the new one that is better trained. We are making good headway toward safety.

It is pretty difficult to start even to talk safety on the beach because the longshoremen are like any men raised around ships, and shipping is very suspicious. If you stick up a poster and tell him to be careful, he will say, "Oh, what is the matter with them! They are trying to save a dollar!" That is just what he says.

But that is wearing away and we are getting better cooperation and notwithstanding what has been said here, we find that it pays; and after all, sentiment in business is all right, but you have to put an argument up that it pays. We all have the sentimental side, but the paying side is the one we have to sell, and the stevedore, the steamship man, and the longshoreman are thoroughly convinced that today it pays to be safe.

C. H. FLATHERS (Eastern Steamship Lines Co., Boston, Mass.): Mr. Magill spoke of the men who are in the habit of getting intoxicated. In our drives that we have just inaugurated and our safety campaign, which has recently been put into effect, we took three initial steps.

The first was the elimination of what we call repeaters. I think one of the speakers intimated yesterday that longshoremen do not purposely get hurt. But we find in our experience there is a certain class of men who will purposely injure themselves for the benefit of drawing compensation. We have had several instances of that kind, in connection with our campaign work.

We have analyzed our accident records for the last two years and selected those men who have been in the habit of getting hurt frequently—two, three or four times a year. I think we selected forty-eight men, and those forty-eight men in two years had been injured 158 times, from two to three times each. Now we have established a procedure whereby those men do not get work again. I think that is a very effective method, and I am placing that before the committee for those interested.

These men are not, of course, the usual type of longshoremen. We have good men, who work earnestly and I think most of the members here are in the same situation. Some of the longshoremen will work for years and years. This repeater is a dangerous man to have, and he is not only going to be injured himself but sometimes will be the cause of another man being injured.

Then we have another type—the troublesome employee who is always carrying the chip upon his shoulder and looking for trouble, and sometimes will run his trouble into another fellow who is injured. This fellow worker resents that and will probably turn around and give him a poke in the nose, and we have two injury reports in place of one. We have had that happen twice recently.

We have impressed upon the men employing longshoremen, the necessity of selecting men physically fit for longshore duty. We have at the present time two or three striking cases where men were employed and were unfit for the work, and they received a slight injury; and as a result of some trouble which originated

before their employment with the company which was increased, we would have them on our hands for some time.

So there are three types of men, I think, other than the one who is in the habit of becoming intoxicated—the repeater, the dangerous man, and the man who is physically unfit for the task of stevedoring.

FRANK A. FRITZ (T. Hogan & Sons, New York): I rise first with the idea of hoping to present a solid front for the stevedoring interests represented here today, and in addition to what has already been said by Captain Blanchard and those others who spoke from that viewpoint.

I should prefer to hear from those who have had more experience in this line and who represent some of the oldest concerns, but I don't feel that I could remain silent on this subject in view of the fact that the company which I represent, and which is another good-sized company, has tried to do in the past year and a half some real active work.

I think I can safely say for our company that the work has proved itself in a considerably short space of time.

It is undoubtedly true that the game has hazards, and there are various and devious kinds that are too long to narrate now. A good many of them have been mechanical and a good many are represented by what we call the human equation. But this much I think is fundamental—that men come to work to support their families, with the idea of working out a livelihood, and certainly with the idea of working out that livelihood with safety, so far as they conceive it to be compatible with their work. I mean, if we have accidents due to the human equation, they are due perhaps to the fact that the idea has not sufficiently been brought home to the particular man who is doing the particular job.

Now maybe I am wrong in stating that is the problem that confronts the long-shore industry today—How to get the idea of safety to the man who is actually doing the work. But I think primarily we can only hope to reach some degree of success along those lines if first of all we start from the top of our business and work down.

Of course, it is a long row to hoe. You have your executive level and you have your superintending force, and you have your minor supervisory levels. But my short experience has taught me that you have to simmer from the top down to each one of those levels before anything of a constructive nature can hope to be accomplished in the lowest element that you have. And by that I mean simply the range of the employees working in the hold or on the docks of your ship.

Now, of course, a question which has been frequently asked and which is always addressed to us when we talk generalities is: How is it to be done?

I take it, when accidents occur, they all have a cause. I further take it—and I have seen it demonstrated—that you arouse the interest of the men concerned only when the heads of the companies take the particular causes and try with some sincerity of purpose to eradicate these causes.

At the expense of dealing with something of a private nature, but which I think may be of interest, I may say that in the past year we have paid very close attention to accident causes and have tried to analyze them so far as possible; and we have at least ten accident causes.

By cooperation on the part of our executive force, on the part of our superintending force, and on the part of our foremen, we have been able to devise rigs and appliances which to a large extent have obviated certain kinds of accidents which were repeaters on our accident statistic records.

I say that is not so difficult a situation, and I say you can't hope to get cooperation or enthusiasm or interest in your working force unless you first demonstrate by some such concrete things as that, that your company itself has at heart the reduction of accidents and demonstrates it by concrete methods.

It is true that there is a certain proportion of men who don't cooperate, and it is true that there is a certain proportion of men who are suspicious. But I find that after having conducted weekly safety committee meetings, made up of foremen or headers taken from various gangs, that they become convinced after awhile that you are not shooting solely at the dollar. They become interested, and give you credit for trying to do something that will eliminate hardship for injured men, and their families. And by and by they do begin to lose some of the suspicion that they had in the beginning. There is no question but that we are confronted with suspicion when we start out.

If any of you have tried to sell safety shoes to your men, even at a low cost, you find it doesn't make very much difference whether you are selling them below cost or not; there is a certain element that is suspicious about that proposition. And it is true about everything else you tackle. I say, unless the safety business is approached in the frank spirit of laying all your cards on the table, and you are willing to take your lowest man into the safety meeting and have him express an opinion as a man not as an employee, a longshoreman or dock walker, and give attention to that opinion as you do to the opinion of the president of your concern, you are heading for failure in safety work. I think the sum and substance of safety work is cooperation, giving the topic of business and making it filter through until you get the last level.

CHAIRMAN BUSH: The place of the physician in industry has been touched upon in Mr. Heberman's paper, and also by Mr. Flathers and others. The next speaker is a physician who had had a wealth of experience. He is the port physician of the United Fruit Company, with headquarters at Boston. Dr. Francis X. Crawford will now deliver his paper.

Medicine in Industry

By DR. FRANCIS X. CRAWFORD

Past Medical Officer, United Fruit Company, New York City

Ever since medicine has been practiced as an art, preventive ideas against disease have been uppermost in the teachings of all medical writers. Preventive medicine, therefore, is nothing more than "Safety Measures" applied to the practise of medicine. Today more than ever before we are constantly teaching methods of how to prevent disease, either by avoiding the occasion to infection, or by vaccination.

Physicians always have been striving to lessen the liability to disease and many have sacrificed their lives in this most worthy object. During the last century, the expectancy of life has increased from about 30 years till at present it is about 54 years; an increase of 80 per cent, a wonderful extension of life. All this is due to the great discoveries of the causes of diseases and their prevention, which is, as I said before, the safety measures of medicine. Diphtheria, which a few years ago had a mortality of about 30 per cent, is now down under 10 per cent, due to anti-toxin. Small-pox which has had a mortality in some epidemics as high as 70 per cent, is now down to below 5 per cent in well vaccinated communities, this due to the safety measure of vaccination.

Industry recently has been endeavoring to reduce its liability due to accidents for two reasons; first, reduction of expense in production; second, humanitarian ideals toward its employees. (This is the preventive medicine of industry.) So great is the movement toward safety that we see in all industrial plants great efforts made to prevent accidents; and being unfortunate enough to have them, every effort is made to have the injured employee given the best medical attention. So medicine and safety measures must go hand-in-hand, and that branch of

industry which neglects to use a campaign of safety must fall behind its competitors in cost of production.

The physician should have a prominent place in all safety projects, since by his training he naturally seeks the causes of things and the means of avoiding the dangers. His position in industry should be one of very great importance. He, together with the safety engineer, should have charge of all safety measures applicable to the plant. The method of treating and handling all injuries and industrial diseases should be planned by him. He should act in an advisory capacity to the safety committee and deliver, at certain intervals, talks on "First Aid" and preventive measures which might be of advantage to the industry. His advice in medico-legal matters appertaining to injuries and disease should be carefully sought and as carefully given. He ought to have the interest of the employees so much at heart that they would feel free to approach him for advice, not only in obscure medical cases but also in the social phases of life. Such interest in the employees of an organization tends not only to make the physician a great help to his employer, but wins the love and respect of the employees, so that his efforts for safety are more eagerly carried out.

Such efforts by the physician are especially applicable to the shipping industry. Captains of ships which sail without a doctor on board have a great responsibility in caring for the health of their crew. Every captain should have a small amount of knowledge relative to the care of simple ailments and minor injuries; also to realize when some one of his crew is actually injured or sick. He should also watch how work is done aboard his ship to see that the proper safety methods are carried out, and if faulty methods are used, these should be corrected. The marine department of industry should have a physician give talks on first aid and safety campaigns to the officers of their ships regularly. They in turn should hold school with their subordinates in all departments on board ship and should discuss with them the best methods for avoiding accidents, the examination of gears, and the tendency of any of their various personnel to have frequent accidents or work in a careless manner. Such efforts tend to bring careful methods among the crew and if a friendly rivalry can be started among various ships of a line as to which runs longest without accidents, it will stimulate the men to be constantly on their guard. I believe some sort of bonus should be given every year, or every six months, to the ship personnel having the least number of lost time accidents during the period.

Again the personnel of industry should have a physical examination before being hired. This is most important both as regards the employer and the employee: for the employee's sake, so that it may be found out if he is physically able to do his allotted work; for the employer's sake, so that he may be assured of a fit man. All officers of an organization, I believe, should take a physical examination every year to ascertain their physical fitness to carry on. Every man receiving a promotion should take a physical examination and a record is kept of his condition so that it may be seen if he is fit for the extra work. Many costly mistakes have been made by men in important positions who were not physically fit for their job. This should apply particularly to marine officers.

The doctor in industry should act as an advisor to the officers and safety committee, and should watch most carefully the follow-up campaign of its accidents. He should watch their methods and if a particular department of the work is having more accidents than he thinks is normal, a rigid investigation should be made relative to the physical condition of the men in that department and ability of the officers to guide them. He should be generous with his advice and time, and his right to have errors corrected should extend to the officers as well as to medical supervision in general.

I believe the medical department should receive and accept this tremendous power of judgment and should either rise or fall with the results obtained.

There should be no loophole through which might be "passed the buck" to some other department for poor results that should be chargeable directly to the medical department. A doctor accepting this high position in industry should be willing not only to fight for his firm but also for the employees, and unless he shows this spirit of goodwill and friendliness toward those in the lower strata of his plant, he will not receive the help that is so absolutely necessary for the success of his work. He must be exceedingly careful in the treatment of employees even in the lowest grade of work, for it must not be said of him that he neglected anyone or treated him in any way carelessly.

CHAIRMAN BUSH: Gentlemen, the next paper has to do with a new device which is a distinct aid in the navigation of vessels. I have great pleasure in calling on Mr. H. J. W. Fay, Vice President, Submarine Signal Corporation, Boston, Mass.

Echo Depth Sounding to Promote Safety on the Surface of the Seas

By H. J. W. FAY

Vice-President, Submarine Signal Corps, Boston

It gives me great pleasure to review briefly some of the work which has been accomplished in echo depth sounding to make the sea a safer and a better place for navigation. This subject is one which has received extensive research and the best efforts of our organization.

The vital importance of an efficient sounding apparatus and the necessity for its use when "on soundings" can hardly be exaggerated. There are many times when the safety of the vessel and the lives of those on board will depend to a great extent on the accurate and rapid determination of the depth of water underneath the ship. Reference need only be made to the existing facts in almost every case of stranding on record to substantiate this statement.

There is no doubt in my mind that anyone who will review the records of marine disasters for the past few years will freely admit that there is need for an improvement in our present methods of safeguarding navigation to prevent strandings. During the year 1926, an aggregate of 146 ships or 234,000 gross tons were total losses due to stranding, striking rocks or other obstacles, according to Lloyd's Register of Shipping. A conservative estimate of the value of these ships is \$25,000,000 not including the cargoes.

According to the U. S. Shipping Board Bureau of Research, 1,799 vessels of over 500 tons each were partial losses due to stranding in the year ending May, 1927. Beginning with July, 1927, and ending with June, 1928, the total number of disasters recorded are 1,962, of which 621 were due to groundings.

The majority of these strandings and groundings, I believe, are due to a lack of knowledge of exact position on account of fog and storm. Therefore, I feel you will be interested to hear something of the development of an instrument designed to keep the navigator well informed at all times of the depth of water underneath his ship. I refer to the Fathometer (*Figurer*), an echo depth finding instrument infinitely more effective than the time-honored lead and line.

The first use of the lead and line is lost in the haze of man's first attempts at navigation. The application of soap or grease to make particles of sand or mud adhere to the lead and give an indication of the nature of the bottom was recorded by Herodotus more than four centuries before the Christian Era. One of the most important improvements on the earlier methods was the Kelvin Sounding Machine, in which a device encased in the lead records the hydrostatic pressure. In spite of the tremendous advantages of this system a mechanical contact with

the bottom is required. Subsequent efforts have mostly been bent to the task of eliminating the line and utilizing solely the difference in the physical characteristics of the water and the bed of the sea for obtaining depth measurements.

The recent improvements in depth sounding methods are a radical change from the simple but slow system used throughout the centuries. Everyone knows that a cliff will send an echo back across a valley, and submarine signaling had shown

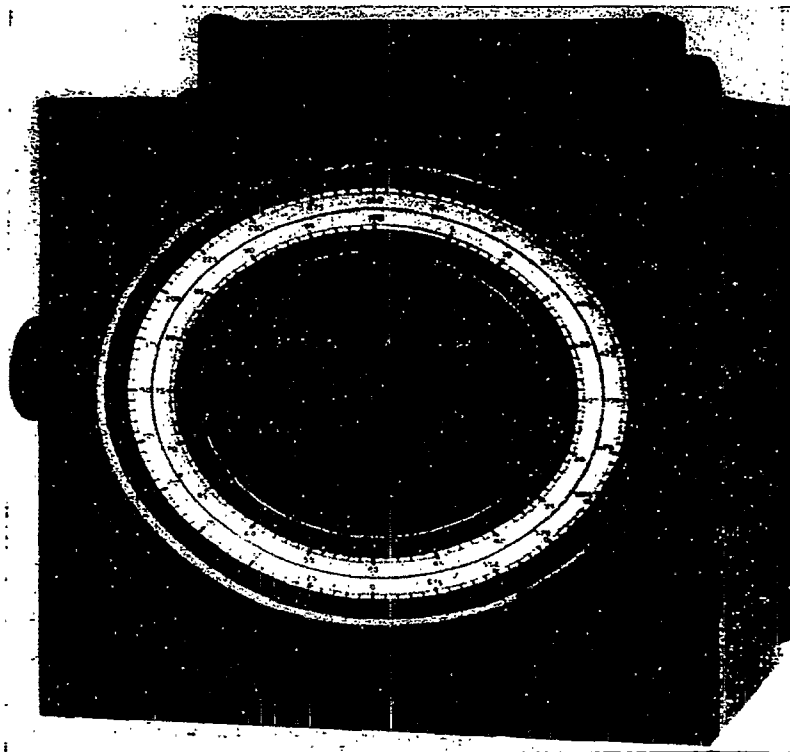


Figure 1. The Fathometer.

that water is a far more perfect medium than air for conducting sound, but it was not until Professor Reginald A. Fessenden created sounds under water with his oscillator and timed the return of the echo that the marvelous possibilities of echoes were applied to depth soundings.

Professor Fessenden's discovery of this new method of depth sounding is linked in its history with the "Titanic" disaster. It was this appalling disaster which led Professor Fessenden to propose experimenting with his oscillator for the purpose of detecting the presence and proximity of icebergs by means of an echo.

In 1914, Professor Fessenden made tests on the Revenue Cutter "Miami" while the latter was on its usual ice patrol off the Grand Banks. In these tests Professor Fessenden found that the oscillator could be used not only to detect the

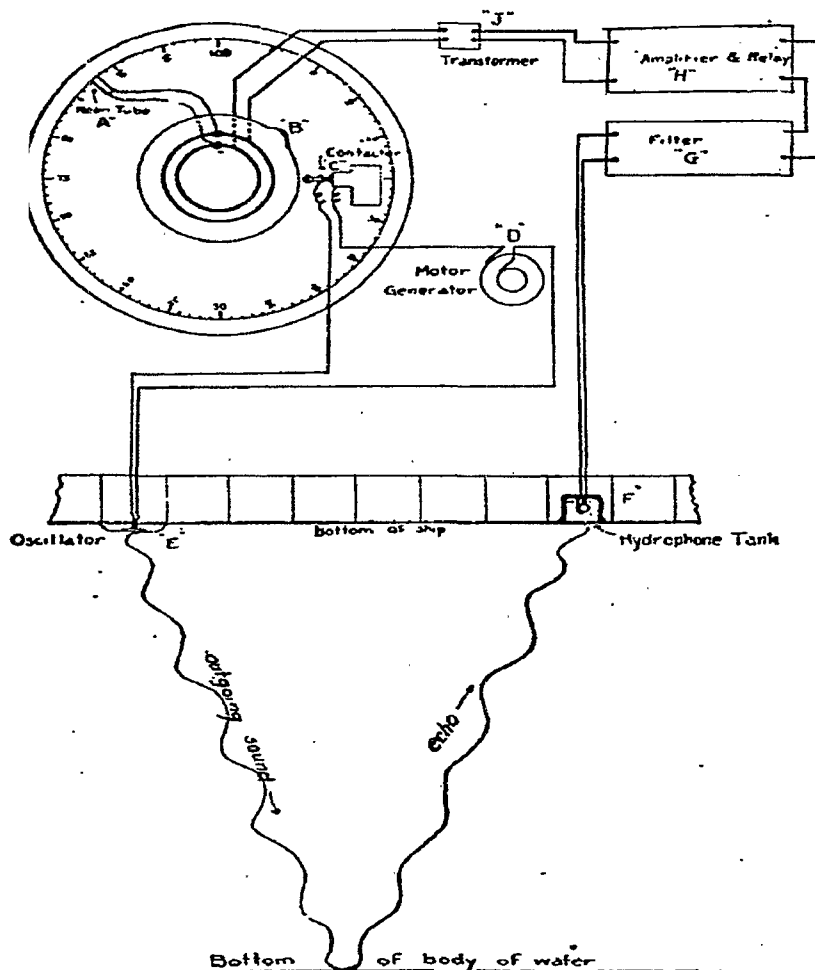


Figure 2. Operation of fathometer red-light method. As the neon tube "A" passes its zero position on the depth scale, cam "B" closes contactor "C," which sends an alternating current from motor generator "D" through oscillator "E." This produces a sharp sound which is transmitted through the water to the bottom and is reflected, so that a hydrophone "F" placed in a tank of water adjacent to the skin of the ship receives these sound waves, transforming them into electrical waves of the same frequency. There are other sounds or noises about the ship which set up currents of various frequencies, but these are filtered out by the filter "G," and only the current caused by the echo is allowed to pass on to the amplifier "H." Here it is amplified to such an amount that it will operate a relay, breaking a circuit of the primary of a transformer, which induces a current in the secondary of the transformer of sufficient voltage to cause a momentary glow of the neon tube, indicating the proper depth on the dial. This operation is repeated each time the neon tube passes its zero position.

presence and nearness of icebergs, but also to determine the depth of water that the Revenue Cutter was in, by measuring the elapsed time between the sound of the oscillator and the return of the echo.

The first experiments gave promise of success, for echoes were heard from great depths, and sound waves created by the Fessenden oscillator have been echoed from the ocean floor near the Azores in 3,000 fathoms of water, a distance down and back of nearly seven miles. However, the problem was not a simple one, for sound travels in water with a velocity of 4,800 feet, or 800 fathoms, per

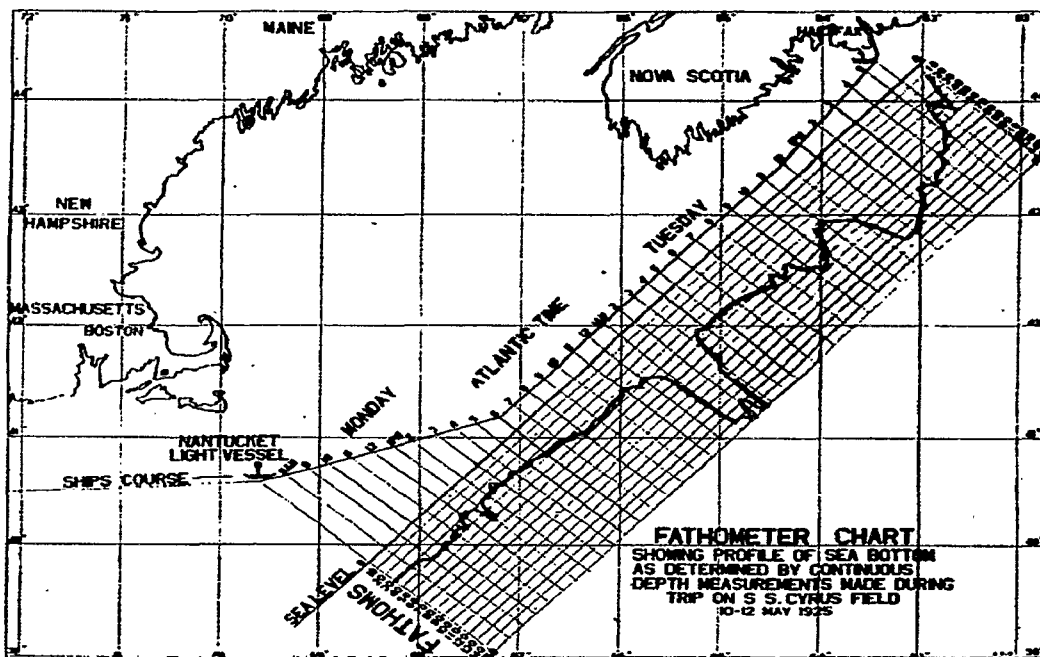


Figure 3. Profile of the sea bottom.

second, so that if one is measuring the depth in 40 fathoms, only a tenth of a second elapses between the instant when the sound is created and the moment when the returning echo is heard. If it is desired to know the depth within a fathom, the measurement of the time interval must be accurate to 0.0025 seconds, a precision which is readily obtained in a laboratory but which has heretofore been extremely difficult to realize on a pitching ship.

Many different applications of the echo method of depth sounding have been proposed and much research has been done in the last few years with a view to finding the most suitable way in which to utilize echoes.

In this country where the first experiments were carried out by Fessenden, interest has not lagged and experimental work of great accuracy and importance has been carried out by the United States Navy, the Coast and Geodetic Survey, and by the Submarine Signal Corporation.

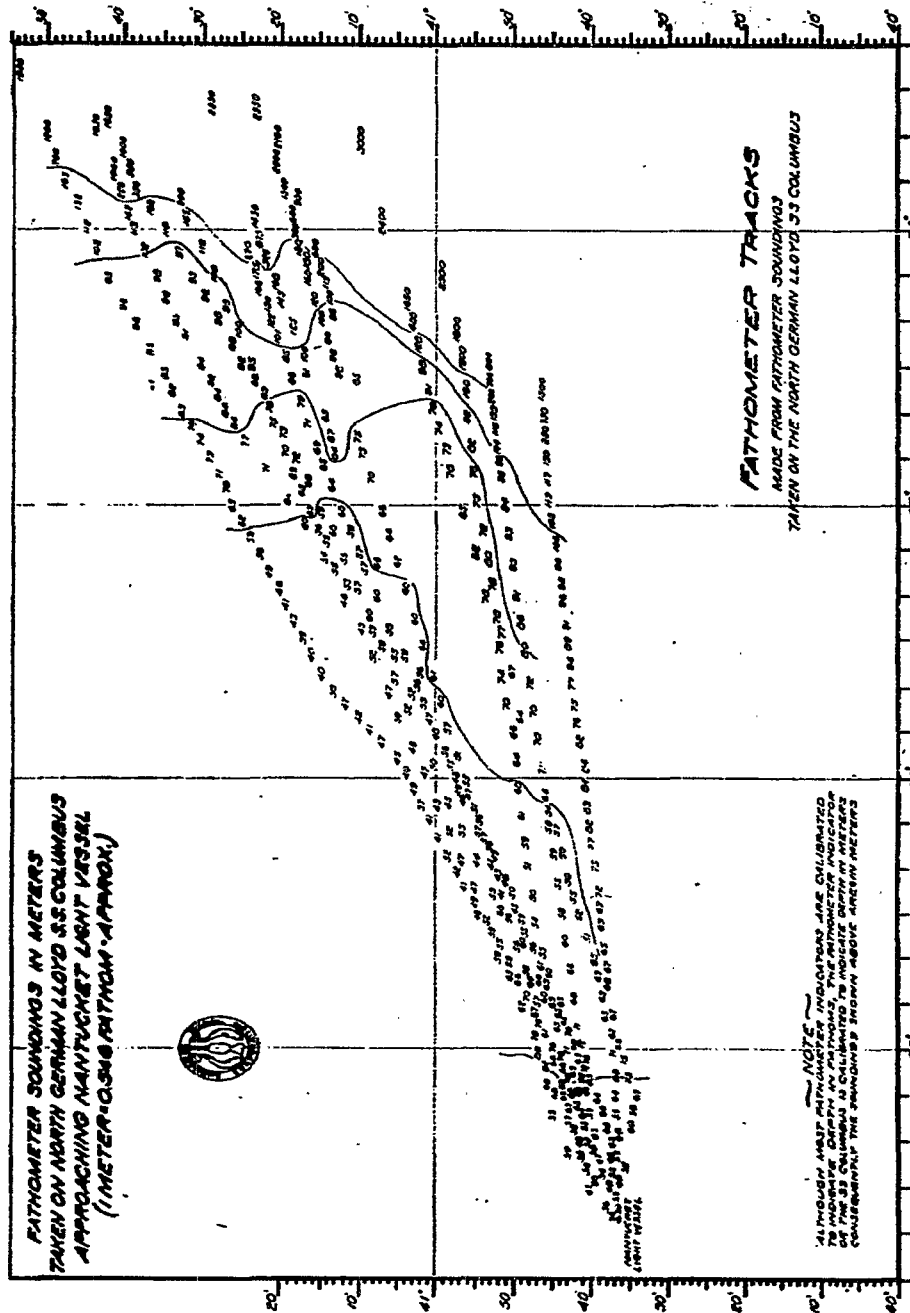


Figure 4. Chart showing lines of soundings of the sea bottom.

The following is a brief description of the work done by the Research Laboratory of the Submarine Signal Corporation in developing the "Fathometer."

Many problems confronted the experimenters who first endeavored to make accurate measurements of the time elapsing between the production of a sound under water and the return of an echo from the bottom. If the submarine sound produced had a duration of a tenth of a second, the initial waves of the disturbance had time enough to reach a depth of 40 fathoms and return before the initial sound ceased, and the echo blended in with the original so that it was impossible to make any measurements in these depths.

Whatever was used to produce sound waves it was imperative that the disturbance be over in less than three thousandths of a second if any great accuracy was to be obtained. A sound producer was developed which gave a short musical note and could be excited in a very small interval of time.

The sound producer used in the universal type of Fathometer is known as an oscillator. It consists of a steel plate firmly clamped at the edges and having the properly chosen dimensions so that it vibrates with a frequency of 1,050 cycles giving a short musical tone under water. The plate or diaphragm is actuated by a powerful electromagnet energized by an alternating current.

The echo itself is detected by means of a special hydrophone enclosed in a water tight case and connected to a diaphragm in contact with the water.

The diaphragm takes up the under water vibrations and transmits them to the hydrophone button where they produce variations in an electric current which are faithful reproductions of the under water disturbances.

The current from the hydrophone goes to the Fathometer indicator where the time required for the echo to reach the bottom and return is accurately measured and the depth of water is automatically indicated on a dial graduated in fathoms.

The indicator mechanism is sturdy and will operate in any position as it contains no delicate adjustments which can be put of order by the rolling of the ship or even severe shocks but it is extremely accurate and gives depth readings that can be relied upon within a fathom. In operation a luminous finger points to the spot on the scale corresponding to the depth, varying when the ocean floor is shelving and remaining fixed when the depth is constant.

The light itself is not continuous but flashes several times a second giving the illusion of a nearly constant light as shown in *Figure 2*.

With the completion of the development work and extended trial installations of the Fathometer on our part it then became incumbent on us to prove its accuracy and reliability to the various Marine authorities.

The generally recognized high standard of the sounding work of the U. S. Coast and Geodetic Survey led us naturally to this service to prove the accuracy of echo depth finding as embodied in the Fathometer.

The extent to which we have done this is best told in the following extract from the 1927 Annual Report of the U. S. Coast and Geodetic Survey:

"During the last year the apparatus successfully passed all tests and was accepted for use in hydrographic surveys. Steps have been taken to procure additional echo depth finding machines and install them on nearly all of the vessels of the survey.

"By means of this echo-sounding apparatus, known as the 'fathometer,' it is possible without stopping the vessel to take soundings in any depths from a few fathoms under the keel to at least 2,500 fathoms (15,000 feet), and probably to greater depths. The advantage of this apparatus for survey service is that soundings can be taken as rapidly as desired—as frequently as four per second—with the vessel steaming at full speed. It is, therefore, possible to survey more than twice as much area per day with this apparatus as would be possible by any other means. This apparatus, however, is not confined to the use of the surveyor. In fact, it is of even more value to the navigator since the master of a vessel equipped with an



Figure 5. Profile of deep sea sounding.

echo sounding machine can feel his way at night and during stormy weather without stopping the ship. He can also find his position at sea by comparing a series of soundings with the depth shown on his chart, and with this information lay out a safe course to his port of destination.

"While the primary purpose of this bureau in going into this subject, and cooperating with a commercial firm in the development of the fathometer, was to secure an apparatus that would enable the bureau to speed up its hydrographic survey, it was, nevertheless influenced by the belief that the perfection of this apparatus would be of great benefit to marines everywhere and would contribute toward greater safety at sea. I am glad to report that our estimate of this apparatus has been fully

justified and that our cooperation has been of material assistance in bringing to perfection a very important contribution to navigation."

The value of the Fathometer to cable ships was apparent from the start as it was evident that any method that would give practically a continuous line of accurate soundings and thus show the most desirable cable route to adopt would be of great practical value both to the cable laying and repair ships. The "Cyrus Field" was one of the first of the cable ships to be equipped with a Fathometer in May, 1925. *Figure 3*, showing a profile of the sea bottom between Nantucket Lightvessel and Halifax, N. S., made from continuous Fathometer soundings is the first echo depth sounding work done by the "Cyrus Field."

Naturally, the efficiency and accuracy of the Fathometer as demonstrated in the Coast and Geodetic Survey, in the Navy, and on cable ships attracted the attention of owners of commercial vessels, for a sounding device that could prove reliable in such exacting services most certainly held advantage for commercial navigation.

One of the first lines to equip a vessel with the Fathometer was the North German Lloyd S. S. Company. And incidentally, the Fathometer on their S. S. "Columbus" is used for position finding as well as depth sounding. The officers of the vessel have plotted lines of soundings (*Figure 4*) on charts in the form of courses and when making Nantucket or Bishops Rock, in fog or thick weather, they pick up one of these courses and follow it to their objective.

A fact significant of the value of the Fathometer is its use by such representative ship operators as the United States Lines, North German Lloyd S. S. Company, United Fruit Company, Clyde Line, and Eastern S. S. Company.

The last few decades have witnessed many startling applications of science to industry, and these inventions have nowhere shown themselves more fruitful than in increasing the speed and safety of navigation.

The rapid progress of recent years in the development of echo depth finding is all the more noteworthy when compared with the centuries that the lead and line remained the unchallenged means of measuring ocean depths.

The echo method of depth finding which requires no mechanical connection with the bottom represents a radical and brilliant step in man's mastery of the sea.

CHAIRMAN BUSH: The meeting is open for discussion.

P. B. BLANCHARD (Turner-Blanchard, Inc., New York City): Mr. Chairman, here is a case where I am going to deviate from the stevedoring and go back to sea. If that is as we heard it, I consider it the greatest invention that has been handed to the shipping world. I say that not in idle talk.

I have gone out on this coast in a sailing vessel, in the dead of winter, making the land, and seeing neither hide nor hair of the sun for days, and we used to take the old lee line and carry it forward and take the sail back to the main tops of the quarter, and take a sounding and go a little ways and take another.

We wrote that on a piece of paper that we put a blotter on so we could read it. We plotted that along and took a slide on the chart until it matched the soundings that were on the chart.

That is the way we found our position, and it is a fact, those that have tried it know that the ocean bottom is very regular, and if it is possible to plot along at different distances it is like finger prints. At the bottom of the ocean it is different everywhere. You can plot on a piece of paper and slide it along on a chart.

I consider this the finest way of finding your position that is known to the navigator, and I feel that is one of the most wonderful inventions ever made.

M. T. DONNELLEY (Consulting Engineer, New York City): I had occasion to sail quite extensively in the North Pacific Coast. I want to bring up here that they use echo there in navigating, to a very surprising degree.

I have laid awake in my boat for night after night and listened to the "toot toot."

and inquired next day what it meant. The man kept pulling that whistle all night and kept me awake.

I found that was the way they navigated. It was a long "toot" long enough to kill the first echo. Then he gets the echo from the further side. In that way the man on the bridge without any apparatus at all except what God has given him, can navigate by echo. In talking with the captains they say they can even catch the echo from a log on the water when conditions are right.

That isn't all. We have had, at the entrance of Vancouver Harbor, British Columbia, a narrow inlet and a great deal of fog. The entrance is about 300 yards wide, with hard rock on each side. I have hit one side and gone through many times. Through that they can sail down the big fog and commence to "toot" the whistle and by and by get an echo.

The captain stands there with a watch in his hand. He knows how far he is from port. They have set up against that house, a board, two boards at right angles. They don't get the echo unless they come within right angles. As soon as they cross the line at right angles the echo will go and strike one point and then cross the other and come back.

The reflection is the same as the turn of a billiard ball on a billiard table. If you shoot at the one pocket it will cross over and come back parallel.

They can tell then that they will sail down this line and first get the echo, and then they get a certain distance—a second or two seconds or three seconds away—and swing on the course and hit through this narrow passage.

That has been done for a good many years. I would like to ask the speaker if that instrument has been used in connection with a set board or if it is practically possible to navigate with your instrument in that way, being guided by an echo on a board?

MR. FAY: The fathometer is essentially an accurate time-making instrument, and if the echo came back accurately, there wouldn't be any difficulty in measuring it. I think there is a good possibility in the future of working something toward the line of prevention of collision at sea by giving the ship speed and distance just as we are giving now the distance from the bottom. But that is too far ahead.

MR. DONNELLEY: I wonder if anything has been done in putting up these boards, other than just by chance in Vancouver?

MR. FAY: Not that I know of. We recently were testing a whistle at Execution Rock and got some echoes from a house. And then we got echoes off boats that passed. But I don't know of any special boards that have been set up.

On the Coast of Maine, going up near the Penobscot River, you get wonderful echoes there. You can time them beautifully. I think we are just coming into the utilization of echoes in safety work; as you all motor, you hear the echoes off the picket fences as you go by, and off trees. And maybe echoes will come into the navigation of airplanes in helping landing. I think the usefulness of the echo is just being appreciated.

MR. DONNELLEY: There is no reason why you shouldn't navigate a river like the Hudson by an echo board.

R. L. McALL (American Seamen's Friend Society, New York City): Is there an element of direction in the reception of the echo wave? In other words, can it be turned? I didn't quite catch it, not being a technical man. Can it be turned so as to direct the echo in another direction, or is it a spherical wave which does not have the directional element?

Supposing you were going through a very narrow and very deep channel, the Canyon of the Colorado, we will say, under water. Would you get an echo from the side if you are in the middle, at an angle, or would you get the echo from the bottom? Can you make the instrument tell the distance from different angles?

MR. FAY: You could do that, if you wish to install the instrument so that it will need to be directive and could be rotated, but we get the echo from the nearest point. We have echoes from icebergs and the bottom at the same time. But the echo which we obtain from icebergs at a distance of from two to three miles, we do not recommend for high-speed ships as we get too close to the bergs.

ADJOURNMENT.

October 3, 1928

American Steamship Owners Association Day

A. R. BUSH, Chairman

Personnel Manager and Safety Engineer, The Barber Asphalt Company
Maurer, N. J.

The third session convened at nine-fifty o'clock, Chairman Bush presiding.

CHAIRMAN BUSH: The first paper this morning, gentlemen,—this being American Steamship Owners' Association Day, that organization having greatly co-operated with us in the preparation of today's program—is "Safety in the American Merchant Marine," by a man who needs no introduction.

I am pleased to present at this time, Mr. H. B. Walker, the President of the American Steamship Owners' Association.

Safety in the American Merchant Marine

By H. B. WALKER

President, American Steamship Owners' Association, New York City

Accident prevention in all lines of human endeavor has passed the doubtful stage and is now considered essential in all branches of industry. From a humanitarian point of view its worth has never been doubted but to gain a permanent place in business its economic value had to be demonstrated.

Despite the splendid results which are being obtained as a result of the work being done by the National Safety Council, local organizations and individuals, there is urgent need for increased and extended effort. Some idea of the appalling loss caused by accidents may be gained from a statement recently issued by the New York State Department of Labor:

"Compensation was awarded during the year ending June 30 last for 1,129 deaths and injuries to 93,565 persons in industrial accidents. Figured on a time basis, this means 'society lost the productive labor of 45,000 men and women for one whole year' the Department pointed out. The total spent for compensation was in excess of \$28,000,000!"

Assuming that there are 300 working days in the year and that the average wage is \$4 per day the injuries in New York State for the year ending June 30 resulted in a direct economic loss amounting to about \$54,000,000—with no account taken of the indirect loss of production due to the stoppage or slowing up of work when the accident occurs or of the loss occasioned by the replacement of the injured person.

Authorities are of the opinion that from 75 to 85 per cent of this loss was avoidable.

With higher wage rates and more liberal compensation provisions the cost of the average industrial accident is increasing which results in a higher cost to industry and which can only be offset by a reduction in the number of accidents.

In the shipping industry the value of accident prevention is being more generally realized. Shipping executives are taking a keener interest. On the Great Lakes safety education has been carried on through Ship Safety Committees for a number of years with splendid results. Each committee is composed of six men and holds a meeting once a month upon call of the master of the vessel, at which the master and chief engineer are present in an advisory capacity. These committees consider various questions of safety, discuss accidents, give instructions to new

men, etc. The members of the committees are paid for their attendance at the meetings and if no accident occurs to any member of their crew during the season, necessitating his absence from the ship, a bonus is paid to the members of their committee. The number of vessels receiving the bonus has increased regularly. The minutes of the meetings of the various Ship Safety Committees are sent to the manager of the lines as well as to the office of the Lake Carriers' Association. These are very carefully examined for constructive suggestions.

As result of their experience a Code of Recommendations has been issued covering the following: ladders, tackle, gear and stagings, machinery, lights, hand rails and gratings, pipe lines, boilers, valves, hatches, cables, loading and unloading, fire, life preservers, etc.

In Seattle, safety education is conducted by the Waterfront Employers' Association in which both employer and employee have representation. This association, by means of careful employment selection, has greatly reduced the high labor turnover in the stevedoring industry, which has resulted in a more steady employment for the men, with increased earnings. The safety work, which is in charge of a competent engineer, has made for a steady reduction in accidents. The results of the work have been gratifying.

In San Francisco there is also a cooperative movement. The Pacific American Steamship Association, the Shipowners' Association of the Pacific Coast, and the Waterfront Employers' Union have organized an Accident Prevention Department which began to operate in 1927. The different organizations interested have appointed representatives which meet and form the governing board of the Accident Prevention Department. A safety engineer, who devotes his entire time to the work, is in charge. Each company of the steamship owners' association has designated an executive to cooperate with the Accident Prevention Department. He is responsible to the company for the accident prevention work, and is known as a Safety Contact Executive. Monthly meetings of these executives are held, where the methods of conducting the work are discussed.

Dinner meetings for executives, for chief stevedores, for gang bosses, and others are held, and have done much to stimulate safety thinking. Bulletin boards and special safety slogans, standardized first aid kits, and first aid stations are being used with success. Special safety letters and reports and studies on various subjects are issued from time to time. Accident statistics are compiled and regularly submitted to the membership. These reports are carefully analyzed, the accidents segregated by causes, and used in various ways to impress upon the personnel the necessity for "safety" in their daily work.

Recently the accident prevention campaign has been enlarged to include the harbors of Los Angeles and San Diego. Several of the companies are developing safety departments within themselves, and in some instances have safety committees working both on shore and on ships. A program of accident prevention for ships at sea is also under consideration. Rules governing safe practices, duties of hatch tenders, stevedoring foremen, etc., are in course of preparation.

Galveston is also carrying on an active campaign.

On the Atlantic Coast the cooperative movement of shipping organizations and individual steamship companies in combating the great evil of avoidable accidents has probably had its greatest impetus. This has been accomplished through the activities of the Marine Section of the National Safety Council in which many of the leading American shipowners and operators hold membership and whose representatives meet monthly for the exchange of information. The work has produced excellent results. One company, it is reported, has saved \$70,000 in one year in the cost of accidents occurring among the longshoremen and other employees, through an organized safety movement costing less than \$500. The methods used by various companies differ to some extent, but can, in general, be classified into two groups, (1) those having well-developed safety departments in charge of a

safety engineer, and (2) those who contract with outside organizations for accident prevention campaigns.

The American Steamship Owners' Association has recently become interested in this very important subject and has appointed a safety committee. This committee has in mind the formation of safety recommendations based upon the practices of those of our members who have been carrying on campaigns of accident prevention for some time. It is believed that this will do much to interest the executives of other companies in the work, and that it will materially increase the number now engaged in it.

It must not be forgotten that the industry faces certain difficulties which are not as marked in other lines. For example, the labor turnover, both ashore and afloat, is very high. Stevedores are not regularly employed on many docks, and seamen do not stay with a ship sufficiently long to be influenced by safety propaganda. It may be possible to develop some plan, as was done in Seattle, whereby this turnover will be reduced. Then too, as you well know, the shipping industry has had and is having a hard struggle to make both ends meet. There is, therefore, a hesitancy to undertake anything which would appear, at least, to involve additional expense.

It is the constant goal of operating officials to increase the ship's turn-around. The officers and men, therefore, have little time in port to devote to the study of accident preventions. The method of conducting these campaigns requires considerable attention and unless the work is entered into with a whole-hearted spirit on the part of the company's executives it is, in my opinion, doomed to failure, for employees are suspicious of the company's motives in welfare work.

There can be no doubt that the preparation of safety regulations or safe practice handbooks, such as have been prepared on the Great Lakes and in Seattle and are under consideration in San Francisco and by the American Steamship Owners' Association, is a distinct forward step. Under the Longshoremen's and Harbor Workers' Compensation Act, which was enacted by the Sixty-ninth Congress, the United States Employees' Compensation Commission is authorized to "make studies and investigations with respect to safety provisions and the causes of injuries in employments covered by this Act and shall from time to time make to Congress and to employers and carriers such recommendations as it may deem proper for the best means of preventing such injuries." It is reported that steps have already been taken by the Commission toward an investigation of the subject with a view to the formation of a marine safety code.

Personally I feel that better results for all concerned will be obtained if the industry undertakes this work itself or if the Commission should give the industry the opportunity of cooperating. A code, if developed, in my opinion should set forth only minimum requirements, for the reason that past experience has proven that whenever codes are prepared they are likely to be enacted into law. The chief objection to this procedure is the difficulty with which they may be changed. For this reason it is generally believed that it would be better if the code could be the regulations of a department of the government. It would, in fact have the force of law, but would be more easily changed if modification was deemed desirable.

I have purposely refrained from going into great detail concerning the work of the various organizations which are now functioning as this has been described at previous meetings of this Section. The progress which has been made to date and which to you must be most gratifying I believe can be attributed directly to the splendid work done by the members of this Section, individually and collectively. That shipping executives are becoming more interested in this subject I think is amply demonstrated by the fact that this Section has increased its membership from 57 to 150 in a period of two years. You are to be congratulated upon

this splendid showing, and I extend to you our best wishes for your continued success.

CHAIRMAN BUSH: In opening the discussion on Mr. Walker's splendid paper, I am going to call first on Mr. A. C. Holzepfel of the International Composition Company of New York City.

Discussion of Mr. Walker's Paper

By A. C. HOLZEPFEL

International Composition Company, New York City

Mr. Walker's paper gives us valuable information on what has and is being done to assure greater safety in connection with our industries and shipping. The existence of the various committees referred to gives us the assurance that this work will be progressively developed.

May I be allowed to diverge somewhat from the scope of Mr. Walker's paper?

In view of the fact that so many gentlemen prominently connected with the oil industry are identified with this Congress, I have deemed it permissible to offer some remarks on a subject in which the mineral oil industry as well as the shipping community are likely to be interested.

Ever since tank vessels were built, it has been found that they are more subject to internal and external corrosion than other vessels. The same is the case with the fuel tanks for passenger and cargo ships, although to a less degree.

The deterioration referred to has been caused by the formation of acids, chiefly sulphurous, formed by the mixture of water with oils containing sulphur, also by the formation of sulphide of iron, due to the contact of steel surfaces with hydrogen sulphide gas. This sulphide of iron sets up electrolytic action, thereby accentuating corrosion.

Practically all mineral oils contain some sulphur, but lately, chiefly in Texas, many oil wells have been opened up, the oil from which contains a much higher percentage of sulphur, with the result that damage to storage tanks, refinery plant, tankships and tank cars has been considerably increased.

Protection against such damage by ordinary paints is out of the question, for not only would they be quickly dissolved and removed by the mineral oils and their condensation, but they also possess no adequate resistance against sulphurous, sulphuric and other acids, with which such surfaces may come in contact. For years the Oil Industry searched for a material capable of protecting their plant against such damage and it is only during the last three to four years that new synthetic gums have been developed, which are capable of being made into a protective paint against such damage. Such paints have been introduced to the Oil Industry and are being extensively used in refinery and storage plants, but they have not been so far adopted for use in tankships, because of the difficulties and loss of time in connection with efficient application. The inspection of the internal surfaces of a tank steamer will convince members of this Congress of these difficulties.

Not only has a viscid mass of oil film to be removed, a matter of great difficulty, but underneath is generally found a heavy layer of rust which has to be removed before any protective can find firm adhesion to the steel surfaces. To carry out the effective cleaning and painting of a modern tanker would occupy probably two weeks or more, a sacrifice of time which oil companies would not readily consent to. I have, therefore, suggested that such cleaning and painting may be done during the return voyages in ballast of the tankers. Two or three capable men might be carefully instructed in such work and carried on board, provided with

pneumatic or electric scaling tools, with a sand-blasting outfit and painting tools, also the necessary staging. They could clean and paint one tank at a time, while the vessel is on voyage from discharging to loading port, and in this manner, perhaps in six or twelve months, all the tanks may receive a protective coating, so as to prevent the serious damage and resulting danger to which they are now exposed. The principal thing is to have expert men for this purpose, who could then be moved from one vessel to another together with their outfit, till all the ships of a fleet had received adequate protection. In this connection, it may be mentioned that the loosening of rivets by lubrication of the oil would be avoided, also the damage from electrolysis, which is caused by the formation of sulphide of iron on surfaces in contact with hydrogen sulphide gas emanating from sulphurous oils; lastly, the danger of explosions in tanks *after* they have been degassed, resulting from emanation of gases from the thick layer of rust present on unprotected surfaces in the tanks.

It is, however, not only in tankships but also in other vessels carrying fuel oil or Diesel oil that careful attention should be given and, if possible, to a protection such as I am suggesting. In this connection, it should be borne in mind that fuel oil tanks and tanks containing Diesel oil are also attacked in the bottom by acids. Last year while I was in Los Angeles I was informed that some fuel oil tanks of the Southern Pacific Railroad were having their bottoms renewed on account of corrosion. A large Norwegian firm of shipowners, owning not only tankships but also Diesel-driven ships, wrote me as follows:

"Corroded and slack rivets in tank steamers is a well known fact and have given us a lot of trouble, so if there should be a possible cure it would be worth considering. We have also had the same experience with other ships carrying fuel oil in the ordinary tanks, and I am afraid we shall also have similar experience in the motor ships carrying fuel oil in the bottom tanks."

It is also well known that fuel oil tanks, whether containing regular fuel oil or Diesel oil often need repairs. In this connection, it might be borne in mind that many vessels carry their fuel oil in double bottoms which are rather shallow and inaccessible. The presence in the bottom of these tanks of a thick viscid mass of oil makes inspection for damage extremely difficult. For this reason, there is all the more need for adequate protection against damage by acids emanating from these oils.

During the last few years a number of oil deposits of very high sulphur content have been developed in Northwest Texas. Fuel oils and Diesel oils from these deposits are much more dangerous than the oils with which industry formerly had to reckon.

Classification societies no doubt realize the enormous responsibility under which they are in connection with the protection of these fuel oil tanks; at least one classification society has written me on this subject, stating how anxious they are to obtain adequate protection, but there is one difficulty which should be appreciated by this meeting. The protection of tankships and other vessels is under the responsibility of engineers. Now, to the engineer a paint is a "dark horse." In connection with his business he deals mostly with engineering apparatus, whose effect in actual use he can easily appreciate from their drawings and from practical tests, whose results are quickly obtained. In regard to a paint, however, particularly a new protective material which is not yet in general use, he is apt to be extremely skeptical, as he is unable from his own experience to judge its efficiency and the permanency of protection offered by it. In this connection, the engineer ought to get the assistance of the chemist in order to enable him to form a judgment; by so doing, he would be able to decide much more quickly than otherwise on the adoption of an efficient protective.

CHAIRMAN BUSH: If there is no discussion, we will proceed to the consideration of the next paper by Mr. Joseph J. Farrell, Senior Engineer, Travelers Insurance Company, Brooklyn, New York.

MR. FARRELL: Before starting to read the paper, I wish to state that a lot of our trouble in the stevedoring business has been in the past and will be in the future, the uncertainty of the business. When we have been on the ship for discharge or load, we have no idea at that time just what the cost of that production is going to stand us. And so it is with accidents. We start loading and discharging a ship; we do not know or realize how many accidents we are having. We can't foresee that.

I believe, due to this uncertainty, that we should diagnose the situation. I have tried to do it now here in a simple manner, with this paper, that I am about to present, and I think that a lot of men who have spent a good many years in the Port of New York will realize that a lot trouble will lie behind these facts.

Now let's diagnose:

Safe Practices for the Prevention of Accidents in Stevedoring

By JOSEPH J. FARRELL

Senior Engineer, Travelers Insurance Company, Brooklyn, N. Y.

What is the cause of the accident frequency in stevedoring?

The majority of persons engaged in this business or associated with same will state either equipment or labor are the responsible factor.

I disagree with them in this respect and state that it is the lack of executive participation and poor supervision on the part of the supervisors that is responsible for the frequency. Let us discuss these features in the order named.

Labor

There is a certain element among the Longshoremen of the Port of New York who are compensation experts. It is commonly known that cases prevail where men are drawing compensation and while being compensated are working for some other stevedore under an assumed name. Can the responsibility of this element be placed upon the shoulders of the majority of men associated with this organization or upon the labor organizers? No, the responsibility lies right at the doorstep of every concern engaged or associated with this business for not getting together and formulating some plan to eliminate this practice. Aside from this practice labor on a whole can be properly controlled if the supervision is properly selected.

Equipment

Everyone who has been associated with stevedoring for any period of time will certainly concede that at no time during the history of the business has better equipment been in use. Lighters, piers, ships along with the stevedore's gear has shown a marked degree of improvement during the past five years. Having taken this into consideration, we will all have to exclude equipment as responsible for the frequency in accidents.

Acting in this capacity our principal duties refer us to cost accounts and the proper remedies for the reduction of same. Stevedoring executives are no different from those engaged in any other line of business. Therefore, the most costly item is the first problem. Labor being their subject they tackle it with all the ingenuity and experience within their respective organizations for devising means of better

dock transportation or new equipments and methods of adjusting better production at a lower cost.

All efforts being concentrated on this one subject in most cases the second highest cost item, insurance, is overlooked. Therefore, no time or energy is spent on this cost in ascertaining whether or not a plan could be formulated to reduce it. Having the executives' efforts in regard to the cost, it will be evident, after going down the line of supervisors in that organization what interest is taken by the hatch bosses in accident prevention work. This lack of interest on the part of the hatch boss relative to accident prevention work is only to be expected when the executive interested in cost does not know what each foreman and hatch boss is costing him in insurance premium. The amount of premium you pay each year is based on your accident frequency or experience as it is commonly known in the insurance field. Can you lay the responsibility on the foreman or hatch boss for not being interested in safety work if it is not just as an essential qualification by their employer. In my opinion, there is no safer practice for the prevention of accidents than that of executive participation.

Supervision

Everyone knows well we have a hatch boss to every hatch, particularly in unloading operations. It is not because of any custom but for the purpose of greater production, in eliminating over-stowage, property damage and the increase of tonnage which can only be had by close supervision.

Every member of the stevedore firm considers the supervisors, such as foremen and hatch bosses the backbone of his organization and due to this fact places the entire operation in their hands with little interference, if possible. Due to this prevailing situation, the foreman is not annoyed by the executives with being held responsible for accidents occurring under their supervision.

I do not believe there is another line of work where such an excess of lost motion which, coupled to poor supervision, is the greatest problem of stevedoring. Show me the foreman or hatch boss with the highest accident frequency record and I will show you the poorest producer in your organization. Safe practices and efficiency go hand in hand and no practice that is not efficient is safe.

A review of your accident file is the greatest measuring stick by which you can judge your foremen or hatch bosses. Very often an accident will come to light that would show you that through poor supervision on the part of the foreman, men were required to work under unsafe conditions which caused a serious accident. You cannot blame labor or equipment for this accident but you can certainly blame the foreman and the executive. Executives of an organization following an accident of this type are responsible due to their lack of participation in accident prevention work and keeping of records which would acquaint them with every case that arises which tends to increase their insurance costs.

Through the following safe practices for the prevention of accidents in stevedoring which, if installed in every organization engaged in this line of business I believe they will be the greatest factor in reducing insurance costs also tonnage cost of handling cargo.

Plan for Placing Accident Responsibility

Superintendent or head foremen should be held just as responsible for accident supervision as they are for efficiency and production. All insurance costs and rates are governed by experience, therefore, it is one of the most essential duties of a supervisor to keep the accident frequency under control at all times.

Insurance to a stevedore is one of his largest items of expense, therefore, his personal interest should be given to see that everything is done, to the end, that this

cost is kept as low as possible. Low insurance can be had by good accident supervision on the part of the stevedore and his employees.

In order to control the accident frequency arising from stevedore operations the following action should be taken.

A—Charts should be kept at all locations where operations are more or less of a steady nature, charging all foremen and hatch bosses with the accidents occurring under their supervision. Where an assured does not operate at a steady location, this charge should be maintained in the office.

B—Charts should be reviewed monthly by officials of the company, and the men having the largest number of accidents at each location should be censured by them. It would be a good plan, in our opinion, if the hatch bosses having the best accident record would receive more consideration in regards to employment as it is very often the case that less hatch bosses are needed in the loading and discharging of certain vessels.

Officials will find from the keeping of this chart system, they will be able to know the most careless men in their organization. This man will be generally found to be the one who has the most property damage to cargo handled by the men under his supervision. We find from our records today, that supervision is a responsible factor for 90 per cent of the accidents occurring in stevedore operations.

This system will be of great assistance to foremen and hatch bosses, due to the fact that if censured by executives for production they can state that if their accident record is taken into consideration they are more of an asset to his organization than the man who has the highest tonnage record, plus the highest accident record. Combining the two records, the cost per handling a ton is higher than that of the man having the best accident record.

In conclusion, gentlemen, I wish to state that the building of a safety organization within the confines of each individual organization, must have some responsible person designated for carrying out of safe practices outlined, agreed upon and sponsored by all supervisors.

APPENDIX

Safety Meetings in Stevedoring

1. Meetings to be held at least twice a month.
2. Meetings to be from 15 to 20 minutes duration and to be held when they will not interfere with operations.
3. The personnel of attendance should consist of—
 - a. Members of Firm
 - b. Representative of Insurance Co.
 - c. Superintendents
 - d. Foremen
 - e. Hatch Bosses
 - f. Timekeepers, and
 - g. if possible, representative of Steamship Company who is directly responsible for the equipment of the vessels and terminals.
4. Subjects to be considered at meetings:
 - (a) Prevention of accidents.
 - (b) Review and analysis of accidents that have happened since previous meeting and necessary recommendations for the prevention of like acci-

dents in the future. In this review of accidents an effort must be made to determine the BASIC CAUSE and to place responsibility for faulty physical conditions or for failure to enforce safety rules.

- (c) Use of proper equipment for the handling of various commodities and the condition of equipment.
- (d) Proper handling of hatch covers, beams and strong backs.
- (e) Proper use of ship's equipment in the handling of heavy cargo.
- (f) Necessity of notifying the proper authorities immediately when any equipment of the stevedore or the vessel is unsafe.
- (g) Proper method of tiering cargo on docks and in holds of vessels to prevent it from falling.
- (h) Necessity of wearing gloves for preventing cuts and lacerations.
- (i) Necessity of receiving prompt first aid for all minor injuries.
- (j) Reporting of accidents immediately after same have occurred to hatch boss, foreman or timekeeper.

It may be impossible to discuss all of the foregoing subjects at one meeting, but it is probable that one or more items will necessarily receive consideration in connection with the review of accidents.

These meetings should be controlled by the employer and a talk should be given by him when possible or by the Superintendent in charge of operations.

Minutes of meetings and copies of accident notices that have occurred since last meeting should be placed on file for future reference.

Accident notices should be numbered and a record of the nature and cause of accidents should be kept so that an idea of the frequency of different types of accidents may be obtained for a given period.

Joint Inspections of Vessels and Piers

The equipment of piers and vessels should be inspected by representatives of the Steamship Companies, Superintendent or Foremen of Stevedore to determine safe conditions. The following items should receive consideration.

1. Piers with reference to flooring, doors and lighting systems.
2. Gangways or ladders used for boarding of vessels.
3. Tackle and gear in connection with the use of derricks and booms.
4. Flooring in holds of vessels.
5. Ladders leading into hold of vessel.
6. Hatch covers and identification marks using proper names so as to permit replacement on proper Hatch.
7. Guarding of all steam lines on decks especially those running abreast of hatch coamings.
8. Proper functioning of winches and guarding of gears.
9. Furnishing of sufficient light for men working on deck or in hold.
10. Getting the proper information in regard to the tested strength of booms.

All of the above conditions should be inspected immediately after arrival of the vessel at pier and the necessary action for the immediate repair or replacement of any poor equipment should be insisted upon.

Now in conclusion, I will refer briefly to the general situation around the Port of New York. We have improved considerably as far as equipment and the building of the steamers of today are concerned. We have improved in certain portions of the port of our terminal or dock conditions. And we have improved considerably on means of dock plant transportation from the end of the tackle to point of storage on the dock.

But I maintain that unless we improve conditions on the part of our supervisors and foremen and our own interest as to their qualifications for preventing accidents, we will never come to the point of success, whether or not we have national

codes for safety of longshoremen, whether or not we install resting places on the piers for them, no matter what we give them. You and I and every man in business is held responsible for a certain duty.

Therefore, I think that a lot of the conditions that exist in stevedoring today are due to the fact that when we start an operation we turn the entire thing right over to the foreman and neglect to instruct him that the organization is large enough, that the superintendent of pier is responsible for controlling accidents, that he is responsible to the pier superintendent, and that the hatch boss is responsible to the foreman; and therefore, pass the responsibility down to the point where the thing lies, and back to the highest point of the organization, the executive officer, who should see that these men are properly disciplined, properly censured and given some remuneration for the good work, whether they have been twenty years in an organization or whether they have been one year.

We are all in business to make money, and that is the primary purpose of any line of business. We all admit the humanitarian standpoint of accident prevention work is the outstanding feature of it, but down in our hearts, the almighty dollar is the main point we are in that business for.

Therefore, I wish to get this across to everyone; that the day when we hold the supervisors of stevedoring organizations responsible for accident frequencies, we will come to a point where we will reduce our second largest cost.

CHAIRMAN BUSH: The meeting is open for discussion, gentlemen, on Mr. Farrell's paper.

Mr. Welch, would you care to make a few remarks?

W. E. WELCH (The Travelers Insurance Company, New York City): Mr. Farrell has arrived at his conclusions in that paper by long experience, and they are all facts. I believe the main point is a safety organization in connection with all or every type of industry, and particularly in connection with stevedoring. And I believe that Mr. Farrell was the first to present that to stevedoring in the Port of New York.

I think that is all I have to say in connection with that paper. There are some practical stevedores here.

FRANK A. FRITZ (T. Hogan & Sons, New York): There has been a wealth of material presented here this morning in the two papers thus far read.

Realizing as we all do, the necessity for safety education, realizing that we can't get anywhere without it, I imagine we have all come to the point where we felt we were completely stumped. And by that I mean you get to a point in your organization where you feel that the preliminary feeling of suspicion or lack of cooperation perhaps has passed to a great degree on the part of your supervisory force, but you still wonder how you are ever going to get down to the individual man that does the job.

To my mind, that is the paramount problem we have to meet in the stevedoring industry. I think Mr. Farrell is correct when he says the supervision is the crux of this proposition. But I would like to hear, if we could, what the experience of some of our people has been with respect to getting a dribble occasionally of enthusiasm or interest, down through the strata of supervision among the lowest in rank of employees in connection with this work.

I think we often see that the problem of undertaking to educate men in an industry which has as high labor turnover as stevedoring is certainly no small problem. And it has struck me as it has all of us from time to time that what Mr. Walker outlined this morning, namely, the cooperation of the companies on the West Coast, is perhaps a very distinct step in that direction.

I think we all appreciate that if all the stevedoring companies interested in the reduction of accidents could get together and cooperate to employ standard methods, not so much standard mechanical methods of handling the work, because

there you have a variation due to structure of ship and due to location of piers and structure of piers and whatnot,—but there isn't any room for doubt that we could standardize on the method of educational campaign, and there isn't any doubt that by cooperation among all the stevedores who employ help that we can make the educational campaign a much more universal thing than we have today.

I think if there is lack of success in the safety work among stevedoring companies today, it is not so much because it is not done properly or because it is not done with proper enthusiasm but because of our high labor turnover. I mean by that, that we get men today who have worked for a company which has given little thought and devoted little time to safety work, while the men at whom you have been pounding for the past week leave you and go to work for that particular company. So the benefit that you might expect and that you would actually receive by a steadily employed force is lost to you.

Then it has struck me that placing upon your hatch boss or placing upon your foremen of the gang, the responsibility for accidents, is undoubtedly theoretically sound. My observation leads me to suggest that your foreman is ubiquitous; he is not only a hold man and deck man, but he is likewise a dock man. And his opportunity to observe accidents is not so great as we might think it could be, and certainly not so great as it is on the part of foremen who are employed in a particular place with a steady gang. So it seems to me you have a very serious problem there to solve.

I don't know exactly what the solution is. I suppose if I did, I would be the leading stevedoring safety engineer in the country. But the problem is to get through, below your supervisory strata or supervisory level, the information the man ought to have; which we have all got, but which doesn't do a lot of good, because we don't do the work. Get it down to the man who is actually doing the job.

Then comes the question of stimulus of interest, and I am frank to say that I have always been afraid to advocate stimulus of interest by some of the means which we recognize in safety work, by prizes and bonuses. First of all, I think we can eliminate certain prizes that are offered because that is no stimulus in my opinion to the longshoreman. Second, if you once decide what the form of remuneration is going to be, the next question is: How are you going to fairly allot it and fairly apply the principle so that it is obvious to everybody that you have done the fair thing?

I am inclined to believe that simply expecting safety work from the average employee because that is included in his daily wage and is included in the instinct of self-preservation, is a trifle beside the mark, just as it is beside the mark to take a man that has been hurt and criticize him because he is an old and experienced man and ought to know better. We have to assume that the best man we have will often lapse into carelessness, because that is human experience, whether it be due to the fatigue period or not, it is all present in the most careful of men. So you have to assume that you are going to have accidents sometimes even with your best men.

JOSEPH J. FARRELL (Senior Engineer, Travelers Insurance Company, Brooklyn): I quite agree with you, Mr. Fritz, that as far as the individual is concerned in stevedoring, we would all like to educate that man.

But I have had occasion often to work in ships where I would tell the hatch boss, "I think you had better take another section of hatches off." He would tell me to mind my business, he was the hatch boss.

So I think after we get our supervisors instructed and hold them responsible for the conditions that the men working under them have no accidents, I think our next step is to work on the individual, because there is one of our captains who used to say, "There is sometimes more brains in the forecastle than up in the bridge."

CHAIRMAN BUSH: Is there a representative here of the Southern Pacific Company?

MR. COOPER (Southern Pacific R. R.): We have been conducting a safety campaign for several years. I think we are practically pioneers. I feel proud of that. We have accomplished very successful and gratifying results. We have done it by a system of education.

We hold frequent, periodical meetings of our foremen, and discuss our safety problems and arouse their interest. We have posters. We have a definitely well-defined plan. We change them from day to day as conditions seem to warrant.

We would be glad indeed if anyone is interested, to have you come down and visit us. We will show what we have and what we are trying to do. But to enter into a detailed discussion of what we are doing is a large order.

CHAIRMAN BUSH: There are a number of practical stevedores here. The purpose of these meetings is the exchange of information and ideas and experiences.

R. L. McALL: I would like to ask a question. The point has been raised by every speaker this morning about the uncertainty of the duration of the employment of the individual laborer, that is, the casual type of laborer, which constitutes really the greatest problem.

If you could be sure that your laborer was going to stay with you for any decent period of time, you naturally would be bound to that man and he to you. You could do something with him. If he is with you for some time he begins to expect that sort of friendly interest which all good companies are showing.

I don't know why some attention cannot be given to making that a quest to see how stevedore labor can be made less casual. A fugitive laborer comes to you, whatever he does on ship or pier, for just one trip, for just one job, and has no other object than just to draw the hourly wage of the day's pay or just for that job. You know nothing about him. You don't know his right name.

It seems to me the point of attack has been solved partially by some steamship companies. At the risk of repetition, I feel most strongly convinced that the thing you have to build up is another bond with your laborer than to just say, "Now, John, do that. Go up there. Haul this. Look out for that." There must be something else, and that something else comes in a proper relation of supervised employment for a period of time, the longer the time, the better.

Therefore, I believe that one of the unsafe things and perhaps the ultimate unsafe thing is the small degree of contact between the employee and the employer. I will go further and say if you are interested in the employment and the length of employment, and it develops to the point where you know somebody in the company knows something about his home, knows a little about some personal problem that may come up, knows when the wife has two or three children or practically a new born child, and knows the terrible load at home and the anxiety of the men, knows when the man is getting a rough deal at home, knows perhaps when his wife is, a close friendly relation might be built up. I know there are complications. I am only outlining a few things that come to my mind.

It is a very uphill job. The stevedore will tell me, I have no doubt, that it is impossible to have that sort of relation. I don't believe it. I think to a certain extent it can be done. It is a discouraging job. But I think it can be done to some extent.

Then you will find when you have that, the question as to how you award by bonuses, the methods of encouraging the safety movement, will more largely solve themselves. They are very difficult, when you can't count on the continuous labor of any man for a long period to form a unit in your distribution, to mention only one practical problem.

Yesterday we heard from the Export Steamship Company. They mentioned those who made two trips in the year and those who made three trips. There

was the recognition of the partial percentage of duration of employment, and a very wise one, because in a year, even if you make four trips, you will have four three-months' periods, which is a time long enough to form a self-respecting basis of award. And I can see why that would be respected.

All distributions or bonuses or encouragements must be respected by those who won them and by those who didn't win them. You have both sides to consider there.

Six or seven years ago it was almost impossible to attack, eight years ago let us say, at a time when I first got to know steamship men, and they were absolutely grabbing every man who had shoes on his feet and a pair of trousers to wear. They were getting men who were no more seamen than I am, and they were being fleeced by the undesirable element. We all know that element is being weeded out. The process of weeding out always goes on and must go on in any potential business organization. It is the essential part of efficiency. But while you are weeding out the unfixed, the repeater, and the physically unfit, the encouragement to the man whom you would like to have stay, will be one of the greatest assets of good will any business can have.

DR. FRANCIS X. CRAWFORD (Port Medical Officer, United Fruit Company, Boston, Mass.): I wonder, in doing this work, why we can't get every day the same workmen we had the day previous. We certainly get a very large proportion of them.

I think if we hold those whom we have today to a certain type of work, and when we put that same crowd to work tomorrow, put them in the same work, we are solving a part of the problem. In our experience we have been using quite a few men and putting them on the same job every time we hire them. The new ones we get we fill in, putting some experienced men in. In working along those lines our experience has been extremely gratifying in the type of accident. I think through an education of that kind, making the new men fall in with the old, we get a very good working machine most of the time.

MR. FARRELL: I thank Dr. Crawford for his remarks, for the simple reason that it brings us back to that point that I expressed this morning, that supervision is the mainstay of the stevedoring business.

Take your hatch boss. He has his regular hold men following him all the time. He has his regular deck men and regular dock men. Naturally if he needs another hold man and his men are busy, he will take a dock man and replace him, and put a new man on the dock.

Therefore, when the supervisor of the gang is able to distribute his labor to the best of his knowledge and experience of the business, we have the best results and, therefore, the supervisor is the man responsible for giving us the best result and reducing accidents from the higher standpoint.

MR. FRITZ: This might be an appropriate time to say that perhaps an approach to the problem which we have been discussing for the last fifteen minutes could be made, if we would see a greater cooperation, which I think we can get, from our labor organizations.

I have been impressed, in the short time that I have been associated in this capacity, with this stevedoring company, with the absolute fairness and integrity and business ability of those who are conducting and are at the head of our labor organizations in this city, and I refer particularly to the longshore industry, because I know practically of no other.

It has seemed to me at times that perhaps if we would ourselves take the step forward to meet labor organizations on this particular point, we might be able to reach a greater group and with more emphasis than we do through our own individual activities on the plant.

CHAIRMAN BUSH: I am prolonging the time for discussion, gentlemen, because of the importance of the subject. Is there anything further to be said?

If not, we will pass from the handling of cargo to the boiler room of ships. The next speaker is an expert of established reputation. For forty-eight years he has been actively identified with the gauge glass business. I take pleasure in presenting to you, Mr. William A. Tucker, Manager of Moncrieff-Rogers Division, Jenkins Brothers, New York City.

Gauge Glasses—Their Make, Use and Abuse

By WILLIAM A. TUCKER

Manager, Moncrieff-Rogers Division, Jenkins Brothers, Inc., New York City

In order to understand some technical words and expressions, it may be wise to commence this paper with the raw materials which contribute to the making of glass and then proceed with its manipulation to produce a gauge-glass.

We will avoid giving the several quantities or proportions in the many formulae; but most glass is made by fusing together some form of silica (as sand), an alkali (as potash or soda), and some other base (as lime or lead oxide). These parts when put together are termed "the batch." The purer the several ingredients the better the batch, which should be well sifted and thoroughly mixed. The oftener the batch is sifted the surer it will be properly mixed and the larger particles segregated; and the sooner it will melt when heated in the furnace, the required heat nearly reaching 3,000 degrees Fahrenheit.

Many formulae are constantly in use (some of which are said to be trade secrets) and they are of endless varieties depending on the ultimate use of the glass product. To a chemist in the laboratory of a large glass factory was put the question, "I suppose you have as many as 26 formulae which you are constantly using; how many have you?" The chemist withdrew a record book from his desk and announced, "The latest one is numbered 1,109; all have been tested and a large part frequently used."

It is evident the glass factory should be well informed when you have unusual problems for them to solve, and thus deliver to you the perfect article required.

Even with gauge-glasses you must know and decide, or impart, the pressures to be exacted, whether they be steam, hydraulic, hydrostatic, gas or air pressures; or is the glass merely for thermal purposes or refrigeration. Also to withstand the action of various alkalies contained in water.

To emphasize the point, although it may seem anomalous, the several qualities will stand by comparison as follows:

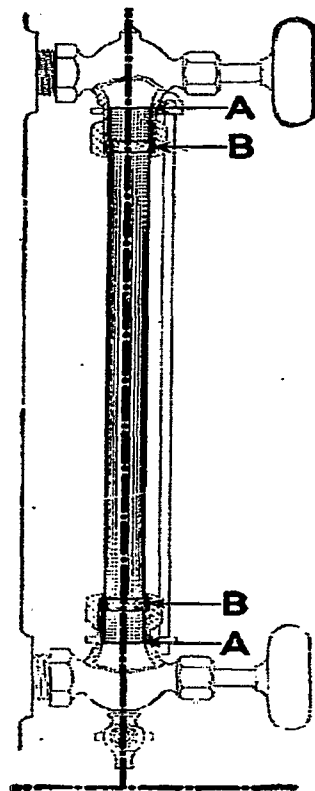
	Steam Pressures	Hydraulic Pressures
Standard Quality.....	150 lbs.	4,000 to 5,000 lbs.
High Pressure Quality.....	500 lbs.	2,000 to 3,000 lbs.
Red Line, Interlayered.....	150 lbs.	1,000 lbs.
Red Line, Superimposed.....	250 lbs.	1,000 to 2,000 lbs.

Tubular gauge-glasses are mostly hand-made, but some, recently, have been made by machine.

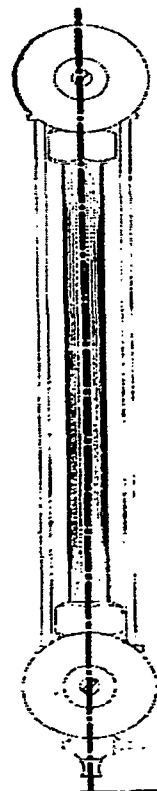
As to the hand drawn process, the method of manufacture has changed very little in the course of years. The extraordinary accuracy of diameters, the exact roundness, and the even distribution of the glass are the result of great skill on the part of the workmen concerned, as no moulds are used. A brief description of the process of manufacture is as follows:

On the end of a hollow "blow-pipe," a certain quantity of glass is gathered from a tank or pot filled with molten glass. The glass so gathered is manipulated and

air is introduced by the operator blowing down the "blow-pipe" until the shape resembles somewhat that of a pear, thus creating a central chamber of air in the glass. After this operation the glass, having cooled to a certain extent, is plunged into the molten glass again and by a continuous turning movement a fresh coating of glass is added. This larger body is then withdrawn from the furnace and shaped on a "marver" or steel plate, retaining its pear formation, and



Sketch 1
Correct

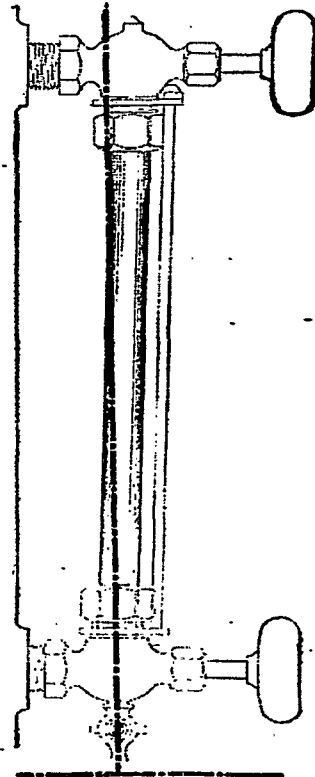


Sketch 2
Correct

the central air chamber. It is then placed in a subsidiary furnace or "glory hole" and heated until quite pliable, without adding more glass. When it is withdrawn the base is placed on a saucer-shaped piece of hot glass formed on the end of another blow-pipe by another workman. The mass is then pulled out and elongated by the two men slowly moving in opposite directions, a rotary movement being given to obviate ovalisation, until a length of 60 feet or upwards of accurate tubing is produced. While the glass metal is being elongated, so also is the chamber of air in the center of the pear-shaped ball, thus giving us the hollow center in the gauge-glass. The length of each draw varies according to the diameter required.

You will appreciate while making the "small ball" and larger "pear-shaped ball,"

that the workman's skilled eye and "feel" is constantly on the glass under manipulation; further, the marvering makes the glass compact and expels the small air bubbles; the second dipping into the pot of molten glass gathers a second layer on the ball; then more marvering compels the two layers to fuse together, thus these two layers are laminated making them a stronger construction than to create the pear-shaped ball of one solid mass.



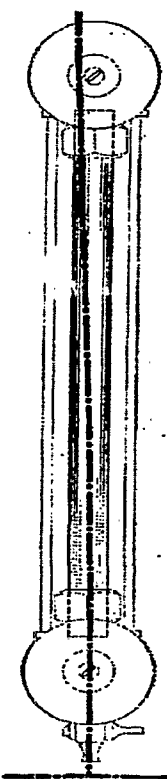
Sketch 3. Incorrect
This gauge and glass are not in alignment, because the bottom cock is screwed into the boiler further than the top cock.

The skill of the two workmen, as they go in opposite directions drawing the glass tube, affords them an additional observation and "feel."

From this brief description it can be understood readily that it takes many years for a set of skilled men to achieve the extraordinary accuracy of diameter and uniformity of bore required of the modern gauge-glass.

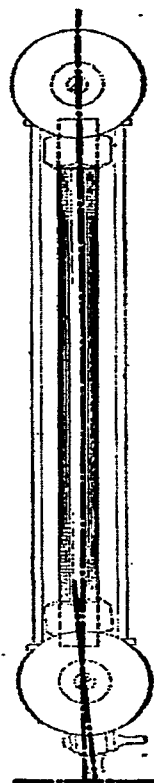
This marvering of each layer and the laminating of the two layers in a particular way is not done on "machine made" glasses which are a single thickness, not marvered in any way nor strengthened.

The main advantage of machine made glass tubing is the economy of production, which is very marked in the case of small diameters made from soft glass. There is a disadvantage, however, in this process, particularly as regards the manufacture of gauge-glasses. Accuracy of outside diameter and bore are difficult to regulate, and further there is a tendency that the glass in a machine made tube is not of the same composition or structure throughout, nor as compact as is the case with the hand drawn tubing.



Sketch 4. Incorrect

This gauge and glass are not in alignment, the glass tilts to the right because the holes tapped in the boiler are not true to each other.



Sketch 5. Incorrect

While the holes above are in alignment the lower nut does not align with the top, thereby causing the lower end of the glass to bear against the metal.

Tubular gauge-glasses today are, generally, of two classes—those known for standard steam pressures (say 150 to 200 pounds) and the other for high steam pressures (say up to 500 pounds).

There is one factory which produces a high pressure gauge-glass which will withstand 500 pounds working steam pressure, and these glasses have frequently withstood 750 pounds steam pressure (in a recorded case the glasses withstood 750 pounds steam pressure for 122 days without breaking and were still in service—

able condition). Such a glass is worthy of your consideration, if you value the time of your engineer and his continued services, and the safety to engineer, bystanders and the adjacent machinery.

In an open vessel or tank a gauge-glass must indicate more than the height of water or liquids, for it must be able to withstand pressures. The large oil tanks do not simply use transparent glass tubing, but must have a gauge-glass for registration and to sustain the power exerted within the glass by the pressure created by the static heat of the liquids. These glasses, on these large tanks situated in the open, are exposed to atmospheric pressure and climatic variations.

Rather than purchase long glasses, up to thirteen feet for tanks, I suggest you buy three glasses five feet each and stagger them, so that if one breaks, less loss and initially less expense are involved.

Boiler room practice sometimes indicates the gauge-glass is not only sustaining the heat and pressure exerted by the steam and water throughout its length, but overcoming the occasional or continual frigid blasts of wind issuing through an open door or window, which sudden changes break many a gauge-glass of poor quality.

One is apt to forget that a gauge-glass, when performing its important duty of indicating the water level of a steam boiler, is subjected to the same steam pressure as the metal plates or tubes of the boiler. There is an instinctive impression in one's mind that glass is easily broken, but here we have a fragile looking glass tube resisting the highest steam pressure efficiently and safely.

Glass to last indefinitely is a mooted problem. Some samples have lasted for many years, but it has a recognized life and death. What about a gauge-glass? Within itself, if unused or undisturbed, not distorted, nor purposely or intentionally crushed, it will outlast a human life.

By far the greatest cause of breakage of gauge-glasses is occasioned by metal interference. Glass and other metals are as homogenous, seemingly, as the proverbial mother-in-law with her daughter-in-law.

I have seen a cut-nail purposely passed through a gauge-glass, then the glass was laid aside and undisturbed for the night; but the next morning particles of glass were found, but not tubular; for the nail, in its passage through the tube, had scratched the inner wall, set-up a strain, thus causing the collapse, due to the difference of coefficient of expansion and contraction of the two layers.

There is no doubt in my mind as to these two layers, that the tendency of the inner layer is to expand outwardly, while the tendency of the outer layer is to expand inwardly, thus making the amalgamation stronger; but if the inner layer is given any abrasion it destroys its initial power to expand outwardly against the outer tube. Thus the inner layer in its endeavor to compensate for the abrasion now seeks escape by moving inwardly, then the outer layer takes the opportunity to move inwardly.

These new forces working contra to each other and their endeavor to overcome the displacement causes a collapse of one or both layers and ultimately the destruction of the tube.

Again, a thrifty engineer, desiring to clean a gauge-glass, passed a piece of much used, wet and gritty cotton-waste through the inside of the tube with like result.

And yet, a customer purposely passes wire through a gauge-glass without initial harm or unfortunate result. In this case he had better results with high pressure gauge-glasses. Others have endeavored to do similarly but with signal failure.

But it is where and when the gauge-glass and its metal holder meet which cause many breakages.

The alignment of the water gauge makes the trouble. Probably more glasses are broken through faulty alignment than from any other single cause. Tipping the glass to the right or left, or backward or forward may bring it in contact with

the metal supporting it, thereby causing an early break. While the rubber washer at the top and bottom of the glass may temporarily keep the glass from touching the gland or nut, after a time the washer may become displaced allowing the glass to bear against metal.

It is important to have the boiled or water column properly tapped so the water gauge will be in alignment when installed and the gauge-glass in alignment when inserted. Glass should not be too long, as it gives greater opportunity for steam end to be worn thin or broken down. For instance, if boiler is tapped about 9 inches, center to center of holes, the gauge-glass should be about 7 inches long. Purchase regular listed sizes thus avoid cutting the glass and re-fusing the ends. If you must cut the glass to a shorter length and have not the facilities to again fuse the end, install the cut end at the bottom or water end of the gauge.

The rubber washer, used at the top and bottom, should be of highest quality. The washer should be of such size that it falls easily into the nut without force.

Do not use a wrench when screwing the top and bottom nuts into position. They need not be any tighter than can be screwed up by the thumb and finger. If screwed too tightly sufficient clearance is not allowed for expansion of the glass. The nut may leak a little at first but this is overcome when full steam is turned on and metal and glass are fully expanded.

Three points have recently come to our attention, which may be explained here. Some engineers have asked for glasses with extra-thick wall, others with very thin wall, and others have admitted they are using improper washers.

While glasses vary somewhat in the thickness of the wall, they are practically correct. The wall can be too thick and not allow for the expansion and contraction of the glass. The wall can be too thin and thus the glass break too readily.

The outside diameter of Moncrieff glasses are invariably undersize, and for a good reason. If the nut for the glass is exactly $\frac{5}{8}$ inch, you will appreciate you cannot insert a glass that is absolutely $\frac{5}{8}$ inch in diameter. If too near the diameter of the gland, the glass is too closely surrounded by metal, and expansion of the glass under steam heat cannot occur, so the glass, being weaker, must break.

The glasses are purposely scant in diameter and wantage is overcome by a rubber washer surrounding each end of the glass. This washer must be flexible and of correct size, so that it will hug the glass by a slight pressure of the nut attached to the gland; and the washer must be of dimensions, thickness, etc., to fully fill any aperture or inequalities in the gland, to avoid emission of steam after the glass and metal have reached their fullest expansion under steam pressure.

Any stiff washer made of hard material or even a cloth-insertion washer, if not sufficiently flexible, is to be avoided, for they do not compress enough—neither to hug the glass nor fill inequalities of the gland. Should a larger glass be furnished the glass must break, due to insufficient space for expansion.

Quite naturally I present, as follows, the correct way of testing a gauge-glass, adopted by a marine user who uses a greater quantity than any one concern, because its many vessels of varied construction traverse all seas.

Specifications for High Steam Pressures Up to 500 Pounds

Gauge-glasses shall be of the best quality, free from internal strains and all imperfections, cut to proper length, fused at the ends, shall be straight and of uniform bore and diameter throughout its length.

The maximum outside diameter shall not exceed the nominal diameter of the glass called for and the minimum acceptable diameter shall be $\frac{1}{16}$ -inch less than the nominal diameter.

When subjected to the "Steam Shock Test" described hereafter, the average of the total operations withstood by the glasses under test shall be not less than ten. No glass shall be subjected to the test for more than fifteen operations.

Each glass shall be tested for straightness by rolling on a plane surface. The diameter shall be determined by means of a "Go" and "No Go" gauge of suitable material. The "Go" gauge shall be the nominal diameter. The "No Go", $\frac{1}{16}$ -inch less than the nominal diameter.

The following is a description of the Steam Shock Test:

The glass to be tested is installed in the fittings; the valve in the water line is opened until the glass becomes half filled with water at a temperature of 75 degrees Fahrenheit; the quick opening valve in the steam line is then opened and the glass is suddenly subjected to steam pressure of 275 pounds gauge pressure. At the end of one minute the quick opening steam valve is closed and, by opening the discharge valve, the steam and water are allowed to blow from the apparatus. Cold water is then passed through the glass until it becomes cool, when the above operations are again repeated, until fifteen operations have been successfully withstood or the glass breaks. Three glasses shall constitute a complete test and the average number of successful operations shall not be less than ten. In order to protect the operator from injury by flying particles of glass, a heavy wire screen guard and a sheet metal guard are placed around the glass and the apparatus during the test.

Unific gauge-glasses pass the above tests.

The specifications for Standard Steam Pressures less than 125 pounds are similar to those mentioned for high pressures.

These gauge-glasses shall be capable of being heated in boiling water for two minutes and immediately quenched in water at 43 degrees Fahrenheit; eight times, without spalling or cracking.

The maximum outside diameter and testing with "Go" and "No Go" gauge shall be the same as for high pressure glasses.

Fused ends will not be required on gauge-glasses for standard steam pressures.

These tests have not been determined as a matter of course, but only after much experimenting and research.

About one hundred years ago the English Parliament was asked to forbid engineers to carry greater than 20 pounds steam pressure. They feared the boilers would not stand greater pressure.

As pressures increased so was the strain on the glass greater, thus constant improvements to meet the altering conditions were necessary, until now a gauge-glass will withstand 500 pounds working steam pressure or more.

On the tubular glasses it is the steam end which is attacked by the steam until the steam end of the tube is as thin as your finger nail. One such glass of "standard steam pressure" type was in use for twelve months without breaking on a boiler carrying 150 pounds steam and where the fire was drawn every night.

Another instance was a "high pressure glass" in use for six weeks operating the boiler constantly on an average of 275 pounds steam pressure but they used strong boiler compound which severely ate away the glass. (Where boiler compounds are used, you can expect some effect on the glass.)

Further, in this last case, the engineer was using a glass $14\frac{3}{4}$ inches long whereas it would have been more resistant if the glass had been 14 inches long, or even 13 inches long. The extra length of glass received the initial force as the steam and condensation were driven from the boiler to the water gauge. This extra length of glass acted like a baffle and the forceful steam in transit surrounded the circumference of the glass, thus creating excessive erosion.

The introduction of high pressure steam boilers demanded improvement in the quality of gauge-glasses, and in like manner it necessitated improvement in methods of packing and in quality of packing material used in fixing a glass into a gauge cock.

High pressure gauge-glasses will stand a steam pressure of 500 pounds, a hydraulic pressure of 2,000 to 3,000 pounds. They may be heated in oil to a temperature of 400 degrees Fahrenheit, and after being so heated for two minutes, taken out and plunged into cold water. Yet notwithstanding these capabilities of resisting sudden variations of temperature, breakages sometimes occur. Our experience, the result of prolonged experiments, is that breakage is almost invariably due to the expansion of the glass being interfered with, or the packing material giving away.

Interference with expansion may be caused by the gauge cocks not being in absolute alignment as stated heretofore; the glass having been ordered of too large

CHAIRMAN BUSH: We are very much indebted to Mr. Tucker for his very informative paper. Is there any discussion, gentlemen? It seems to me he has covered it very well.

MR. TUCKER: In the program you see my name and address. I would be delighted to get a letter from anyone who wishes to know anything about gauge glasses, and I would try very earnestly to answer all questions.

CHAIRMAN BUSH: Thank you, Mr. Tucker.

The next paper, gentlemen, is to be delivered by a gentleman so well known that I am sure that no introductory remarks are necessary on my part. The mere mention of his name is sufficient. I therefore present to you, Captain Charles A. McAllister, President, American Bureau of Shipping, New York City.

The Relation of Classification to Safety of Ships

By CAPTAIN CHARLES A. McALLISTER

President, American Bureau of Shipping, New York City

At the International Shipping Conference, held in London in June of this year, the following statement was made: "In the last fifty-five years British shipping has averaged 4,000,000,000 passenger miles per annum and 200 passengers have been drowned per annum, or one passenger to every 20,000,000 miles.

"Although it has been said that one can make any kind of a case from statistics, this is surely a remarkable record and shows wonderful progress from that of the seven years 1846 to 1853, when no fewer than 61 British emigrant ships were lost at sea, a state of affairs which resulted in the Merchant Shipping Act of 1854, the beginning of active government control in British shipping so far at least as the laying down of safety regulations was concerned. There is no doubt travel on the high seas is becoming increasingly safer, and this is due in a large measure to the growth in size of ships, the change from wood to steel as a material of construction combined with the application of scientific methods to structural design, the change from sail to mechanical propulsion, to superior navigating equipment and aids to navigation, to government safety regulations, the licensing of officers and engineers, and last but not least, to the beneficent influence of the various classification societies' rules and regulations.

We are by no means out of the woods yet when one recalls the mysterious disappearances at sea, with losses of all on board even within the last few years, of vessels which were seemingly swallowed up without any known or apparent cause. The risks to which ships were subject in the good old days are described in the marine insurance policy as follows:

"Touching the adventures and perils which we the assurers are contented to bear and do take upon us in this voyage, they are, of the seas, men-of-war, fire, enemies, pirates, rovers, thieves, jettisons, letters of mart and counter-

mart, surprisals, takings at sea, arrests, restraints and detainments of all kings, princes, and people, of what nation, condition, or quality soever, bar-ratry of the master and mariners, and of all the other perils, losses, and mis-fortunes that have or shall come to the hurt, detriment, or damage of the said goods and merchandises and ship, etc., or any part thereof."

The risks to which ships are now exposed are fortunately not quite so formidable, and we need only consider in ordinary peace times the first and third on the list, i. e., "Perils of the seas" and "Fire." The principal casualties to which vessels are subject are foundering through stress of weather, stranding and collision, where the damage may be such that water will enter in sufficient volume to offset the reserve of buoyancy and the ship sinks, in which case the only chance of saving the lives aboard is by the provision of suitable and adequate life saving appliances. From the point of view of safety to the ship herself it is essential that she be what is termed in nautical parlance, "seaworthy." The essentials for a seaworthy ship and the main requisites for safety are, sufficiency of structural strength, a proper measure of stability, suitable freeboard, reliability of machinery, and proper equipment. It is obvious that to be seaworthy for a particular voyage a vessel must also be efficiently manned and have sufficient fuel, fresh water, etc. It is interesting to note that the classification certificate certifies the ship to be in good and seaworthy condition and "fit to carry dry and perishable cargoes," and in the strict sense of the word a leaky ship is not seaworthy, even although she may be able to make port.

In addition to the main considerations of structural strength, stability, and freeboard it is obviously desirable (especially in a ship carrying a large number of passengers) that she be efficiently sub-divided with the largest practicable number of bulkheads, so that the vessel will remain afloat after serious damage or at least keep afloat as long as possible and so increase the chances of getting the passengers and crew safely transferred to the boats and to shore or another ship. There is no branch of engineering where the problems are so complex and varied as in naval architecture. Not only must the designer meet the requirements of the specification with regard to deadweight, speed, fuel consumption, trim, maximum draft, etc.; but due regard must also be paid to the regulations of the government inspection service and the construction rules of the classification society in which the vessel is classed. The safety of the vessel herself and of the valuable lives aboard in the event of a disaster to the ship are essential considerations in the design of a passenger vessel, but ship design is peculiar in the sense that any policy of playing safe entails a serious economic handicap to the owner, for while sufficient structural strength must be provided (and the structural problem does not lend itself to exact mathematical treatment) any excess of hull material not only entails increased costs of construction, but must be carried around for the life of the ship, with resultant loss of cargo deadweight. Every ship would have a suitable measure of stability for the service conditions without requiring undue care in loading, but care must be taken not to render the ship too stiff if she is to be popular with passengers, who, as a class sometimes ignorantly prefer comfort to safety. Again, a high standard of sub-division is desirable and in my opinion reasonable bulkhead requirements should be required by law in the case of passenger vessels, but here again it is obvious that there is a practical limit to the number and disposition of transverse bulkheads in the minimum lengths of cargo holds which experience has shown to be necessary for the carriage and economic handling of certain cargoes. When one considers the many and special types of vessels, ranging from the humble box shaped barge operating in smooth water to the large

passenger liner crossing the North Atlantic practically on schedule, I think you will agree that the naval architect's job is no sinecure.

There is no commercial undertaking in the world today that is regulated to such an extent as the shipping business. This is due to the hazardous nature of the seaman's occupation in earlier days and in some measure to the fact that the shipping business is international in character and highly competitive. Major disasters at sea receive so much prominence that the various governments are from time to time forced by pressure by public opinion to enact new and to amplify existing safety regulations. All maritime countries have shipping laws, promulgated with the best intentions, and while some of this legislation has been admittedly beneficial in its effects some of the enactments have been not so good. It is a truism that the less a government interferes in business the better for the business, but it must be admitted that the enforcement of regulations which have for their purpose the safeguarding of the lives of its citizens is a proper function of any government. Government control is universal and indeed essential in connection with such matters as the admeasurement of tonnage, which besides being the basis of dock dues, etc., is useful for statistical purposes; the entry of vessels into the national registry; the enforcement of rules of the road for the prevention of collisions at sea; detention of ships alleged to be unseaworthy, and restrictions on loading. Overloading beyond the regulation freeboard markings is one cause of detention and prosecution in every maritime country except the United States, which has as yet no compulsory load line law. It is impossible within the scope of this paper to discuss shipping legislation in all its aspects, but a few remarks regarding the safety regulations of this country and Great Britain, respectively, may be of some interest.

The British Merchant Shipping Act of 1854, which was the direct result of public opinion aroused because of the large number of lives being lost at sea, especially on emigrant ships, originated the Marine Department of the British Board of Trade with power to appoint surveyors to investigate and report on accidents and damages and to inspect machinery, boats, and life saving equipment. The Merchant Shipping Act of 1894 extended these provisions, and the Merchant Shipping Act of 1906 not only amplified existing regulations, but enacted that certain requirements of the Merchant Shipping Acts, including compulsory load line regulations be applied to foreign vessels operating out of British Ports. Load line legislation in Great Britain was the result of popular feeling aroused by the agitation of a member of Parliament, Samuel Plimsoll, who alleged that British vessels were being sent to sea in an overloaded and unseaworthy condition. In 1876 a law was passed requiring every British ship to be marked with draft marks and with the load line which the owner considered safe, but it was not until 1890 that load lines were required by law to be determined in accordance with specific regulations issued by the Board of Trade. It should be emphasized that the Freeboard Tables are not embodied in the Act itself, the Board of Trade having authority to modify the regulations from time to time as may be found desirable after consultation with the Classification Societies authorized to assign freeboards.

To give effect to the provisions of various Merchant Shipping Acts, the Marine Department of the Board of Trade controls for all ships such matters as registration, tonnage admeasurement, load lines, collision regulations, signal lights, life saving appliances, and regulates the carriage of special cargoes, i. e., cattle, dangerous goods, and grain. The Board of Trade has also power to detain for survey any ship alleged not to be in a fit condition to proceed to sea by reason of defective hull, machinery, or equipment, overloading or improper loading, etc. In the case of ships carrying more than 12 passengers,

the special rules with regard to survey and inspection are quite extensive, every ship being required to have a passenger certificate which is issued only after survey by the Board of Trade and which is valid for not more than twelve months. The surveyors in their declarations to the Board of Trade have to state:

- a. That the hull and machinery are sufficient for the service intended and in good condition.
- b. That the boats, life buoys, lights, signals, compasses, and shelter for deck passengers are as required by the Merchant Shipping Acts.
- c. The limits (if any) beyond which in the surveyor's judgment the steamer is not considered fit to ply.
- d. The number of passengers which in the judgment of the surveyor the vessel can properly carry.
- e. That the certificates of the officers and engineers are as required by the Acts.
- f. That the boiler safety valves and fire appliances are in such condition as is required by the Acts.
- g. The date of the last load line and whether same is still valid.

For the guidance of the surveyors the Board of Trade issues very elaborate instructions. The "Instructions as to the survey of passenger ships" published recently is important, as the various regulations given regarding watertight subdivision, life saving appliances, etc., will represent the British proposals at the International Convention for the Safety of Life At Sea to be held in London next spring. It is probably the most comprehensive and complete set of safety regulations for passenger ships yet issued by any government authority. Like all other government regulations no rules for the scantlings or construction of hulls are included, but detail rules are given for marine boilers, steam engine shafting, fire extinguishing appliances, oil fuel installations, and survey of passenger accommodation. It is interesting to note that since 1923 the Board of Trade and the British classification societies have had a common set of rules for marine boilers. If a vessel is classed, the hull material test certificates of the classification society are accepted by the Board of Trade, also the hull scantlings, testing of double bottom tanks, etc., and except for the testing of boiler material and the supervision and hydrostatic testing of marine boilers there is no overlapping of inspection between the Board of Trade and the classification society's surveyors.

It should be noted that while the Board of Trade's safety regulations and inspection procedure are quite comprehensive in the case of vessels carrying passengers the inspection of purely cargo carrying vessels is confined to safety appliances, except where on complaint of the crew that a vessel is unseaworthy the ship may be held for survey. The safety regulations of the British Dominions (Canada, Australia, etc.,) are pretty much on the lines of those of the Board of Trade. An important exception is the definite recognition given to the certificates of the classification societies, for example, the Commonwealth of Australia Navigation Act 1912-1920 explicitly exempts from survey all steamships not carrying more than twelve passengers to which classification certificates have been granted by any corporation for the survey and registry of shipping approved by the Governor General.

You have noted, no doubt, that I have dwelt at length on the British requirements for load lines, for the fact is that they have taken the initiative on all matters pertaining to safety of ships at sea, in this respect.

It is most regrettable that there is not a line in our statute books concerning load line requirements, which is fundamentally the basis of safety at sea. Numerous attempts have been made, covering many years, to bring about

legislation of this kind in America, but to date nothing has been accomplished, although bills have several times passed either one or the other of the branches of our national legislature. A bill passed the Senate during the first session of this Congress, but it will require the united efforts of all persons interested in shipping to procure final enactment. Let me suggest that it would be a very wise thing for this organization to pass a strong resolution favoring such legislation at this meeting and forward copies of the same to Congress.

United States shipping legislation so far as safety regulations and inspection are concerned really began with the Act of Congress, 1871, when the Steamboat Inspection Service in its present form was instituted. Unfortunately we have no department at Washington whose sole business it is to deal with matters affecting the Merchant Marine, and the Steamboat Inspection Service, a branch of the Department of Commerce, is only concerned in the administration of the navigation laws relating to inspection. The operation of the Steamboat Inspection Service, in so far as keeping its rules up to date, is hampered and limited by the fact that certain requirements (for example, the method of computing the thicknesses of boiler shells) are embodied in the law and cannot be changed except by act of Congress. Another essential difference between our practice and British practice is that the hulls and boilers of ordinary freight ships are subject to the same inspection procedure as purely passenger ships; in other words, there is no such sharp line of distinction between the inspection of freight and passenger ships as is drawn by the British Board of Trade. The rules and regulations of the Steamboat Inspection Service could with advantage be amended and brought up to date, and it would certainly be advantageous to all concerned if agreement could be reached on a set of American standard marine boiler rules which would be acceptable both to the American Bureau and the Steamboat Inspection Service, the only authorities having jurisdiction over marine boilers built in this country.

The early history of classification and classification societies is extremely interesting, but even to trace the development of our own American Bureau of Shipping would make this paper unduly long. It is perhaps sufficient to say that classification had its beginning in England more than a century ago when wood was the only material of construction, and was the natural result of a desire on the part of marine underwriters to have an authentic record of ships for insurance purposes. As the idea of classification and registry of shipping originated with the underwriters it was to be expected that the classification societies were in the beginning largely controlled by marine insurance interests. As a matter of fact, the control of these technical organizations by committees of management on which all the various shipping interests (i. e., ship owners, underwriters, shipbuilders and marine engineers) are adequately represented is comparatively modern, dating back to 1890, when the British Corporation entered the classification field in Great Britain with ideas on committee representation and ship construction rules which were revolutionary at the time.

The classification societies in existence today are Lloyd's Register, and the British Corporation with headquarters in Great Britain, Bureau Veritas in France, Norske Veritas in Norway, Germanischer Lloyds in Germany, Registro Italiano in Italy, and the American Bureau of Shipping in the United States. Some of the older societies make pretensions to being international as far as the scope of their operations is concerned, but the working alliance and mutual agreement of the American Bureau, British Corporation, Registro Italiano and Imperial Japanese Marine Corporation, by which the surveyors of each society carry out in its own territory surveys on behalf of the other parties to the agreement, is truly international and cooperative

in the best sense. My main purpose in enumerating these well known societies at this time is to emphasize the fact that every maritime country with any pretensions to a merchant marine has found it necessary to develop its own national classification society.

The American Bureau of Shipping, to which I have the honor to belong, had its beginning in 1862, when the Legislature of the State of New York passed an Act incorporating the American Ship Masters' Association, which charter and title was in 1898 changed to the American Bureau of Shipping. The American Lloyd's was combined with the Bureau in 1882. The American Bureau in 1908 absorbed the United States Ship Owners, Ship Builders and Underwriters Association, and in 1916, acquired the Great Lakes Register, which is now the Great Lakes Department of the American Bureau. In 1916 the Bureau was thoroughly reorganized to cope with the enormous volume of tonnage building in this country during the war emergency, since when the Bureau has undoubtedly reached a high standard of efficiency. The Board of Managers is influential and thoroughly representative, and every effort will continue to be made to render efficient service in the interests of the American Merchant Marine. It should be emphasized that the Bureau is not a profit making concern, all funds accruing to the Society from classification fees, etc., being used solely to defray operating expenses, any surplus being utilized for its extension and improvement.

The principal functions of a classification society may be briefly stated as follows:

A.—To provide a Register Book giving essential particulars of the hulls and machinery of the vessels classed with the Society, the classification assigned to each vessel, together with the dates when surveys were carried out, etc.

B.—To issue certificates of character for merchant ships, their machinery and equipment, i. e., classification certificates, certificates of seaworthiness, etc.

C.—To prepare Rules for the Construction of Hulls and Machinery, including material specifications and detail regulations for the carrying out of periodical surveys, etc. The rules are necessarily modified from time to time to keep pace with developments in shipbuilding and marine engineering, and are the standard by which the eligibility of a vessel submitted for classification is determined.

D.—To carry out other work relating to the structural design, construction, and maintenance of merchant ships such as the assignment of freeboards which may be delegated to the Society by the proper government authority; also when specially requested by owners or builders to investigate questions such as sub-division, etc., which affect the safety and seaworthiness of the ship.

The following summary of the work of the Surveying and Technical staffs of the American Bureau may be of some interest:

1—Classification Surveys of New Vessels

a—Examination of Plans

Certain detail plans of the hulls and machinery of new vessels intended for classification are required to be submitted for approval before the work of construction is commenced. Plans also may be submitted by the owners or builders of unclassified vessels or vessels of novel design where the approval of the Society is specially desired.

b—Testing of Materials

The testing and inspecting of the materials of construction, i. e., hull and boiler shapes and plates, forgings and castings for hull and machinery, anchors

and cables, etc., is a requirement of the rules in the case of vessels building to class. Testing of materials going into unclassed vessels is also carried out when this is specified by the purchaser, and material for other engineering purposes may also be tested by the surveyors to purchasers' own specifications. Testing work, including the issue of certificates of test, etc., constitutes an important part of the work of a classification society.

c—Supervision During Construction

The hulls and machinery of all vessels specified to be built to class must be supervised by the surveyors during construction. The services of the surveyors may also properly be utilized for the survey of machinery, etc., not necessarily intended for classed vessels in cases where the manufacturers may desire certificates of test and inspection.

2—Surveys of Vessels in Operation

a—Classification Surveys

The surveys carried out for the purpose of classing vessels already in operation are on the lines of the requirements for periodical surveys, according to the age of the vessel, except that the scantlings of the plating, etc., are carefully gauged and compared with the Rule requirements.

b—Surveys for Maintenance of Class

These include the regular docking surveys, special periodical surveys, and boiler surveys. The scope of these various surveys is detailed in the rules.

c—Damage Surveys

When a vessel is damaged she must be submitted for examination to determine whether the seaworthiness of the hull and machinery has been impaired, and if so such repairs must be effected as will render the ship seaworthy. At the request of the owner efficient temporary repairs may be accepted by the surveyors until such times as permanent repairs can be carried out. If the damage is covered by insurance, the underwriters are obligated to put the ship into the same efficient condition as she was prior to the casualty, and it is the duty of the classification surveyor to require that the repairs are such as will place the ship in a condition to meet the classification standard of the rules. Special certificates of seaworthiness are issued on the satisfactory completion of all damage repairs.

d—Refrigeration Surveys

On vessels carrying refrigerated cargoes the refrigerating machinery and insulated spaces are subject to periodic examination if an R.M.C. certificate is desired. Surveys of insulated holds, etc., if made at the loading port prior to refrigerated cargo being loaded are also carried out at the request of owners and special loading certificates issued.

e—Condition Surveys

Condition surveys are made on unclassed vessels at the request of owners to determine the physical condition of hull and machinery and their suitability for particular voyages and trades, and seaworthy certificates issued in connection therewith if found warranted.

3—Technical Work

In addition to the examination of plans a large amount of work is done by the Technical Staff in making investigations in connection with the preparation of new rules and analyzing reports of vessels in service with a view to determining what amendments in existing rules are desirable. The Bureau is also represented on certain standing committees of the American Society for Testing Materials, American Marine Standards Committee, American Engineering Standards Committee, National Fire Protection Association, American Welding Society, and on important Government Committees, such as Fuel Conservation Committee, Ship Construction Committee, and Load Line Committee.

The American Bureau of Shipping is officially recognized by the United States Government in the Merchant Marine Act of 1920, which states as follows:

"That for the classification of vessels owned by the United States, and for such other purposes in connection therewith, as are the proper functions of a classification bureau, all departments, boards, bureaus, and commissions of the Government are hereby directed to recognize the American Bureau of Shipping as their agency so long as the American Bureau of Shipping continues to be maintained as an organization which has no capital stock and pays no dividends."

The Board of Supervising Inspectors of Steam Vessels at its annual meeting in Washington in 1916 adopted Section 9 of Rule VI as follows:

"In the inspections of hulls, boilers and machinery of vessels the rules promulgated by the American Bureau of Shipping respecting material and construction of hulls, boilers, and machinery, and the certificate of classification referring thereto, except where otherwise provided for by these rules and regulations, shall be accepted as standard by the inspectors of this service."

Although the ship construction rules of the British classification societies are accepted by the Board of Trade as a standard, the recognition is not so definite as is given by the various Dominion Governments except in the administration of the load line law where freeboards are assigned by the classification societies as direct agents of and responsible to the government. In France, Italy, and Japan the national classification societies are authorized to carry out surveys on behalf of their respective governments, and the growing tendency to utilize the services of the classification societies in all maritime countries is undoubtedly to the advantage of all concerned. It should be pointed out that the primary concern of the Government in laying down regulations is safety of life, while the underlying idea of classification is safety of the ship herself. Compliance with Government Safety Regulations is of course compulsory. Classification, on the other hand, is not obligatory, so that the owner who voluntarily builds his vessels to the rules of a classification society and carries out the periodical surveys required for maintenance of class is surely entitled to some consideration from his Government.

The shipping business being more or less international in character, it is extremely desirable that the various maritime nations should reach agreement on general principles governing safety regulations if only in view of the great convenience to ship owners which results from the mutual acceptance of each others national certificates. Largely due to the war, the 1913 International Convention for the Safety of Life at Sea was not generally ratified by the governments concerned. Since that time, however, passenger ships have been built in substantial accordance with the Convention Rules, and the experience gained thereby shows that some modification of the regulations is desirable and indeed necessary before international agreement is possible. It is for this reason that the International Conference to be held in London next spring is so extremely important, and you may be interested to know that a Ship Construction Committee under the chairmanship of Admiral Geo. H. Rock was recently formed under government auspices with a view to investigating the whole question of safety of life at sea in order that the delegates from the United States to the forthcoming conference will be fully informed as to the views of our ship owners and builders. I fully anticipate that international agreement will be reached at this conference and that the 1929 convention will be ratified by all the principal maritime nations. It will then be possible for the Steamboat Inspection Service to bring its Rules and Regulations in line with the most modern safety requirements for passenger ships. It might not be out of place here to express what I consider to be the essentials for safety regulations in general and particularly those affecting merchant shipping:

- a. Government supervision should be kept to a minimum. Regulations should be international in character as far as practicable.

b. The shipping law should provide the necessary administrative machinery, and as safety requirements are concerned should confine itself to general principles, leaving the proper administrative authority, i. e., Department of Commerce, power to lay down detail rules in accordance with these principles and to modify same from time to time with developments in shipbuilding and marine engineering.

c. The rules and regulations should be fairly and equitably administered by competent and proper authorities with due regard to uniformity of action in the various ports and districts.

d. Unnecessary duplication of surveys and inspection should be avoided. In this connection the various governments concerned should as far as practicable recognize the certificates of their own national classification societies.

CAPTAIN McALLISTER: Since that paper was written, gentlemen, much to my amazement, I have found that none of the classification societies have given any credit to fireproofing of ships.

I have traveled a good deal by sea lately, and what I am afraid of is that some of these boats will burn up: In the preparation of plans for these new ships which the Government is going to build, a great deal of attention is being given to it.

We all remember how it used to be that if you stayed in a hotel and didn't burn up you were lucky. But the demand of the public makes it obligatory to follow building regulations that provide fireproof buildings. You are paying for it in your hotel bill, but you don't mind it when you can sleep in safety on the twenty-third floor or on any other floor.

That much attention has not been paid to ship building, yet a ship is a floating hotel, especially the big passenger ships.

I brought the matter up before the Board of Managers the other day, and they authorized me to appoint a committee to give credit in our book for vessels where special attention has been given to fireproofing ships. And it is going to be a matter of attention at the Safety of Sea Conference next June. A committee has been appointed to recommend certain rules for adoption by the Conference, and we are going to make that a part of our rules and in our book give credit to every ship where the fireproofing has been given special consideration. We all hope it will greatly add to the safety at sea.

CHAIRMAN BUSH: Gentlemen, in connection with Captain McAllister's suggestion, as to the passing of a resolution on this proposed load line legislation, I wish that were possible. Personally I am very much in favor of it, and I know the majority of the members of the section are.

But it is contrary to the policy of the National Safety Council to pass resolutions which have to do with matters of legislation. We have tried it before, and when it reached Chicago, we have been successfully blocked. There may be some possible avenue of escape. I will make my own best efforts to see if that can be brought about. But a resolution at this time, under the existing policy of the Council, would not be in order.

CAPTAIN McALLISTER: I want to apologize for putting that in. I was not aware of your rules. It is a very good rule. You might get into trouble. But this being such a broad, such a national thing, I didn't know but possibly that might be done.

CAPTAIN P. B. BLANCHARD (President, Turner-Blanchard, Inc., New York City): The Captain's suggestion on fireproofing is along the right line. We have had brand new ships brought home to us, in the last few years.

In fact, I was reading in a marine paper of a ship in which all kinds of fire-fighting appliances were fitted. The following day I read where she was burned at practically a total loss while at the pier. The Captain will probably remember it.

CHAIRMAN BUSH: It certainly is progressive. Thank you, Captain.

The next order of business is the election of officers. The chairman and secretary of the Nominating Committee are unfortunately both ill, and are not present this morning. So I will ask Mr. Welch to present the slate as prepared by the committee.

SECRETARY WELCH: The Nominating Committee, consisting of Captain Kain, Mr. Tode and Mr. Hunter, have designated these gentlemen for certain offices for your approval.

I will read them.

Report of the Nominating Committee

Chairman—A. R. BUSH, the Barber Asphalt Company, Maurer, N. J.

Vice-Chairman (In charge of Publicity)—ARTHUR M. TODE, The Texas Company, New York City.

Vice-Chairman (In charge of Information and Service Committees)—CAPT. R. C. BRENNAN, Oceanic Terminals, Portland, Oregon.

Vice-Chairman—P. P. FOISIE, Waterfront Employers Association, Seattle, Wash.

Secretary and News-Letter Editor—CAPT. W. P. KAIN, Shipowners' Claims Bureau, Inc., New York City.

Chairman Program Committee—JOHN S. HUNTER, The Atlantic Refining Company, Philadelphia, Pa.

Chairman Research and Statistics Committee—CAPT. IRVING L. EVANS, Munson Steamship Line, New York City.

Chairman Stevedoring Committee—FRANK A. FRITZ, T. Hogan & Sons, Inc., New York City.

Chairman Engineering Committee—CAPT. G. BARTLETT, Cosmopolitan Shipping Company, Hoboken, N. J.

Executive Committee—THE OFFICERS AND

E. F. DALY, Morse Drydock & Repair Company, Brooklyn, N. Y.

R. F. EDWARDS, The Prudential Insurance Company, Newark, N. J.

CAPT. REGINALD FAY, The New York Central R. R. Co., N. Y. C.

CHAS. H. FLATHERS, Eastern Steamship Lines, Inc., Boston, Mass.

W. A. KIGGINS, JR., A. H. Bull & Co., Inc., N. Y. C.

ELLIS KNOWLES, C. D. Mallory & Co., Inc., N. Y. C.

CAPT. C. A. McALLISTER, American Bureau of Shipping, N. Y. C.

J. D. MURPHY, Murphy, Cook & Co., Philadelphia, Pa.

CAPT. C. H. POTTER, Potter Transportation Company, N. Y. C.

W. E. STEWARDSON, Colombian Steamship Company, Inc., N. Y. C.

C. STORY, JR., Cities Service Transportation Company, N. Y. C.

FERN WOOD, Williams Steamship Company, Inc., N. Y. C.

J. WRIGHT, Export Steamship Corporation, N. Y. C.

W. E. WELCH, Travelers Insurance Co., N. Y. C.

CHAIRMAN BUSH: Are there any nominations from the floor?

(The motion was made, seconded and carried that the nominations be closed and the report of the Nominating Committee approved.)

SECRETARY WELCH: I move that the chairman be authorized to fill any vacancies during the year 1928-1929.

(The motion was seconded and carried.)

ADJOURNMENT

October 4, 1928

National Board of Steam Navigation Day

A. R. BUSH, Chairman

Personnel Manager and Safety Engineer, The Barber Asphalt Company
Maurer, N. J.

The fourth session was called to order at nine forty-five o'clock, by the chairman, A. R. Bush.

CHAIRMAN BUSH: The first order of business this morning is the submitting of committee reports. We have deferred this from the opening day, on Monday, due to the absence because of illness of those who were expected to present them.

The first report I will call for is from the vice-chairman, Mr. A. M. Tode, in charge of Membership. Mr. Tode, will you please submit your report.

Report of Membership Committee

By ARTHUR M. TODE

Chairman

Your membership committee, appointed at the 1927 Annual Safety Congress, held in Chicago, reports that during the past year the membership growth of the Marine Section has shown a steady increase, reflecting the continued and added interest in the accident prevention movement by maritime companies and organizations throughout the United States.

From October 1st, 1927, to October 1st, 1928, twenty-four new members have been admitted to the Marine Section. The list of these companies who have actively identified themselves with the maritime safety movement the past twelve months is impressive, and includes:

Alabama Drydock & Shipbuilding Co.	Mobile, Ala.
American Bureau of Shipping	New York, N. Y.
Board of Commissioners of Navigation	Philadelphia, Pa.
Chile Steamship Company, Inc.	New York, N. Y.
Dollar Steamship Line	San Francisco, Cal.
Eastern Steamship Lines, Inc.	Boston, Mass.
Ford Motor Co., Marine Department	Detroit, Mich.
Fyre Freeze Corporation	New York, N. Y.
Goldsmith Corporation, The	New York, N. Y.
Grace & Co., W. R.	Seattle, Wash.
Hartford Accident & Indemnity Co.	Hartford, Conn.
Knickerbocker, Cram & Co., Inc.	Hartford, Conn.
McCormack Steamship Company	San Francisco, Cal.
Merritt-Chapman & Scott Company	New York, N. Y.
Morse Drydock & Repair Company	Brooklyn, N. Y.
National Board of Steam Navigation	New York, N. Y.
National Council of American Shipbuilders	New York, N. Y.
Oceanic Terminals	Portland, Oregon
Pusey & Jones Corporation	Wilmington, Del.
Submarine Signal Corporation	Boston, Mass.
Terminal Engineering Company, Inc.	New York, N. Y.
Van Gordon, J. W.	New York, N. Y.

U. S. Employees Compensation Commission..... Washington, D. C.
 Velez Course Indicator, Inc..... Boston, Mass.

The 24 new members admitted to the Marine Section during the past year are classified respectively:

General freight and passenger steamship companies.....	6
Shipyards and repair yards.....	4
Industrial companies and equipment manufacturers.....	6
Insurance companies.....	1
Maritime associations.....	3
Personal membership.....	1
Nautical schools.....	1
Miscellaneous	2
Total	24

The present Membership Committee has now functioned for two years, and it is gratifying to report that due to the efforts of the several members of your committee, and through the assistance accorded the committee by other members, that there are now on the rolls of the Marine Section 145 members as compared with but 60 at the Detroit Annual Safety Congress 2 years ago; this is equivalent to an increase of 142 per cent.

Number of members in Marine Section as of October 1, 1927.....	127
Cancellations of members received from October 1, 1927, to October 1st, 1928.....	6

121

Number of new members admitted to Marine Section from October 1, 1927, to October 1, 1928.....	21
Subsidiaries and affiliations of Members admitted to Marine Section from October 1, 1927, to October 1, 1928.....	3

Total Increase in Marine Section for 1928.....	24
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Total Membership of Marine Section as of October 1, 1928.....	145
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Among our 145 members are included the majority of the great American petroleum corporations, some of the largest and most influential American passenger and freight steamship companies, the largest railroads operating floating equipment, important shipyards, repair yards, stevedoring companies, industrial organizations, etc.

A summary of our membership, a large majority of whom are actively and consistently prosecuting accident prevention work in their respective organizations reveals:

Petroleum companies operating steamships.....	26
General freight and passenger ss companies.....	27
Shipyards and repair yards.....	12
Stevedoring companies.....	12
Industrial companies and equipment manufacturers.....	19
Railroad companies operating floating equipment.....	18
Insurance companies.....	6
Maritime associations.....	8
Personal memberships.....	5
Miscellaneous	11
Total	145

Respectfully submitted

ARTHUR M. TODE, *Chairman*, The Texas Company
CAPTAIN R. C. BRENNAN, Oceanic Terminals, Inc.
WM. L. BUNKER, The Texas Company (Calif.)
JOHN S. HUNTER, The Atlantic Refining Co.
FERN WOOD, Williams Steamship Company
G. D. ZEH, Associated Oil Company

CHAIRMAN BUSH: The membership of this Section has been due largely, if not wholly, to the personal efforts of Mr. Tode. He is indeed, to be congratulated.

He also is chairman of the Publicity Committee. I will ask him to present the report of that Committee.

Report of Publicity Committee

By ARTHUR M. TODE

Chairman

During the past year the Marine Section has received a larger amount of publicity anent its activities of the accident prevention work in which its members are engaged, than has been the case in any previous twelve months.

The extent of the publicity work of the Marine Section is probably best attested to by the steady increase in the interest of accident prevention work, which is now being taken by the leading shipping companies and affiliated maritime interests, and the increase of the Marine Section membership from 60 to 145 members in the past two years. Publicity was further secured from invitations issued to various steamship companies who were non-members, to attend the monthly meetings of the Marine Section and become acquainted with the important work which the Section is sponsoring.

A supper meeting of the Section held during February was attended by nearly 40 representatives, including Mr. Homer Niesz, President of the National Safety Council, and Mr. W. H. Cameron, Managing Director of the National Safety Council.

Much publicity has been accorded the Marine Section by the leading American, as well as foreign maritime trade publications. Several of the papers presented at the sixteenth Annual Safety Congress in Chicago, as well as other new articles written by our members, were published in these periodicals. In numerous cases reprints were secured and distributed to our membership in any quantity desired.

Further widespread publicity for the Marine Section was secured at the present seventeenth Annual Safety Congress through the cooperation of the following maritime organizations, all of whom sent advance programs to their members, and whose President in several cases is actively participating on the Marine Section program:

American Steamship Owners Association
Maritime Association of the Port of New York
National Board of Steam Navigation
Propeller Club of the Port of New York
Alumni Association of the New York Nautical School
The Society of Naval Architects and Marine Engineers.

CHAIRMAN BUSH: The next report I will call for is that of the Program Committee, Mr. John S. Hunter of the Atlantic Refining Company, chairman.

JOHN S. HUNTER: The work of the Program Committee was greatly assisted by the active efforts of all the members of the Executive Committee. They cooperated with us very well, and I wish to take this opportunity of thanking them for their help.

I would also like to express to all the gentlemen who have prepared papers and presented them to us, the deep appreciation we feel for their assistance.

CHAIRMAN BUSH: We will hear the report of the secretary, Mr. W. E. Welch, of The Travelers Insurance Co., New York City.

SECRETARY WELCH: After hearing the reports of the Chairmen on Membership and Publicity and the Program Committee, I wish to ask (as did the Toastmaster at the Banquet last night) that you bear with me after hearing such fine reports.

I would like to state that there was a meeting of the Executive Committee every month, with very fine attendance. And I would like to call your attention to the fact that this is the only section that has a monthly executive committee meeting. At those meetings there is helpful information given to new members, in the starting of their safety campaign on their steamers and on the wharves, and it has been a great help to new members and also to old members.

There has also been sent to all the membership a *News Letter*. This *News Letter* was principally the latest in accident prevention work, and has been a help to the membership.

The Executive Committee has started the National Safety Code on cargo handling. And the Marine Section, or the Executive Committee of the Marine Section, is behind this movement, and is more or less of a steering committee and will give it all the help they can in making the code practical.

Also the Executive Committee has started a Safe Practice Pamphlet on "Marine Boiler Hazards," which will be to the benefit of the membership, a little later.

I desire to thank all the members for their very fine cooperation with me, and for their help in getting out the *News Letter*.

CHAIRMAN BUSH: Mr. Hand, the second vice-president, in charge of the Poster Committee is not present, but I have his report which I will read.

Report of Poster Committee

By ROBERT F. HAND
Chairman

The chairman of the Poster Committee has a single objective; to get out posters which will so graphically present various hazards as to lessen their danger and thereby reduce accidents. The Poster Division in Chicago, takes care of the printing and distribution of the posters, which leaves the Poster Chairman with the twofold duty of evolving poster ideas and translating these ideas into suitable pictures.

Conceivably, the Poster Chairman could do this by himself. He could study the hazards of shipping, make use of his experience, and select a number of ideas which he would then have portrayed in photographs or drawings. But this would be unfair, because it would be putting the whole job on one man's shoulders and it would be foolish because the series of posters would be limited by the limits of one man's experience.

The Poster Chairman has felt this, and therefore has attacked the problem from another angle. The membership of the Marine Section is varied; it represents many phases of shipping and many totally different types of hazards which should be posterized. An effort was made, therefore, to draw poster material from all types of members—the operators of general cargo ships, stevedores, lighterers, tanker operators, shipbuilders, etc. On December 12, 1927, a form letter was sent to all members requesting poster material. On January, 9, a follow-up letter was sent to all members.

The response to these two appeals for poster material ideas and/or photographs, was poor. There was an immediate need for poster material; but the members

did not take it upon themselves to give assistance. For that reason it was necessary to fall back on a few willing members, with the result that the entire supply of ideas and pictures for the year was supplied by six members:

The Atlantic Refining Company
 The Barber Asphalt Company
 The Cosmopolitan Shipping Company
 The Hartford Accident & Indemnity Company (St. Louis)
 The Standard Shipping Company
 The Texas Company.

About 40 photographs or illustrations were submitted by these six members. Thirty of these, covering twenty-four subjects were considered good enough for use and were sent to the Chicago Office for production. In some cases two photographs were necessary to bring out the idea, which explains why only twenty-four subjects were covered.

Following is a list of the subjects covered by the material submitted to Chicago:

Ladder Hazards	material for 6 posters
Fire Hazards	material for 3 posters
Draft Hazards	material for 4 posters
Gangway Hazards	material for 1 poster
Poor Staging Hazards.....	material for 2 posters
Dark Places in Hold Hazards.....	material for 1 poster
Inattention to Job Hazards.....	material for 2 posters
Tools laid carelessly on gratings Hazard.....	material for 1 poster
Gauge Glass Hazards.....	material for 1 poster
Steam Hazard to Man in Boiler.....	material for 1 poster
Heavy Lifting Hazards.....	material for 1 poster

A study of this list shows that but a few hazards of the industry have been touched, and it is hoped that in the ensuing year more members will respond to the call for poster material to the end that new hazards may be posterized.

In addition to the above mentioned work, the Poster Committee circulated a letter among members on July 6, 1928, calling for sketches and posters for display at the present Congress. As this material was to be sent direct to Chicago, the Chairman cannot make a definite statement as to the response to this letter. However, it is known that four or five members sent such material and perhaps more did. The display will speak for itself.

CHAIRMAN BUSH: Now, gentlemen, today has been dedicated to the National Board of Steam Navigation, through whose cooperation this program has been constructed.

We are honored this morning by the presence of the President of that organization. And I will now ask Mr. Arthur J. Grymes to deliver his paper.

The Importance of the Human Element

By ARTHUR J. GRYMES

President, National Board of Steam Navigation, New York City

Industrial safety engineering has coined the maxim, "A Safe Plant Is an Efficient Plant." Paraphrasing, it can unequivocally be stated that "The Safe Ship Is an Efficient Ship." In one form or another this thought has been expressed so repeatedly that it has become embodied in the working creed of the safety engineer. The truth of it seems to have been accepted without question—as real truths often are—without critical analysis, without attempt at proof.

On the the subject of industrial accidents, President Calvin Coolidge quite recently wrote, "It is difficult to believe that industrial accidents have reached an irreduc-

ible minimum while the death toll is probably not under 23,000; and the nonfatal injuries approximately two and one-half million each year. Especially should we be hopeful of greater improvement in this record if those who claim that 85 per cent of those accidents are preventable are even approximately right."

Men and women are much the same the world over. Industrial accidents as well as marine accidents have the same root evils, though the conditions and causes which make for accidents in various industries as well as on different types of vessels, for example, will obviously vary according to conditions and standards. The importance of the human element in this subject, however, the men and the women workers, is basically no different, be the employment on board ship or wharf, field or factory, office or home.

It is of significant interest to observe that careful records concerning personal marine accidents, which have been compiled over a period of years by large American steamship operators, have shown that from 85 per cent to 90 per cent of their reported accidents can be classed as "preventable accidents." It is not a mere coincidence that these figures obtained by the compilation of marine accidents are practically the same as the percentage of "preventable accidents" which industrial accident statistics show, but it is conclusive proof that the marine industry is no different from any other industry and that the human element is the same important factor in every industry.

When accidental injury is prevented by protecting the body of the workmen, it does not necessarily follow that the accident capable of causing the injury is eliminated. It is safe to assume that the application of protection alone does not greatly reduce injury occurrence in any industry and cannot, of itself, make a safe plant, a safe wharf, or a safe ship. Engineering revision of the plant, the wharf or the ship and revision of the workers' mental attitude can accomplish it. When injuries are prevented by eliminating the accident cause, as takes place when revision is applied, not only are injuries and accidents extirpated but the lost time is diminished.

Most maritime accidents are not the result of a single cause, but of the coincidence of a number of contributing causes, each of which may be, in turn, the culmination of a long series of events. They may have to do with a ship and its equipment or with a wharf and its facilities for loading and unloading. In each of these some element of inefficiency may have been introduced—improper maintenance, for example, defective construction, bad design. On the other hand there is the importance of the human element, and here is encountered poor technique, lack of skill, inattention, absence of proper supervision, fatigue, defective vision and a host of other contributing causes that affect both safety and efficiency. Eliminate all or any one of them for the sake of preventing accidents or for any other reason, and efficiency cannot help but be improved.

There is, moreover, an indirect relationship. It requires the highest grade of intelligent operating management and responsive personnel to eliminate accidents and to reach that desideratum of maritime safety engineers "to reduce marine accidents to the minimum." There must be effective organization, cooperation and spirit. Exactly the same requirements must be fulfilled in order to attain a high order of operating efficiency. The steamship owner or operator who has attained the one goal will, or can, attain the other.

Marine safety engineers frequently proclaim that virtually all personal injuries and accidents are due either to carelessness, ignorance or neglect. Carelessness is inexcusable, and therefore merits the consequences that always come to the careless. Continual carelessness is indisputable evidence either of ignorance or indifference. Carelessness is a crime that the conscience punishes with great severity, but the conscience does not support the suffering dependents or the injured individuals.

The National Board of Steam Navigation, which I have the honor to represent, has always been much interested in the subject of maritime accident prevention both as relating to ships and their cargoes, and personal injuries. The naval architects design and the shipyards construct ships which are the wonder of the age and virtually unsinkable. The Government, through the Department of Commerce, has given us the rules of the road, and accurate charts of all navigable waters marked with beacons, lighthouses and bouys; and yet with all these factors for the prevention of accidents property and human life are continually damaged or destroyed.

And why? Because that all important element, the human element, is not and cannot function 100 per cent. Many solutions have been attempted and through the instrumentality of the National Safety Council great improvement has been made. Accident prevention work to bring results requires the most consistent and persistent efforts on the part of the management of any organization which must permeate down through the higher and lower officials and the rank and file whereby appreciation and assistance of the human element which is so vitally concerned will be of as high a percentage as it is possible to obtain.

Those steamship and maritime organization officials who are lending their efforts in this great movement of accident reduction deserve the highest praise from their associates and from their employees. To those executives who have not yet seen the handwriting on the wall let it be known at this time that unless they take the necessary steps to encourage accident prevention work on their ships, wharves and terminals, the Government of the United States will undoubtedly soon enact legislation making it imperative for them to bear their share of the responsibility.

CHAIRMAN BUSH: The meeting is now open for discussion on Mr. Grymes' paper.

Mr. Jewett, would you care to give us the benefit of your experience? You are constantly around the shipping centers and the docks. We would be glad to hear from you.

E. H. JEWETT (Elliott Service Company, New York): I came here primarily to listen and learn. If there is any contribution that my brief experience in this work may have made, I wish you would consider it from the light perhaps of the old biblical quotation, "Out of the mouths of babes and sucklings."

There are one or two specific things on my mind that have come out of the past three years very definitely. Mr. Grymes has covered them very ably. The first is the executive realization of the importance of this work. And right at that point I would like to ask a question of those executives, because it comes up almost every day in our work.

Why is \$100,000, \$500,000, or any other real amount of money paid out of the treasury of that company for compensation because of accident or responsibility for accident, to say nothing of the wastages that come from this? Is it of any less value to the treasurer of that company than a similar amount of money spent for any other piece of operating work?

I have had presidents, vice presidents, and other operating officials, seem to think that because they were buying their insurance, either through an American or foreign club, or perhaps buying it from the state, mutual or stock company, they felt they had done their all.

I don't believe, gentlemen, that if they had a single operation, where there was a wastage of \$100,000 or \$500,000, that they wouldn't sit up nights and try to break down and stop that wastage. And yet because it happens to be wastage because of accident, they don't give it the same consideration.

Is \$100,000 or \$500,000, or another similar amount that is lost, of any less value to that company than a similar amount in the handling of lumber, copper, lead, or the operation of a ship?

Summing up on that, I don't believe they have tried to break it down. I don't think they have realized the importance of saving that money as land interests as a whole have done.

There is only one other thing that I would like to say, and that is: After the executives have looked at it from that angle and seen the true significance of respective values, agencies like our own, with due respect to the National Safety Council,—I think we ourselves are partially to blame in not driving home and riveting attention to the actual workman, the actual working personnel, whether pier superintendent or marine superintendent, on down the line, through hatch and gang bosses. There is a difference between what is the cause of that accident and the cause of the injury. That is purely a practical problem.

I think I see here in this room several men who are familiar with that situation in the form of accident reports. I may have been unfortunate. It may have been my unfortunate experience that in picking up 100 or 300 accident reports, I have not been able, even with their assistance, to get from that report the cause of the accident. I can get 100 per cent the cause of the injury.

I think that is one reason why we haven't made headway. I would like to draw two parallels and make my point on that. I will take a serious accident, say where a steam valve on a vessel should either be tightened or removed. His attention is first called to that valve by the escaping of the steam.

He goes to repair it. In many cases he is like the plumber; he doesn't take his tools. He has to go back for them. But if there happens to be—and I am citing now an actual occurrence—if he gets to the steam valve and doesn't happen to have a small wrench, but he sees lying there a huge Stillson wrench, he will not go back. He will not walk thirty feet to get a proper tool. He does, however, take this huge Stillson wrench, and when he puts that on, plus the power of his physical body behind it, off comes the whole valve with live steam, and two men are scalded to death, and three are yet in the hospital. That accident happened nine months ago.

What bearing has that on Mr. Grymes' remarks? This engineer was a competent man. He must have had brains to enable him to get out an engineering paper. But what good was that qualification to him, because, using plain language, he was too "cussed" lazy to walk thirty feet to get his proper tools.

The actual escaping of that steam, the actual blowing off of that steam, was the cause of those deaths. But what was the actual cause? It is just as true in fatalities as it is where a scullion on a ship will use a cleansing agent such as mineral water, full of decayed and deleterious matter to clean his pots and pans, and in that operation pricks his finger and doesn't think enough about it to go and get first-aid, and perhaps we have a serious case of blood poisoning.

You can go from fatalities to the slightest thing, and it is purely a case of the human element rather than the mechanical cause, in other words, human failure and not mechanical failure.

There is just one more thought. If we could get our steamship companies, our stevedoring operators, to look at this movement more from a preventive angle and less from a claims settlement, I think headway would be made in that direction.

I am going to tell one little story, and then I am through. The average man operating in this work, whether he is a stevedore or with a steamship company, heads up to claims department. I feel that is a mistake. I think that he should head up to the operating department.

I don't know what your experience may have been in the claim department, but I have found they would much rather look at it as a good job, well done, if they could make a thousand dollar settlement on a \$2,500 claim, and thereby save their company a considerable sum of money. They think they have done a splendid job; but they should have taken that same amount of time and energy and directed

it to preventive measures so that accident would not have happened perhaps in the first place.

In other words, I believe that the best thing to do in a case of that kind, is to prevent the original occurrence.

And I will say this: It is my sincere feeling that until the medical profession can develop some new or radically better form of cure, we can't expect to make very much advancement from the cure phase of accident prevention work, until the Federal Government and the various state governments provide for practical legislation; and until the legal departments, the legal profession, can make some advancement in the adjudication and settlement of claims, I don't think we can go very much further in our settlement of claims.

Now what does that leave us, if that is true? It leaves us one other avenue by which treatment can be made; namely, concentrate on actual prevention.

CHAIRMAN BUSH: We will proceed to the consideration of the next paper.

I have just been informed that Mr. Burke of the United States Lines is ill and is unable to present his paper, but he has sent a gentleman to represent him. Mr. Owen A. Smith, Passenger Traffic Manager of the United States Lines, will read Mr. Burke's paper.

Taking Steps to Insure the Safety of Passengers at Sea

By DAVID A. BURKE

General Manager, United States Lines, New York City

What I have to say will not be new to you, as you are thoroughly familiar with the technical operation of steamships. To the layman however, this subject is one with which he rarely ever manifests any interest or concern.

I have made inquiry of our various passenger department representatives as to whether any person arranging for a booking on one of our vessels, has ever brought up the subject of safety aboard the ships. You may be surprised to learn that in the experience of our passenger department, no prospective seagoer has ever questioned the safety angle. A person will frequently ask many questions regarding the contemplated voyage, disregarding entirely the question of safety at sea, which I assume is due to the fact that they no doubt consider the feature as more or less a foregone conclusion.

Fortunately there has been no serious accident of any kind or any catastrophe in the North Atlantic passenger service since the war, when of course the submarines were an additional menace to navigation. Perhaps the war has had much to do with the psychological change in the public mind regarding sea travel. Before the war, this question of safety was often brought up by prospective passengers. During the war, tourist travel was at a standstill, and then following the hostilities when events of the war were indelibly carved in the minds of all of us, our pre-war thoughts, if I may use that term, were subordinated.

So, with the submarines eliminated from the seas as a menace to the safety of passengers, it is my opinion that the tourist feels there is nothing to hinder a safe journey to and from Europe.

To the steamship men however, this is quite another question. We regard safety as one of the most important factors in the operation of steamships. During a voyage and while they are in port, vessels are constantly being watched with critical eyes, tests being made, one instrument checking against another, so that hour after hour, the danger to the lives of passengers are reduced to a minimum.

The United States Lines is now at the beginning of its eighth year of operation. It is gratifying to me that those eight years can be recorded as successful from many angles. Financially the company has been on the up-grade and constantly the

number of passengers being carried by the vessels of our fleet has improved, so much so, that during the last year, each of our vessels on several voyages east and westbound carried the maximum number of passengers. The Leviathan alone has established several records for passenger carryings. On a recent voyage, she brought to this country 887 first class passengers, the largest number ever carried by any liner in that class, and during the eight years of steady increase in business in a highly competitive field, I am proud to say that not one passenger transported by any vessel of the United States Lines fleet has lost a life during the course of a voyage. Deaths, of course, have occurred on vessels, due to illness, but not once has any death been the result of negligence on the part of our officers and crews, which is a high tribute to the men in the American Merchant Marine.

The United States Lines is constantly alert and anxious to provide its vessels with the most modern equipment to safeguard the passengers at sea. As an illustration, we recently installed a fathometer which has been found satisfactory. This fathometer consists of an indicator with a clocklike dial mounted in the Chart Room on the bridge, with a receiver for checking up the echo emitted from the sound sender in the hull of the vessel well below the water-line which transmits sounds to the bottom of the sea. The period required for the return of the echo is timed to a split second, and is translated into fathoms of depths on the fathometer, so it is possible for the ship's master to determine the depth at any time. This instrument can be put into operation by pressing a button and continues to operate until it is turned off.

To the man who knows ships, little need be said about the value of the fathometer, which according to tests has accurately measured depths from three to 130 fathoms below the vessel's hull and is of extreme value when the ship is in a fog approaching port.

Of course from the standpoint of safety, stability and seaworthiness of the vessel are the most important factors. The stability of the ship is usually predetermined, and can be accurately gauged on the first voyage. Seaworthiness is a matter that requires constant attention and can only be maintained by efficient supervision. Perhaps the most important hazards at sea are fog and fire. Large sums of money have been spent in the efforts to combat these two elements. As an illustration, let us take the Leviathan, carrying at times approximately 3,600 persons including passengers, officers and crew. Suppose that someone on that ship should leave a lighted cigarette in a stateroom, causing material or paper to catch fire. For such an accident we are prepared. Each of our vessels has hundreds and hundreds of feet of tubing located in passageways and in all staterooms which expands from abnormal heat causing a bell to ring at some certain point on the bridge where the fire prevention instruments are located. In addition to the aero-alarm, as this is termed, our vessels are equipped with the Rich System for fire detection at the fire control station. This system has tubes running to various parts of the ship through which air is constantly being sucked by means of fans to the detection apparatus. The men on watch can tell within a few minutes from what part of the ship the smoke is emanating. For example, recently smoke was seen coming from one of the tubes connected with the after section of the Leviathan. This smoke was not very dense, so the man on watch telephoned to the watchman in that portion of the liner, and he in a few minutes reported that one of the members of the crew was smoking a cigarette.

Any section of the ship can be smothered with steam regulated from the detection room and a fire even though of considerable proportion could readily be extinguished. In addition to this, we have the regular fire fighting apparatus extinguishers, sand boxes and large quantities of chemicals in the Engine Room to located in the various parts of the ship, men constantly on watch, chemical fire preclude the possibility of a fire making headway to sections where oil and coal, used as fuel, are stored.

To forestall the danger of fog, we have the fathometer, compasses, and, most important of all, the radio. As an adjunct to the high powered radio apparatus, each vessel is equipped with numerous auxiliary outfits, that will permit the ship to communicate with others at all times and under all conditions. Our radio operators are at their posts twenty-four hours a day while the vessel is at sea, for the protection not only of the ship itself, but for the benefit of other steamers that might be within radio range and require assistance. To offset the fog hazard the radio direction finder is one of the most valuable instruments for use in arriving at the vessel's position.

Under the trans-Atlantic Conference agreement, certain tracks for navigation are designated for use during certain seasons of the year. Changes are made on specific dates in accordance with information submitted by the United States Hydrographic Office and the Coast Guard Service. The latter has maintained a patrol of the ice fields for a number of years from April until the latter part of July and the Coast Guard patrol boats during that period send out positions, movements and speed of floating bergs and ice fields that may be considered a menace to navigation. Vessels can then change their course to avoid this danger long before they have come in close proximity to the ice fields. Since this patrol has been in operation there have been no collisions between ice bergs and trans Atlantic passenger liners. The navigation on these tracks has been made easier by the Gyro-Compass and the Gyro-Pilot, which by the way, has been referred to as "Metal Mike." With the latter it is possible to maintain a certain pre-determined course for any time without deviating from it, but this course, even when the pilot is utilized, is being checked by the officers on watch with other efficient instruments.

The modern liner is equipped with all kinds of accident prevention apparatus which is employed only when the ship is in danger. Supposing a liner is struck by another ship, an iceberg or some floating derelict in a vulnerable spot below the water line. Assuming the engines go dead, there are located in various parts of the liner gasoline engines and storage batteries to furnish the power required for radio transmission and an auxiliary lighting system. With the vessel illuminated, if only to a moderate degree, there is less likelihood of the passengers becoming panicky than would be the case in utter darkness, thus enabling the officers and crew to better cope with the emergency, the passengers, in the meantime having a sense of security that would be lacking if the ship were in darkness.

Water tight doors are a very important factor in the mechanism of a vessel, and are therefore frequently inspected with great care, both at sea and in port. In the event of a collision, it is possible to prevent a rush of water through the ship by means of these doors. On the vessels of our fleet, they can be controlled either mechanically or by hand, the remote control being from the bridge. Perhaps in the majority of cases, the mechanical control from the bridge is of paramount importance, for it is on the bridge that the officers on watch would be in the best position to judge what doors should be closed first.

When the vessels of the United States Lines are in port there is a regular program followed by the officers and the men to safeguard the liner for the next voyage to sea. Life boat drills are held, the boats inspected, the equipment and provisions gone over and replaced if necessary, the davits are examined and greased, fire prevention equipment tested and all emergency apparatus is given a work-out, in fact every piece of machinery is examined and tested and no detail is left undone in this examination even to checking the steering apparatus from the bridge and the steering gear house.

Recently we placed acetylene torches on all of our vessels. This torch had never been actually used aboard our vessels, but came in very handy not long ago, when the Republic was at her dock at Bremerhaven. The tug, "Serius" which chanced to be near the United States Liner, capsized, and the man on watch on the Republic immediately ordered a life boat lowered and after several men were

pulled out of the water it was discovered that there were men of the crew who had been imprisoned in the engine room of the "Serius." The Republic crew immediately rowed back to the vessel's side, called for the acetylene torch and cut through the steel bulk head and removed the engineer of the tug who was still alive but unconscious. This proved to be a case where the foresight actually saved a life, even though it was not aboard one of our own ships.

On our vessels of the United States Lines fleet, a safety campaign has been conducted under the auspices of the Merchant Fleet Corporation and through the use of placards and other pieces of writing matter and warnings, accidents to members of the crew aboard the vessels have been reduced to a minimum.

There is one more fact in relation to the safety program that is conducted by the United States Line which is worthy of mention to you gentlemen. The Leviathan goes into drydock twice every year and our other ships are frequently taken from their schedule for an under water inspection. Criticism has been directed against the management of the United States Lines and frequently rumors have been spread that the Leviathan is not functioning properly, because she goes to drydock twice a year. I wish to take this opportunity to emphasize that we send the Leviathan semi-annually to drydock because we feel that we are taking an extra precaution to guarantee against any trouble, developing below the water line. By making this inspection, it is oftentimes possible to avoid serious trouble, considerable expense and a protracted lay-up of the Leviathan and the other ships.

Of course, there is an element of luck which cannot be overlooked, when accidents of even a minor nature are avoided, but to a far greater degree accidents are prevented by care and study, such as you gentlemen have given these problems.

We have been exceptionally fortunate in this country to have various companies and government bureaus co-operating to avoid catastrophies at sea, and due to your surveys and study, such conferences, as the one which will be held in London next year to revise the International Convention of 1914 for Safety of Life at Sea, can really be productive. On the American Committee which is now engaged in making proposals to be taken up by this International Convention, the United States Lines is represented. It is this care, that is constantly being taken in this country to insure the safety of lives at sea that is going to contribute in such a large measure to build up the American Merchant Marine to the position it deserves, and the American people will be proud of the work that you gentlemen have done in assisting us to attain that end.

CHAIRMAN BUSH: The next paper on the program is by a gentleman who has been one of the most active members of the Marine Section. He has been regular in his attendance at the Executive Committee Meetings, and he has given us his cooperation to the fullest extent. He is one of the pioneers in maritime accident prevention work. I take pleasure in presenting to you now, Captain Reginald Fay, Marine Superintendent, The New York Central Railroad Company, New York City.

Marine Accidents—Their Causes and Remedies

By CAPTAIN REGINALD FAY

**Marine Superintendent, The New York Central Railroad Company,
New York City**

As a new member of the Marine Section of the National Safety Council, I am at a loss to understand why I was selected to present a paper for your consideration. Not being altogether familiar with the requirements of such a paper, I have, however, attempted to accumulate some data from our records which I trust may be interesting to this section.

I will not attempt to enumerate the accidents in the several departments, but I would like to outline some of the activities that we are putting forth, not only to avoid a recurrence of accidents, but also to prevent their happening.

At our Marine repair shop where every class of marine equipment is constantly undergoing repair, we are using every precaution that human mind can think of to prevent accidents, for instance:

Portable gangways with suitable rails to pass to and from the boats lying at the piers while undergoing repairs.

Ring bolts fitted to the string-pieces to hold these gangways in place to prevent slipping.

Special gangways, for boarding ferry boats with electric trucks carrying repair material, have already been provided and are of same design.

All air, water, steam and electric lines carried overhead and along the string pieces on piers with metal covers to prevent lines from being caught and to prevent men from tripping at gangways.

Large electric light plug connections properly guarded to prevent men from receiving shocks and burns.

Lumber properly racked to prevent tumbling down and easier of access for any particular piece.

All machines and belting safely guarded. Notices on all machines to use guards and anyone found not using same subject to discipline.

Goggles being used to protect men's eyes.

All air tools returned to tool room and examined each day before using again.

Following some very valuable suggestions offered by our safety representatives, we have been able to show a reduction of "Reportable" or "ICC Entrees" in 1927 in comparison with 1926. Following are the figures for the two years mentioned:

Year 1926: Actual man hours worked.....	4,345,572
ICC injuries	52

Year 1927: Actual man hours worked.....	4,549,288
ICC injuries—one employee killed; 38 injured.	

This shows a decrease of 14 injuries and an increase of one killed, despite the fact that there was an increase of 203,716 man hours worked.

The fact that we were able to make this reduction with the increase in man hours is proof positive that some concrete safety work has been carried on in our department. I might state the fact that we are holding meetings bi-monthly which not only deal with safety, but cover in addition to safety, loss and damage, shortages and everything that has connection with the Marine department. In addition to the above, a campaign of safety education is being carried on through all departments by the heads of those departments with the assistance of the safety agent and with material furnished by the New York Central Safety bureau. Mr. C. E. Hill, General Safety Agent of the New York Central Lines has furnished us from time to time with valuable safety data, such as bulletins, posters, letters, etc., which I think have been instrumental in a great measure in educating our employees to the fact that safety and efficiency go hand in hand. It is my earnest hope that with the assistance of the various supervisors of departments, through their more strict supervision and education, that we may be able to show a much greater decrease in Reportable or ICC injuries at the end of this year.

The New York Central Marine Department consists of the following units:

Ferry Boats	9
Tug Boats	29
Steam Lighters	6
Oil Storage Barges	4
Steam Hoist Barges	4

Gasoline Hoist Barges	16
Hand Hoist Barges	18
Coal and Pumping Barge	1
Scow Barges	5
Covered Barges	114
Refrigerator Barges	37
Grain Boats	23
Car Floats	63
TOTAL	329

I would like at this time to refer to some of the corrections of conditions that have been carried on on our floating equipment, this due to past injuries to employees,

Tug Boats:

On our tug boats and steam lighters an up to date search light has been installed for the purpose of locating boats to be towed, at the same time making the operations safer for the men while making fast and letting go the lines.

All fire room exits are properly railed to prevent men from slipping and falling into the fire room.

Platform gratings are installed alongside the boilers for access for maneuvering main stops, etc.

Guards fitted to all dynamos and other auxiliaries where possible.

Covers over main engines, guard rails, turning gears and couplings.

All ladder ways, rails, etc., examined and kept in safe condition.

Man-holes and gratings welded in place where not called for as emergency exits by law and not used for filling tanks.

Covers and gratings provided for all man-holes.

All exposed steam pipes properly lagged.

All steel decks covered with Tenax Decking to prevent personal injury by slipping.

Ferry Boats:

On our ferry boats, heavy safety posts and cables have been installed across the team gangways on each end with a resisting capacity of 20 tons, thus safeguarding automobiles and vehicles from going overboard.

All sorts of suitable signs have been placed on boats and ferry bridges for the safe protection and guidance of passengers and employees.

The law against smoking in automobiles and team gangways is being rigidly enforced for the safety of the public particularly while the boats are under way.

Small printed notices quoting the law against smoking are being constantly handed to all offenders or violators of fire regulations.

Floats:

On the non-propelled equipment of this department consisting of car floats, derricks, gasoline hoisters, hand hoisters, barges, scows and grain boats, every precaution is taken for safety.

On new equipment of this kind, car floats are having the man-holes eliminated from the deck to the holds and placed in the steel structure under the platform.

All cross-over frogs and guard rails are properly guarded with wooden blocks.

Covered barges are being constructed with extra wide guards to make safe the handling of lines from the tug.

All gangway ladders properly guarded with hand-rails and signs in conspicuous places to avoid personal injury.

I might add that this thought of safety applies to all of this equipment and that an inspector is employed to make personal inspection of the non-propelled, as well as the self-propelled equipment daily, and if any defects of importance are found the boat is ordered out of service and into the shop for immediate repairs.

Marine accidents and causes can be remedied only by strict adherence to safety regulations and personal supervision.

I would like in conclusion to refer to the fact that in 1924, the West Shore Ferries succeeded in going through four months, from June 1 to September 30, without a single accident and the first prize consisting of a large silver cup was permanently awarded to that department.

I believe that this in itself is a very fine showing and indicates that the careful supervision of the supervising officers, together with the efficient and strict compliance with safety regulations by the employees, is proof positive that a "Safety Minded Man" is the best accident preventer and safeguard to the public.

CHAIRMAN BUSH: Is there any discussion on the Captain's paper?

CAPTAIN J. E. BRIGGS (Port Captain, Marine Department, Lackawanna Railroad, Hoboken, N. J.): Captain Fay has spoken of several things that I was thinking of touching on and had in mind.

On the Lackawanna Railroad, we operate four ferries, and while we don't have quite as many tug boats in service as Captain Fay has, we have nineteen. In the first eight months of 1926 we had 63 injuries in the Marine Department; in the same period in 1927, we had 59. This year I am very glad to say we only had 35. That is a reduction in three years of 43 per cent. I think this is a very good showing.

Mr. Farrell and another gentleman—I have forgotten his name—said it would be a great help if they could get the fellow who is really on the job interested in the safety movement, and we do that. We have in our department, three deck hands and three firemen who are members of our local safety committee. They take a very active part in the work and are very much interested in it. So we give them honorable mention at our meeting once a month, and at the end of the year we give them a certificate. There is hardly a day that a certain deck hand of ours doesn't come to me and report some little thing. He is on one of our docks. So the men are really interested in the work. There are many things that we have protected that we would not have known about if it hadn't been for these men.

We have had no deaths as results of injuries this year. Most of our injuries have been slight, the majority of them necessitating only one day's disability.

I think it is a very good thing to get a fellow interested in some job to see these little things that we don't see, and when they report to us, we can correct them. Self preservation is the first law of nature. But these fellows sometimes get careless in the continual performance of a certain duty and do it in a subconscious way.

CHAIRMAN BUSH: There is a representative here from the Pennsylvania Railroad, whose name at the moment I regret to say I cannot recall.

O. D. MOORE (Pennsylvania Railroad): It was my privilege to read a paper on the activities of the Pennsylvania last year, at the meeting in Chicago. But Captain Fay was not present, so he had no opportunity to comment on it, and that gives the Pennsylvania somewhat of an advantage.

The Pennsylvania safety work and its fleet in New York Harbor here run very closely along parallel lines with the New York Central. Their maritime activities are a part of the general railroad safety work. But it has been a noticeable fact, at our various marine departments both here and at other ports, that they have been particularly jealous of their records in a respect.

Captain Fay's paper is very properly drafted along practical lines and outlines the specific activities that they have undertaken against certain definite hazards. The only practical comment that I might add, based on reports and experience of the past year in our work, has been a duplication of two accidents of what might be called a special nature as differentiated from the usual run of slips and falls,

wrenches, slipping, and getting tangled up in line. It might be of some interest to pass it on.

There were two cases where men were shocked into unconsciousness by picking up portable electric light lines in which either the insulation was wet or they were grounded on the wet fireroom floor. In both cases the men were sufficiently experienced to have known better. But in view of the fact that there was a repetition, there is apparently need for some additional attention being given to such things as that.

CHAIRMAN BUSH: Are there any further comments?

In the popular mind, gentlemen, the United States Coast Guard Service is an agency of the Government, whose primary function is the chasing of rum-runners. Actually the service is the life-preserver of the American Merchant Marine. One of the members in active service will tell you of their activities. May I present at this time, Commander W. F. Towle, U. S. Coast Guard, New York City.

Activities of the United States Coast Guard in Saving Life and Property at Sea

By COMMANDER W. F. TOWLE
U. S. Coast Guard, New York City

The duties with which the Coast Guard is charged in peace times are numerous and varied. Of the major duties imposed on it, probably the most important, certainly the most hazardous, is that of assisting vessels in distress and saving life and property from the perils of the sea. The ever present necessity to be at all times prepared for this duty has for more than a century been very largely the determining factor in the evolution of the Service, both as to the development in ships and stations, as well as the tradition and spirit of its personnel.

That is to say, Coast Guard cutters, life-saving stations, life boats, and the character of the men who man them are essentially a product of a century of continuous battle with the sea in the interests of humanity. The old sea, in her more violent moods, is a splendid antagonist. She wages warfare with very terrible results sometimes, but always in the grand manner—a manner not altogether barren of compensation for those who survive it. A type is produced. A particular type of ship, and a particular type of seaman to man it.

There are now in the Coast Guard about 9,950 enlisted men; 840 warrant officers; 360 commissioned officers; and about 100 cadets under instruction at the Academy at New London, Connecticut. Under existing law this personnel is organized, trained and equipped to constitute a part of the military forces of the United States. It operates as a part of the Navy in time of war, and under the Treasury Department in time of peace. At all times the Service is maintained under a rigid system of Naval discipline, drill and training, not only to fit it for war service, but also to fit it for the hazardous emergencies of rescue operation at sea in time of peace. The most essential requirement for such work is a crew highly trained to the sea habit, coordinated team work, and confident readiness to act effectively in the face of demoralizing adversity.

Shipwreck generally results from failure to weather a major hazard at sea. Into that hazard the Coast Guard vessel must steam quickly, resolutely—and not only weather it herself, but also she must undertake to bring the other fellow out with her. Maneuvering at night about a disabled vessel in a winter storm with a heavy sea running,—launching of life-boat,—shooting life lines,—coming in before a blizzard to a stranded vessel on a lee shore. All such operations are “touch and go” affairs, in which the cutter’s success is measured by the superior discipline and training of her people. It is, in a sense, a paradox that the identical military system

which fits the Service to destroy life in war is applied in peace to this highest humanitarian purpose.

As its principal floating equipment the Service has in commission thirty-three cruising cutters, twenty-five destroyers, thirty-three 125-foot off-shore patrol boats, thirteen 100-foot off-shore patrol boats, two hundred 75-foot patrol boats, and some forty harbor cutters and launches. Five first class cruising cutters under construction will soon be completed and in operation.

Along the Atlantic, Gulf and Pacific coasts, and on the Great Lakes, there are 273 Coast Guard stations. These are the familiar life-saving stations. They are located at selected points of danger to shipping and vary somewhat in character, according to the environment and the nature of the service required of them. On less dangerous portions of the coast they are placed only at long intervals, while upon other parts they form chains of contiguous posts designed to cooperate with each other. For instance—Cape Cod stretching forty miles into the North Atlantic, like a threatening arm, is fringed on its Eastern shore with forty miles of shifting sand bars exposed to the heavy winter gales sweeping in from the Northeast.

This constitutes a savage menace to the commerce of the principal ports of New England. Likewise the coasts of New Jersey and Long Island, exposed to the full force of northeasterly storms, threatens the commerce of New York. The Jersey coast is fairly lined with wrecks. It is a veritable grave-yard of ships—a gruesome toll taken from our coastwise traffic all of which passes up and down this coast when bound into or out of New York. Consequently, along the Cape Cod, Long Island and Jersey coasts, the Coast Guard stations are close together—about four miles apart, usually. So that these beaches are under constant observation for their entire length. An overlapping beach patrol is maintained at night by men from the stations. Each patrolman is provided with flares and signal lights which enable him to communicate at once with his station and to signal to stranded vessels that they are seen and help summoned. Commerce bound into the Chesapeake and south of Cape Hatteras is likewise protected by Coast Guard stations along with shores of North Carolina, Virginia and Maryland.

The typical Coast Guard stations are manned by a crew of eight men, superbly trained to the caprices and tricks of the surf, of unchallenged expertness and superiority in the handling of small boats in the broken waters of the beaches, bars and shoals, and capable of taking their life-boats to sea on long journeys of rescue.

The equipment of Coast Guard stations consists of the beach apparatus,—line throwing guns,—hawsers,—breaches buoys, and such,—life boats,—surf boats,—and life cars. Pyrotechnic signals and other signal gear are provided as warning devices. The life-boats and surf-boats in use by the American Coast Guard are accepted all over the world as models for life-saving purposes. They have been developed by the Service and are built in the Coast Guard boat shops at Curtis Bay, Maryland.

The 36-foot motor life-boat is self-righting, self-bailing and is driven by 50 H. P. gas engines. I have seen one of these boats turned over twice in the surf on Tennessee Reef, outside of San Francisco, in an attempt to take the people off the stranded steamer *Hanaleila*. Each time she righted and freed herself and continued. With the loss of only one man she got to the steamer and brought fourteen people out through the breakers. They are beautiful craft.

The 26-foot surf-boat is generally what is called "The monomoy." It is designed for getting off the beach directly through the breakers. It is self-bailing but light and buoyant.

The apparatus for shooting a line to a vessel and getting her people off in a breeches buoy is used when the wreck is within range of the gun. It is also used by cutters at sea to get people off sinking vessels when the sea is too heavy to

get them off quickly in life boats. Cutters have taken people off in this manner with a sea running in which no life-boat could possibly live.

A highly organized and thoroughly efficient system of communication, composed of telephone lines, telegraph lines and radio, has been developed by the Service connecting our stations with each other, with divisional headquarters and with strategically located radio stations. So that our coastal stations are in constant communication with each other, with Divisional Headquarters and, through the radio, with Coast Guard cutters cruising at sea.

The typical modern Coast Guard cutter is a ruggedly built steel flush deck steamer. She measures 250 feet over all, 42 feet beam, and about 16 feet draft. She is driven at a speed of 17.5 knots by turbo electric machinery supplied with high pressure steam by two water tube boilers. Most of her auxiliaries are electrically operated. She carries three 5-inch rifles, a 2-inch anti-aircraft gun, and two 6-pounder r. f. guns. Machine guns and rifles to arm a landing force are provided. She is equipped with the most modern and efficient radio apparatus obtainable. The Ice Patrol cutter on the Grand Banks maintains constant direct radio communication with Washington. Ice reports and weather data being thus transmitted.

She carries life-boats and life-saving equipment which I can assure you are the very best human ingenuity and human experience have been able to devise. She can keep the sea for long periods of time on long cruises for derelicts or into the Bering Sea where fuel stations are rare. Her design embodies the best features developed by a century of Coast Guard work, and I know of no other vessel afloat that even approaches her in excellence for rescue work in the heaviest weather. She is manned by about ninety splendidly disciplined men and eight officers whose lives have been spent in acquiring an expert and familiar knowledge of the inshore navigation of our coasts by actually cruising among the reefs, shoals, currents and such dangers which commonly bring vessels to grief.

Cutters are based at the important ports along our coasts, which for purposes of operation and administration are divided into seven divisions and, during the open season, the Bering Sea Patrol, each with a division commander. Ocean-going cutters operate from Rickland and Portland, Maine, Boston and Woods Hole, Massachusetts, New London, Connecticut, New York, Norfolk, Virginia, Wilmington, North Carolina, Savannah, Georgia, Key West, Florida, Mobile, Alabama, and Galveston, Texas, on the East Coast. On the West Coast they are based at San Diego, San Pedro, San Francisco and Eureka, California, Seattle and Neal Bay, Washington, and at Juneau, Alaska. Three or four cutters operate in the Bering Sea, and on—the "Northland"—in the Arctic Ocean, as far as Point Barrow.

The vessel stationed at Neah Bay at Cape Flattery is a vessel built purely for life-saving. One day during a heavy storm in 1923 she rescued the people from three wrecked vessels, one of which she succeeded in towing in.

Likewise, on the East Coast, in one day during a northeast blizzard the "Gresham" came in from the sea on the coast of Cape Cod at Monomy Point and took the people off three vessels, all stranded on the shoals near Hollock Rip, and all breaking up. It was during this gale that the Monomy Point life-saving crew was lost in attempting to get off the beach in their surf-boat. The Massachusetts coast has been a fatal spot for the Coast Guard. The Manomet Station lost three men there last winter when their surf-boat, returning from the stranded steamer "Robert E. Lee," was upended in the surf.

At present a constant patrol of the coast is maintained by the Coast Guard cutters which cruise to locate vessels in distress and answer SOS calls from vessels equipped with radio. This duty, of course, taking precedence over the anti-smuggling work in which they are also engaged. During the winter, from December to April, under what is known as "Winter Cruising Orders," the cutters

maintain a special rescue patrol from Hatteras to the Maine boundary. Vessels in this force have orders to make every effort to locate and assist vessels in distress. A vessel standing along or approaching the American coast, sending out an SOS signal, receives an immediate answer from an American cutter, and next morning you read in the paper that familiar sentence "A Coast Guard cutter is going to her assistance." As a matter of fact all the cutters within reach go to her assistance and generally keep on going until somebody reaches her.

Say, a vessel strands on the coast at night in a gale. She is seen by the Beach Patrol who immediately burns a colored light which means to every mariner "You are seen and assistance is coming." If conditions warrant another light is burned which means "Do not attempt to land in your own boats—landing impossible." Meanwhile the flares are seen by the lookout in the Coast Guard station who at once calls the crew, telephones to neighboring stations and to the nearest radio station who broadcasts a call to all Coast Guard vessels. Whereupon, all hands within reach light out for the wreck, surf-boats on wheels and beach apparatus wagons light out down the beach. Cutters start in from sea with life-boats and ground tackle cleared away. Beach fires are built. Reserve cutters in port get up steam for a call. Generally speaking, an SOS call certainly stirs things up in the Coast Guard, and the hellish part of it is that they almost always come at two o'clock in the morning with a northeaster in full voice.

Last winter we had quite a crop of wrecks along the Atlantic coast. All of the cutters north of Charleston were busy most of the time, either towing something in or taking people off something that could not be towed in. One day we had four vessels out of New York alone towing barges and schooners and taking their people off. During the past year the Coast Guard cutters of this patrol, alone, rescued 39 vessels in distress, the value of which, including cargoes, was more than 6-½ million dollars, and on board of which were 435 persons.

As to the operation of the entire Service during the year 1927, 3,313 persons were rescued from positions of peril. There were 5,508 cases of assistance rendered, and the value of vessels so assisted, including cargoes, was \$37,801,357. There were 14,496 people on board vessels assisted. The greatest number of cases of assistance rendered in one day was 55. 136 derelicts or obstructions to navigation were removed or blown up.

In addition to all that, during the Mississippi floods, the Coast Guard sent into the flooded area an emergency force of 674 officers and men with 128 vessels and life-boats. Many of the life-boats being shipped overland. This force performed all sorts of rescue work, too extensive to list here. 43,853 people were transported from positions of danger to safety. How many of them were actually saved from drowning we do not know, but we do know that a large part of them would have lost their lives were it not for the emergent intervention of the Coast Guard.

I want also to say something about the International Ice Patrol, the Patrol and regulation of anchorages in important harbors, particularly in the Port of New York. The patrol of regattas and parades and the work of the Service in the Bering Sea and in the Arctic. All of these activities are carried on by the Coast Guard purely to protect life and property. As a result of the "Titanic" disaster there was held at London, in 1923, an International Conference on the Safety of Life at Sea, and the various maritime powers of the world signed a convention providing for an international ice observation and ice patrol service, consisting of two vessels which should patrol the ice region during the season of danger from ice bergs. The United States was invited to undertake this service, the expense to be defrayed by thirteen powers interested in trans-Atlantic navigation. Well, two ocean going Coast Guard cutters have been out there at the tip of the Grand Banks every spring ever since, maintaining a continuous patrol of the ice regions. The vessel on patrol locates the ice bergs and field ice, determines their drift and broadcasts their

presence and location to our Hydrographic and to all ships using the trans-Atlantic routes through that region.

The enforcement of the laws and regulations governing the anchorages in the Port of New York and the transportation of explosives in the waters of the Port is a duty of great importance that is becoming more important as the Harbor becomes more crowded with traffic, essential from a transportation standpoint to the enormous and rapidly growing commerce of New York City. There have been several major disasters in the Harbor recently. Anchorages are frequently overcrowded, particularly off quarantine after a fog where numbers of ocean steamers arrive together. Difficulties of this nature constitute a problem in New York bay which must soon be taken up.

The Bering Sea cruises of the Coast Guard cutters and the Arctic cruise of the Northland constitute a volume of romance in themselves. It is a story of rain and sleet, of Eskimos, Aleuts, Hyaks, Cmiaks, Waheenies, Hucklucs, walrus, polar bears, ice floes, ice packs, stupendous mountain peaks, volcanoes spouting fire and rock, and volcanic islands jumping up out of the sea. Caribou and salmon in incredible numbers and thousands upon thousands of propagating seals. They are all up there, even though they have been somewhat overworked in the more recent travelogues.

CHAIRMAN BUSH: It is certainly a splendid contribution, gentlemen. Do you wish to discuss it? Is there anything further to be said? It seems to me the Commander has covered the subject with infinite care and detail.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Metals Section

New Section Officers

- General Chairman*—E. G. QUESNEL, Commonwealth Steel Company, Granite City, Ill.
Vice-Chairman—JOHN P. EIB, Illinois Steel Company, Joliet, Ill.
Secretary and News Letter Editor—E. F. BLANK, Jones and Laughlin Steel Corporation, Pittsburgh, Pa.
Program Committee Chairman—E. R. ROSE, Republic Iron and Steel Company, Youngstown, Ohio.
Poster Committee Chairman—H. G. HENSEL, The Youngstown Sheet and Tube Company, Chicago, Ill.
Membership Committee Chairman—JOHN P. MUDD, The Midvale Company, Nicetown, Philadelphia, Pa.
Publicity Committee Chairman—W. E. MEGRAW, H. H. Robertson Company, Ambridge, Pa.
Slide Committee Chairman—JOHN A. OARTEL, Carnegie Steel Company, Pittsburgh, Pa.
Engineering Representative—J. M. WOLTZ, The Youngstown Sheet and Tube Company, Youngstown, Ohio.
Statistics Committee Chairman—J. E. CULLINEY, Bethlehem Steel Company, Bethlehem, Pa.
Foundry Research Committee Chairman—F. G. BENNETT, The Buckeye Steel Castings Company, Columbus, Ohio.
Executive Committee: THE OFFICERS AND
J. A. NORTHWOOD, Bethlehem Steel Company, Johnstown, Pa.
J. A. VOSS, Central Alloy Steel Corporation, Massillon, Ohio.
HOMER J. WEEKS, American Steel and Wire Company, Cleveland, Ohio.
C. M. BRADING, Wisconsin Steel Company, South Chicago, Ill.
T. H. MCKENNEY, Illinois Steel Company, South Chicago, Ill.

Retiring Officers

Chairman, J. A. NORTHWOOD, Bethlehem Steel Company, Johnstown, Pa.; *Vice-Chairman*, E. G. QUESNEL, Commonwealth Steel Company, Granite City, Ill.; *Secretary and News-Letter Editor*, JOHN P. EIB, Illinois Steel Company, Joliet, Ill.; *Program Committee Chairman*, E. F. BLANK, Jones and Laughlin Steel Corporation, Pittsburgh, Pa.; *Poster Committee Chairman*, H. G. HENSEL, The Youngstown Sheet and Tube Co., Chicago; *Membership Committee Chairman*, W. E. MEGRAW, H. H. Robertson Company, Ambridge, Pa.; *Publicity Committee Chairman*, J. A. VOSS, Central Alloy Steel Corporation, Massillon, Ohio; *Slide Committee*

Chairman, JOHN A. OARTEL, Carnegie Steel Company, Pittsburgh, Pa.; *Engineering Representative*, W. H. WINANS, Union Carbide Company, New York City; *Statistics Committee Chairman*, H. G. HENSEL, The Youngstown Sheet and Tube Company, Chicago. *Executive Committee*: THE OFFICERS AND F. G. BENNETT, The Buckeye Steel Castings Company, Columbus, Ohio; T. H. MCKENNEY, Illinois Steel Company, South Chicago; J. E. CULLINEY, Bethlehem Steel Company, Bethlehem, Pa.; J. M. WOLTZ, The Youngstown Sheet and Tube Company, Youngstown, Ohio; JOHN P. MUND, The Midvale Company, Nicetown, Philadelphia, Pa.; E. R. ROSE, Republic Iron and Steel Company, Youngstown, Ohio.

October 1, 1928

J. A. NORTHWOOD, Chairman

Superintendent of Safety, Bethlehem Steel Company, Johnstown, Pa.

The first session of the Metals Section at the Seventeenth Annual Safety Congress was called to order at 12:30 o'clock by the chairman, J. A. Northwood, Superintendent of Safety, Bethlehem Steel Co., Johnstown, Pa.

CHAIRMAN NORTHWOOD: I want to introduce Mr. N. V. B. Zeigler, who is going to lead us in our singing, and Mr. Bill Mahoney, of the Metropolitan Life Insurance Co., who is going to play for us. Mahoney plays every day over WEAJ for setting up exercises.

N. V. B. ZEIGLER (Personnel Director, United States Aluminum Co., New Kensington, Pa.): This is community singing, not solo work. We will probably have some solo work after while. Let's begin with that famous old song, "Hail! Hail! the Gang's All Here."

(The members joined in singing, "Hail! Hail! the Gang's All Here," and other songs.)

CHAIRMAN NORTHWOOD: While we are being served with our coffee I want to announce that the Mining Section has a luncheon in the Waldorf-Astoria on Wednesday, and all the members of our Metals Section are invited to attend.

Our Metals Section's business could not get along without the mining end of the game, and we have a distinguished visitor with us today and I would like to introduce him to this audience at this time. Mr. Robert M. Lambie, Chief of the Department of Mines of the state of West Virginia.

(The members again joined in singing.)

CHAIRMAN NORTHWOOD: We planned this meeting so that we could get a little closer together and know each other better, and I believe it is working out very nicely.

In order that we may know each other and what companies we represent, and perhaps exchange experience, because I believe one of the best things we get out of these conventions is the opportunity of exchanging experiences and talking things over from the safety standpoint, we are going to have a roll call. We are not going to ask the secretary to call the roll, but we are going to ask each man in his turn to get up and state who he is and where he is from, his position with the company and the town.

(The roll was called.)

CHAIRMAN NORTHWOOD: I am sure it did us all good to learn that we have representatives here from pretty nearly all over the country and even Toronto, Ontario. I want to welcome you all here. I don't know how many new members we have who were not with us last year or are here for the first time; but, fellows,

we want you to make yourself known, and if you don't know some of these men step up and introduce yourself.

Let's make it just as helpful and just as home-like as we can this year, and get a little closer together, making our Metals Section go over perhaps a little stronger than ever before.

On our program you will notice the next report is from the chairman. Our Executive Committee are a bashful crowd, hard to get to talk, and at the last meeting they voted that the chairman should make the report for them. I agreed to go along with that, but I am going to call on one or two of these fellows after I read this report.

Report of the Executive Committee

By J. A. NORTHWOOD
Chairman

Your Executive Committee for the year 1927-28 held their first meeting following the Congress, on November 22, 1927, at the National Safety Council headquarters in Chicago. Most of the members, as elected during the Chicago Congress, were present and the year's work was outlined. Various division chairmen reported their activities and their plans for carrying on their particular part of the work.

The program, as presented at the 1927 Congress, was discussed pretty thoroughly and the query, of course, was: What steps should be taken to make our program for this year even more worthwhile?

It was decided that it would be a good thing to have our members know each other and thus become more friendly and be in a position to exchange experiences that would be helpful in their various branches of safety work; and thus the Monday noon meeting, of an inspirational nature, in addition to roll-call, was planned. Just how successful it will be depends on the response given by the members of our section, themselves.

The type of program that we wanted to present to the next Congress was discussed and outlined. As this first meeting was more or less of a preliminary nature, no definite plans were made.

During the year two other meetings were held by the committee; one February 15, 1928, in Pittsburgh, and the other July 14, 1928, at Atlantic City; at which time our program was finally completed and the report of our Nominating Committee for the next year was presented and approved.

During the year we regretted very much having to accept the resignation of C. L. Peake, of the American Radiator Company, who was chairman of our Poster Committee, due to the fact that he resigned from the radiator company and accepted a position as an operating man, and thus could not give this work the attention necessary to make it a success. Mr. Harvey Hensel, of the Youngstown Sheet and Tube Company, Chicago, Ill., accepted this appointment and has since been handling this work.

I am sure we have all enjoyed the good newsy, helpful *News-Letters* that have been issued this year by our genial secretary, John Eib, of the Illinois Steel Company, Joliet, Ill. It's a big job to get these *News-Letters* out in the way that they should be handled and I think Mr. Eib has handled the work very successfully.

Mr. W. E. Megraw, who has acted as chairman of our Membership Committee, has done a splendid piece of work. During the year, from time to time, we received from headquarters a notification of cancellation of membership

of different companies, as well as acceptances of memberships. Mr. Megraw has corresponded with each company, welcoming them to our section and with those who felt compelled to cancel, every effort was made to induce them to reconsider. As you know, our section is the largest section of the National organization, and during this period of decline in business we have held our membership up to par. I feel Megraw is to be congratulated in his efforts.

What the program committee has done, under Chairman Earl Blank, of the Jones and Laughlin Company, will be demonstrated this week and if you like it, tell Blank about it. If you have any suggestions that will be helpful to the incoming officers, I am sure they will be very glad to receive them and do what they can to work them out.

CHAIRMAN NORTHWOOD: I am going to ask Mr. Megraw to read his report.

Report of the Membership Committee

By W. E. MEGRAW
Chairman

The Membership Committee for the past year consisted of twenty members selected with a view of having representation from all those sections of the United States in which the Metal industry plays a dominant part.

I take this opportunity to express my appreciation of the efforts put forth by the members of this committee in this membership work.

The National Safety Council record of membership in this section for the year is as follows:

From September 13, 1927, to September 11, 1928:	
Number of members in Metal Section September 13, 1927.....	775
New members during year.....	88
Cancellations during year.....	75
Cancellations account of consolidation.....	8
Total membership September 11, 1928.....	780

A Net Gain of Thirteen Members

On its face this report is disappointing, but I would call your attention to the fact that eight of these cancellations are due to combinations of one or more memberships under one head; so that in reality we have had a gain of 13 members for the year.

The general depression in the Metal trade during the early part of the year accounts for the large number of cancellations. Many of the smaller concerns forced to adopt stringent retrenchment policies cancelled membership for purely economic reasons. It is notable that none of the larger manufacturers are represented in this group.

CHAIRMAN NORTHWOOD: I just want to say to you fellows that in your district there are companies that are not members of our National Safety Council; you can interest them to come in with us, and they will help us and we hope that we can help them. Just bear that in mind for the next year.

Mr. Harvey G. Hensel, of the Bulletin Committee, who took over the chairmanship of this committee after nearly a half year in which the committee did no work at all, will make a short report.

Report of the Poster Committee

By H. G. HENSEL

Chairman

Late this year, at the request of our chairman, Mr. Northwood, I agreed to carry on as chairman of the Poster Committee; and while I found it impossible to give this work attention as soon as I would have liked, I did finally get started and now have approximately 40 pictures ready for the bulletin editor of the National Safety Council.

I was not told what particular line of accident prevention I was to follow in getting photos for these bulletins, so I chose "Safe and Unsafe Practices."

While we have some photos showing safe and unsafe conditions, these photos run largely to Safe and Unsafe Practices.

It was too late to appoint a committee to assist in the Poster work at the time I was appointed so I called on my own assistants to help, which they gladly did.

During the coming year however there should be a committee appointed so that photos for posters can be furnished, showing items from the various industries represented in the Metals Section.

CHAIRMAN NORTHWOOD: While in New York to attend our National Executive Committee meeting two or three weeks ago I learned that there was a soloist who could be prevailed upon to sing for one of our sections and I immediately asked if she would not sing for our Metals Section. I am delighted to present to you today Miss Gertrude Berggren, of the National Bureau of Casualty and Surety Underwriters of New York City.

(Miss Gertrude Berggren sang a number of songs.)

CHAIRMAN NORTHWOOD: Miss Berggren, I want to thank you in the name of our Metals Section for this delightful music; also your accompanist.

Gentlemen, in looking around and discussing whom we should get as an inspirational speaker as well as a helpful speaker for this occasion, there was one man who seemed to be outstanding. A number of us had heard him and we were unanimous that if possible we would get him for our speaker today. Mr. John Oartel immediately got in touch with him and we found that he was available. It gives me great pleasure to introduce Dr. Charles Herbert Rust as our speaker for today.

Address

By DR. CHARLES HERBERT RUST

Worcester, Mass.

Mr. Chairman and men of this Great Fraternity of Interest in Accident Prevention: I can hardly express to you all that it means to me to come to this happy reunion in New York, and to again meet you whom I have loved for these many years. Men from St. Louis, from Milwaukee, from Pittsburgh, from Youngstown, from Cleveland, and many other cities and towns, whom I have met in this great and divine safety movement. I feel somehow that it is a privilege for me to meet with you men of brain and brawn, of poise and power, of sense and soul, of assets and achievements. I say without flattery that if you take a cross section of men in the Safety Movement and compare them with any men in any class or any profession, including the preachers in this country, there isn't any class who, to my mind, represent more to humanity than yourselves. I count it a privilege to be here with you.

I heard about the preacher who preached to a certain asylum down in Boston. He was anxious to make an impression and he looked out over the great crowd

and found one man who was interested in him, apparently, leaning forward; and in this institution where people were insane this man seemed to have an unusual clarity of mind and appreciated this preacher's sermon. At the close of the sermon the preacher went down to the superintendent and said, "I saw that man come to you and talk with you and evidently he was talking about me; I would like to know what he said about me."

The superintendent looked up and said, "I don't like to tell you."

The preacher said, "Tell me; my skin is thick."

The superintendent said, "Well, this is what he said as he was pointing to you: 'Think of it,' he said, 'he's out and I'm in.'"

Now as I meet you in your conferences; as I talk with you personally; as I get the real drift of your thoughts; as I catch your spirit, it seems to me, without flattery, that you represent just about the finest thing in human life, and I am proud of it. I am glad to have the remembrances that I have of Pittsburgh and other places.

It seems to me that I left that Pittsburgh district too soon. I love New England. I was born there. I love its hills, its rocks, its rivers, its lakes, and its mountains. I do love the clarity of the air. Just a little bungalow on the hill down there in Worcester, and the sunshine certainly does throb. I love its stability, its traditions. I love its history. I love all of it. But, do you know, with all of that—and I am having a good time there, too—I do appreciate the district that you represent and the humanity there and the struggle of the great metals division, the life of the nation.

It makes me think of what a fellow said when I left. He said, "Rust, you're going down to New England. How can you leave Pittsburgh? Think of it, you are going to that cold, conservative, awful place, New England!" As Cameron, of the Safety Council, said to Blanchard, of Springfield, "Blanchard, I can characterize New England. You never do anything first. Never! You always wait to see what the other fellow has done."

So this fellow said to me, "Think of going to that cold, awful, conservative New England." He said, "They may get together down there, but they always get together by freezing together." He said, "Pittsburgh may have the smoke, but, thank God, we have to have fire to have smoke, and we have got it!"

I realize, gentlemen, that in the great field of industry that you are representing there is smoke; but there is fire; and better than the fire which comes to us simply from physical combustion, or the consciousness of the burning up of brain power, I am conscious of the fire of soul; I am conscious of the animation of personality. I am conscious of something that you men have that makes you masculine and strong, and you represent the fire for humanity. It is there, and I am proud of it!

The accident idea is a great and noble one. It was born in the mind and the lucid brain of the members of the Illinois Steel Company, represented by Mr. Eib, and of other members here; and no wonder they are proud out there that they gave birth to it. I was thrilled by it, and they have reason to be proud. We are proud of the people who could follow them. It is a great and noble idea. The accident prevention task is a great and difficult one. It demands everything that is in big men to meet it. Its issues are tremendous. We cannot get away from it. It confronts us everywhere. A man must be at his best to be able to meet it squarely, to conquer it, to put down the dangers that are confronting us everywhere, to prevent accidents and to keep people safe; and as I think of the personnel of the Safety Movement, from the president right straight down through all the great companies, every safety manager, I feel that you have gathered together a group of men who are able to put over a great task.

The accident prevention problem is ever present and a persistent one. You cannot get away from it. I cannot see any end to it. With the increasing number of

cars, with the complex problems of production increasing every day, no wonder we have 25,000 killed in industry. No wonder we have 95,000 killed altogether.

There were only 78,000 Americans killed in the whole European War, 78,000 from America. That was all, and yet we are killing 95,000 every year through accident. They meet us at every turn of the road, in every shop and every mill. Every safety engineer must be on the alert. His mind must be keen. His body must be well cared for. He must come to his task fully fit, or he isn't able to put it over, and I am glad we have such big men who are doing it.

I was thinking of a peasant who walked up from a certain station in Ireland to a friend's house and then back to the station; and he stood there on the platform and listened to some Irish peasants talking, and he heard one of them say, "Where have you been?"

"I have been over to Kilmary; and where have you been?"

"I have been over to Kilpatrick, and where are you going?"

"I am going over to Kilmore."

And he said, I'm going back to England.

As you look it over, it seems that there are many epidemics of killings; it is there on the street and in the factory and everywhere. So that the problem is a persistent one. But the results are tremendous and glorious. Think of U. S. Steel being able to chronicle in less than fifteen years a reduction of 88 per cent in accidents! Think of it! Think of the Clark Thread Company putting down on their books ten million labor hours without an accident in any factory. I say that that achievement is almost beyond thought.

Think of the Union Pacific Railroad Company having a record in the last ten years of diminishing accidents so that they can say: "There isn't any railroad in the country that can report anything one-fifth as good as the Union Pacific." And so all through I realize the reports that are coming in.

Mr. Cameron wrote me and said, "I have just been to a celebration in a town of 3,500. They have 450 people in a certain mill and for three years they have had those 450 men working without a single accident. Recently we had the whole town come out to a celebration.

You can give these same results. Men from Pittsburgh have been telling me all about it, and men from other places have been telling me. So as a preliminary today I would like to congratulate you upon the glorious achievement in the work which you are doing. It is worth while.

How glad I am to talk with some of them like Mr. Morey, of the Commonwealth, who represents the great company of managers today who are humane, who have a big, broad viewpoint, who understand what it means to struggle through life, whose hearts are tender, and yet scientific and efficient. To have them say, "Yes, we are assuming responsibility. It is up to us."

A great change has come. Once it moved in the realm of sentiment. Once it moved in the realm of toleration. Once it moved in the realm of mere mechanical and economic efficiency. Somehow today it has moved out into the realm of a definite constructive, executive objective. So that managers are saying, "Our whole business as a proposition is a failure if we are constantly killing men." So they put their brains and the brains of their managers together, and they have said, "Yes, we are responsible; it is up to us and we have got the brain to meet it, and the soul to meet it and we will do it." And I am happy in that report at this hour.

Another phase comes to my mind. We all recognize the responsibility of seeing the need of safety work and adopting methods and devices for safety development; but now this comes to me. Mr. Howard once said to the safety managers of the Commonwealth Steel Company, "I would like to have you remove all these danger signs around here, just as fast as you can. I want the whole plant of the Commonwealth Steel Company to be absolutely free from danger!"

Tremendous idea! And then the young man looked into the face of Mr. Howard and said, "Yes, Mr. Howard, but don't you realize that the primary danger in the whole business is the man himself!"

You cannot have the mill safe without men being safe; you cannot have men safe without the man himself being safe, and you have got to have the mental and the physical and the social condition in that man himself which makes him absolutely master of a dangerous proposition. It is for him.

The manager of one of our greatest railway systems recently said to me, "Do you know we have gone through the records carefully, and we find that 70 per cent of the accidents in our whole organization are caused by 30 per cent of the men? One-third of our men are producing 70 per cent of the accidents, which proves that the man is the key; that he isn't safe. There is something in him that doesn't prevent accidents, and we have got to get at him."

So once the whole safety movement—we'll say, ten, twelve, or fifteen years ago—was a movement of sentimental exultation. Then it became a mighty movement of scientific device, and we put a safety device here and there, and all of these legitimate devices cannot be perfect. You must have evolution. An idea is born. You use it the best you can and through its use suddenly all the ramifications come to you and you see what it needs to be.

Now we have changed. As a great man said to me, "We have gone beyond it. We do exult. We have our safety devices, but now we are pressing everything upon the individual man himself. We are seeking to educate him to be safe, whether he be on the street or in the home or in the shop, or anywhere, and that demands a condition."

You know, men, the most dangerous part of the automobile, don't you? The most dangerous part of the automobile is the nut behind the steering wheel. And the most dangerous proposition throughout any plant is the man who isn't what he ought to be, mentally and physically and socially.

One of Rockefeller's best stories is like this: He was in an insane asylum and he heard them say: "Do you know we had a group of visitors here last week, and one of our inmates got out and got upstairs to an open window. He stood directly over the entrance of the insane asylum, and he poured almost a whole pailful of hot water upon several people that were coming in. We got hold of him, of course, and got him down, and said, 'Why did you do that; what do you mean?'"

"He replied, 'I decided that if I was going to be an idiot I might just as well be a hell of an idiot.'"

Do you know, friends (I say it absolutely sincerely), there are people who are hells of idiots, and there are men who are in just that condition. That is one reason why we have accidents. There is a man in one of our great Carnegie plants who yelled to a fellow, "You fool up there! Stop! Use your head. Here's where safety begins. It is up to you," and he was right.

In a great match factory a while ago, a man told me of a certain boy who came there to sell fire extinguishers. He had never been in a match factory before, and he was dead in earnest. He said, "I have got something with which I can put out any fire in an instant. Start a fire and I'll show you."

The manager knew he could not, but he said, "I'll take care of you," and so he arranged with the men in the different departments to be ready for him. He said, "I know this boy with the fire extinguisher cannot do it and when the time comes be ready to put that fire out and be sure to turn the hose on him, because I know that he doesn't know what he's talking about."

Did you ever see a fire in a match factory? They started that fire and it went like that, and the little fellow got the fire extinguisher and began to work and saw it was getting beyond him, and he said, "I don't believe I can do it."

The manager said, "I knew you couldn't," and they turned the hose on him. He was the menace. It was his condition. He was the danger. He wasn't right.

Knowledge is the master of everything, and knowledge is salvation if you know how to use that knowledge. If I were talking to a thousand men, I would like to have them just feel the glory of escaping a condition in themselves which makes them a menace to their firm, a menace to themselves, and a danger everywhere they go.

Men, it isn't fair for a man to come to a shop at seven or eight o'clock in the morning in any condition of mind or body or spirit which makes him dangerous to the man next door, to the man beside him, to any part of that plant. It is up to him when he comes there to come with the phosphorus in the brain, with the iron in his blood, with his mind clear, with his body just a little over par, so that he can act like a man all the way through.

Another menace is the fellow who is drinking hootch; and I am glad that you have such detectives at the gates of your places who can detect the breath, and who insist on making the fellow who is the least bit drunk go back home. As a manager said: "The men in our factory won't work beside a man who has been drinking. We have trained them to it. It is too dangerous."

The sick man is a liability. He has dyspepsia, or something else, a sluggish liver, and he cannot act quickly in an emergency. Something happens. He isn't physically fit and he becomes a liability.

It reminds me of a fellow the other day who slipped on a banana peel and sprained his ankle. His wife was excited and said, "Shall I send for a doctor?"

"No," he said, "send for a veterinary. No one but a jackass would ever do a thing like that." And you know sometimes it does a fellow good to come right down to himself and see how darn foolish, how utterly absurd, he was to be in that condition, which makes him a menace through the factory.

The dissipated man; the man who dissipates anywhere; the man who knows that when he goes to bed at midnight he has so diminished his power that he cannot walk out of his home the next morning at seven o'clock all there. He cannot do it. He is dissipated. It is not fair to the firm for whom he works. It is not fair to his family and to himself, and that is the reason why these accidents occur.

Then again this is true. It is the chance getter who is a menace. Do you know, outside of New Haven we have one of the finest lines of traffic anywhere in New England, anywhere in the United States, on that Boston Post Road, where they have laid nine miles (I think it is) west of New Haven a perfect road. Six cars can move on it. Now remember, gentlemen, they have had that only nine months, and in the first nine months twenty-five people were killed on that nine miles.

It is up to us. The Yale boys were racing and others were racing. So in the last analysis, build your roads as wide as you choose, put all your devices up wherever you think best, all through your factories and city. What we need is education of our men which makes them see that they are the ones to be kept fit, and they are the ones to be kept perfect, so that nothing in their lives shall endanger anybody else.

Then just one other. The tired man is a danger. A great man said to me a while ago (a man who has thousands under him): "Do you know, we have checked up this proposition, and we find almost always that the men who were caught in an accident, who did not act quickly, who couldn't solve a problem quickly—we found that those men were working overtime after they left our place. They were taking on extra jobs in the evening and working until midnight, and they never came to us rested. Never."

So I have outlined to you, gentlemen, the fact that it is the man himself who is the menace. It is the child. The woman herself. The individual. And our great question, as we talk to them in the shops, and as we meet them on the street, is, do they have within them an inherent sense of responsibility which makes them feel they must keep their minds and bodies and everything about them fit to meet

the problems of every day so that, not only they themselves but everybody else around them may be safe?

So you are in a great campaign of education, and I am proud of it.

First, the man must keep his brain fit. One of our ablest neurologists said the other day that the brain, which you have and I have, has in it 9,200,000 little cells; and the ability to think reveals this. Any man right here may use those 9,200,000 cells in a variety of 30,000 combinations to meet any exigency of life:

Did you ever look through the old kaleidoscope? Did you ever take that kaleidoscope and watch those little glasses as they fell together in remarkable shapes and iridescent colors; how beautiful they were, and how wonderfully they came together! The coalitions were so perfect. Oh! If you could look into the brains of people who can think—who can size up a situation because they are well—who can meet any emergency! If we could watch the combination in a man's mind when he says, "This is the thing to do."

Now those brains were given to me and were given to you in order that we might keep ourselves fit, and you cannot keep your brain fit if you don't have iron in the blood; you have got to keep your body up to par; you cannot wear it out. It has got to be kept there to keep the mind fit.

Then again you want to keep your liver fit, too. There is a good deal dependent upon the liver, and I find some people don't think so. One of my best physical training directors, Roberts, of the old Y. M. C. A. in Boston, said when I was only sixteen, "Get a hold of that liver every morning and squeeze it for a few minutes. Keep your system clear and keep your body free from contaminating toxins, so that the mind is never clouded; and you can move through life like a man who is all there." Oh! I have never forgotten him. What we need today more than birth control is girth control. Keep it down. The nearer you can keep your body to what it was when you were thirty the better you are. Isn't that right? Keep it down.

Then the next thing to be safe is this: keep your vision clear; your vision perfect so you can see. Representative Barkley had returned from an European trip to Paducah, Kentucky, and he told of his trip through Europe. I think he visited ten countries and he told about all the sights that he had seen. Back in the audience was an old Kentuckian who had been drinking some, and he said to Representative Barkley, "Can I ask you a question?"

"Certainly."

"I just got one question I want to ask you. You have been telling us all the things that you seen. Tell me, did you ever have delirium tremens?"

And Barkley said, "No, I never did."

"Well, I want to say that you ain't never been nowhere and you ain't never seen nothing!"

Now, fellows, I am not advocating you to have delirium tremens, and there isn't a man here who would go to any such extreme, not very many men in our factories. But there it is, half a vision or seven-eighths of a vision. Keep our bodies up and every part of us fine and fit as real men, as people who work, and who are putting over the great production problems of this world.

Think of the steel. I belong to the Universal Steel Company. I believe in it. I am trying to put girders in where men need them. Keep your vision clear, so that no one can get the best of you and you can meet every problem.

Now lastly, gentlemen, somehow this feeling which I have now makes me feel very tender. Oh! Men, we are in something bigger than steel or metals. We are in something that is tremendously human and wonderfully divine. Keep up your moral consciousness. What do I mean by that? Morality in a simple sense means relationship and a true estimate of the values of human life. You are moral as you are rightly related to every other person. You cannot be moral if your con-

dition isn't fit to keep you related. If you are a danger, a menace to other people, you cannot be moral.

Tell the men that. Tell everybody that. In order to be moral we must be right in relation to them, and we must respect the value of a child. My soul was almost torn to pieces the other day in Worcester by a dear little kid that rushed across the street. It wasn't the driver's fault, but the truck's rear wheels went plumb over his head. Suppose it had been your boy! Suppose it happens in the factory, to some fellow that is dear to you!

I say to you this safety business is anything but some little cold-calculated business proposition, purely economic. This safety business is ramified, shot through and through with a feeling for humanity. We are estimating the values of human lives. We are protecting the homes. We are giving men longer lives. We are making life worth while. In the language of Harry Lauder—I'll never forget it—one day when walking down the street, he was asked, "What does it mean to live?"

I'll tell you what it means to live. God? Yes, respect for some power that is bigger than we are. Dealing rightly with the other fellow every day. Giving him a chance, protecting his life, keeping him safe. Doing your work faithfully in the factory or shop wherever you are. Coming to the end of a day feeling that you have done a good job and you have endangered no man. There has been nothing in you that could endanger him. You have been master of every situation. Coming home to your night's supper and supping with your bairn and your wife; and going across to the next door and sitting with Jock and smoking your pipe; and in the evening after all is over, giving Jock a good shake of the hand and pushing your hand way up in his, and saying: "Good night, Jock. See you in the morning." Then going to bed and resting with the angels and getting up the next day and walking down the street—fit, absolutely fit for your job. Not endangering life, but saving life.

CHAIRMAN NORTHWOOD: Your committee did not make a mistake in choosing the man to make our inspirational talk. I just wish that we had ten times as many safety men in this room to hear this talk. It is something for us to take home. To fight hard and to work hard!

Doctor Rust, in the name of our Metals Section, we want to thank you for this stirring talk. It has been worth while.

We will now have the report from Mr. H. G. Hensel, chairman of the Statistical Committee.

Report of the Statistical Committee

By H. G. HENSEL
Chairman

My work as chairman of this committee has been to cooperate with the Headquarters of the National Safety Council in the gathering of statistics, and the results are clearly outlined in the pamphlet entitled: "Industrial Accident Experience of Members, National Safety Council, 1927."

No doubt all members have a copy of this pamphlet. If not, same may be obtained by writing to the National Safety Council, 108 East Ohio Street, Chicago, Illinois.

The first page of this pamphlet gives us the facts of major importance that are revealed by the Industrial Accident Statistics tabulated by the National Safety Council for 1927, and as reported to them by 2,089 establishments.

The purpose of this printed report is threefold:

1. To enable each establishment to compare its own record with the records of other establishments in the same line of business.
2. To provide a typical cross section of the experience of American industries so that the national trends of lost time accidents may be studied.
3. To convince skeptics that accidents can be reduced through organized and well directed efforts.

All members of the Metals Section should be specially interested in the part of the report covering this Section. The Metals Section report is found on pages 14 to 20, inclusive. A brief outline of some of the important features of this report are as follows:

1. 450 establishments reported for 1927, 318 in 1926. Increase 42 per cent.
2. In 1927 326,362 employees worked 818,618,172 man hours.
3. The 450 establishments are divided as follows:
 - 7 Coke plants.
 - 9 Bolt and nut manufacturing.
 - 29 Structural steel fabricators.
 - 28 Gray iron foundries.
 - 14 Malleable iron foundries.
 - 73 Machine shops with foundries.
 - 101 Machinery and machine tool manufacturing.
 - 15 Railway car manufacturing.
 - 82 Steel plants.
 - 21 Steel foundries.
 - 23 Tubular products manufacturing.
 - 32 Wire manufacturing.
 - 16 Miscellaneous metal working companies.
4. 1927 average frequency rates = 26.59. Average for 5 years previous equals 36.06. Reduction 26 per cent.
5. 1927 average severity rate = 1.85. Average for 5 years previous equals 2.23. Reduction 17 per cent.

In closing I would like to urge all members of the Metals Section to report for the year 1928 a summary of their accidents to the National Safety Council, and if you do not receive a blank form for that purpose, write to the National Safety Council for it.

I am advised that all reports for the year 1928 should be in to the National Safety Council Headquarters by February 1, 1929.

ADJOURNMENT

October 2, 1928

J. A. NORTHWOOD, Chairman

Superintendent of Safety, Bethlehem Steel Company, Johnstown, Pa.

The second session was called to order at nine-thirty o'clock by the chairman, J. A. Northwood.

CHAIRMAN NORTHWOOD: We promised to get started right on the dot and we are going to have a couple of songs to get us in real good trim this morning. (The members joined in singing a number of songs.)

CHAIRMAN NORTHWOOD: I have one or two men whom I want to introduce to our Metals Section. We have one or two of the old guard who left our safety game, and boys when the safety game gets into your blood, it just cannot get out and they are back in it again.

I want to introduce Mr. Jack Mulligan, who is one of our past chairmen of the Metals Division.

MR. MULLIGAN: Mr. Chairman, glad to meet you again; boys glad to be here.

CHAIRMAN NORTHWOOD: Mr. Gibson was a past chairman of our section and has been out of the game for a while. Mr. Gibson I would like to have the fellows know you.

MR. GIBSON: I am standing as high as I can stand.

CHAIRMAN NORTHWOOD: We are mighty glad to have them back in the harness again.

Now then fellows to get down to business. We are here all together in a good spirit on a serious matter, and I wonder some times if we realize how serious it is when we have a congress of this kind with 5,000 to 5,500 men and women gathered together for one purpose, and that is to protect lives. It takes in all branches of the safety game from one end of the country to the other; and yet with it all our accidents are going up—particularly our highway accidents.

It means, as I see it, that those of us who are in industrial safety, who are more or less trained in getting the game rolling from an industrial standpoint, are going to have to take more active interest in our public safety work. It means that we have to get in the game and push with all we have.

We have with us this morning a very outstanding man, a man that you are going to be mighty glad to hear. We are going to handle our subject from the various phases and Mr. R. M. Roosevelt, Vice-President of the Eagle Pitcher Lead Co., New York City, is going to speak on safety from the viewpoint of the management, which means the beginning of things.

Safety From the Viewpoint of Management

By R. M. ROOSEVELT

Vice-President, Eagle Picher Lead Company, New York City

I have been asked to talk on safety from the viewpoint of management. I believe there are many different ideas of management, but management to me is something like a tree. It has roots and a trunk, branches, leaves, and some times bears fruit if the roots and the trunk and the branches and the leaves all work together.

All trees have to start from the roots, naturally, which to me is the workman.

After I graduated from college, I went to work. I think the third day I was at work, I came back from lunch and saw two or three men gathered by a tank car. I went over to see what was the matter and they were pulling a man out of that tank car. His face all around was gone clear to the bone. They laid him on the

dock. I took the pulse to see whether he was alive or not, and it was beating good and strong. They sent for a doctor. I held the pulse and pretty soon it didn't beat any more.

They had missed the man at noon. He hadn't come to his lunch. They had gone to look him up. He had been sent into the tank car to clean it out. There was some sludge acid in the bottom. He had gotten overheated or something and fallen forward into the sludge. I suppose they buried him; I didn't see any more of it. I suppose the insurance company paid the bill. It wasn't on our cost sheet, anyway.

I was nothing but a workman, but I always thought if I got to be anything else that such things would never happen. I couldn't do anything then; there was nothing anyone could do. I had no voice in the matters of management. I couldn't go down to the general office and tell them what I thought. So I shut my mouth, the same as every other workman does.

But in that plant I noticed that while the men were on their jobs when the whistle blew in the morning, I have always said that if the fire whistle blew at five o'clock at night that nobody would stop to see where the fire was; they all go home regardless of what happens. That was my impression of the place when I was a workman.

The New Foreman's Viewpoint

Later on I became a foreman in another plant. That was where I was going to stop accidents. We had a roasting department where we took hot ore out of cars, putting them on little elevators and hoisted them up about fifteen or twenty feet in the air. We shoved the cars off over the tops of bins, pulled a lever and dumped the ore into the bin. I stood about one hundred feet away from that elevator one day. The car went up to the top and a man started to shove it off. He got the front trucks off but didn't have his elevator up within about an inch. He could not get the rear trucks off so he started to hoist the elevator another inch. He pulled the wrong rope and tipped the car up on end. The ore ran down on the ground on his buddy who had helped him put the car on the elevator. It burned his buddy and started to burn the man on the elevator. He jumped and sprained his ankle. The elevator kept on coming down with the hot ore. A third man ran up to grab the rope to stop the elevator and it crushed his foot. In the meantime I hadn't gone fifty feet toward that elevator—I had been about one hundred away to start with.

I was a foreman. I was going to stop accidents and there were three of our men hurt in about fifteen seconds. Well, I didn't know what to do then. But I decided that the men had not had enough practice in thinking for themselves. They had not developed themselves. They needed a little more self-governing. If they had had safety drilled into them the man who pulled that rope would first have made absolutely sure that he had hold of the right rope.

I did a lot of thinking. (Please excuse my reference to what I did. I don't mean to say I. I didn't write a paper on safety. Mr. Quesnel, who is responsible, told me that if I would just come over and talk, that he would forgive me for what I said. So I am just telling you these experiences to show you the process that I have gone through from a laborer on up, and how necessary it is, in order to bear fruit, that the roots and trunk and branches and leaves should all work in harmony.) I educated the men under me to think for themselves. We cleaned house. We put in bathrooms—couldn't get anyone to use the bathrooms at first. (The first man who used the shower baths, we had to carry in with his clothes on and put him in.) But we got them accustomed to the water. They didn't die or anything of that kind, and you couldn't take those baths away from them today with a company of infantry.

I went as far as I could as foreman but I didn't stop accidents. I stopped some of the foolish ones, perhaps, but there were a lot more of them going on.

Every accident that happened delayed the operations. We operated twenty-four hours a day. This one accident I told you about, we were probably three hours getting straightened out, and supplying men to take the place of those injured. In the meantime there were so many charges lost. So much below par; so much below the possibility of that department at the end of the month, and the department which followed and depended upon the operation of that department to carry on.

I felt that if I got to be a superintendent some day, I would correct a great many things that I couldn't as a foreman. One day I was offered a job as superintendent in another plant, and took it. I helped my foremen dispense with accidents, but I found at that time that the foreman never realized how much the accidents cost him. He put another man on the job. The insurance company talked to the man who was hurt. The foreman never came in contact with the cost; he never knew whether the insurance company paid one hundred dollars or one thousand dollars when a man hurt his finger; and it didn't mean anything to him.

So I made arrangements with the insurance company that we would settle our own claims, and settle them fairly to both the insurance company and the man. I found out, by the way, that of the money we paid into the insurance company at that time, only twenty-two cents out of every dollar found its way to the workman who was hurt. The rest went to attorneys, for overhead, to the claim agent, etc.; and I was quite shocked at such figures as those. So we took the thing in our own hands. We kept the claim agent out of it, and the foreman and myself dickered about what we were to pay. That was the first time that we ever began to realize that accidents really were paid for by somebody in cash. We had simply turned it over to the insurance company and that was the end of our worries.

We got along pretty well under those circumstances. But still men were hurt, and the foreman and the men themselves said, "Well, you don't think the men are getting hurt for fun. It hurts them to stay in the hospital a darn sight more than it hurts you, as superintendent, to have them hurt. They certainly are not doing it of their own accord." And I couldn't answer that argument.

Later on I became manager of a plant, and then I carried my own insurance. That brought the cost of accidents absolutely home to us, because it came out of our own payroll. If a man was hurt we put him on the payroll for half-time or full-time; and the amount that it cost to operate that plant subtracted from the amount we received, was the profits. If there were no profits, we had to cut wages or do something else, but there had to be profits in order for foremen or men to get raises in wages. That brought the question of the cost of accidents home to both the workman and the foreman and the superintendents of the plants. We went along for quite a while with that.

Then as the plants got bigger we put in a personnel man who did part of my work and kept tab of the men; working with them on many things. We found that a man who had bad teeth and his system all run down, was more liable to accident, than a man who was in good physical condition. Most accidents happened at the end of shifts—when the man was tired, but if a man who had bad teeth, or was sick any other way the result was the same and we had to examine these men. We finally required a physical examination to start with.

I am trying to confine my remarks to management and not how we did all these things. I am trying not to go into detail.

When upon a physical examination, we found a man who had bad teeth we didn't lay him off but sent him to a dentist and had his teeth fixed up. We found a lot of fellows that were absorbing pus from defective teeth. Their vitality was low and they couldn't think and they didn't care. We gradually worked until we had a gang who were proud of their jobs, because it was—I

won't say an honor perhaps—to work at that plant, but it meant that a man who was working there was absolutely fit and clean in every way. It became so that a girl who knew a man in one of our plants, knew that she was acquainted with a man who was absolutely clean and fit; and it meant that when a head of a family was working at one of our plants his whole family knew, and the merchants and everyone else he dealt with knew, that he was on the square, mentally and physically.

This department continued working along such personal lines; worked in sickness and outside accident compensation, and things of that kind which help a man retain his mental alertness. If a man was out hurt or sick for two months and came back with everyone pressing him for grocery bills, he couldn't have his mind on the work. The result was he would get hurt. You have to have that man so that he can think 100 per cent of his work while he is at the plant. He cannot have family worries; he cannot have bills to pay; he cannot have anything the matter with him physically; and he must have a certain pride in the place he works, and a certain confidence and pride in that company; until you get that you cannot have a low cost of accidents.

We worked along these lines until about 1925 and our cost of accidents had been reduced to about \$12.09 per man per year. That is only one dollar a month for every man you have working for you, and we thought that was quite wonderful. But we hadn't gone the limit yet. We found that could be improved upon, but it couldn't be improved upon except by the men themselves. We had the men clean; we had their minds on their work; but we had to turn still further the management of affairs over to those men so that they would have an increased amount of pride in the records which they made; and we did that.

We appointed the men on committees. We brought about competition. We had sign boards and with discs for each department showing the record of that department each day—green discs if they didn't have an accident and a red disc if they had an accident. At the present time those sign boards have little automobiles racing across from one end of the month to the other. When anybody has an accident, his automobile is turned over the day that he had the accident; and while there may be a certain amount of psychology in that, it is simply to make a man look at the board oftener. But the real thing at the base of it is the pride which he has in his department. We did that in 1925 with a loss of \$12.09 per man per year. In 1926 we reduced that to \$2.69, a decrease of about 80 per cent, by turning things over to the men themselves and letting them run their own business. In 1927 we showed a further improvement and reduced our cost per man per year. When a man hurt his finger, if he went five times to a doctor that was always thrown in. We have reduced cost of compensation and doctors bills to \$2.24 per man per year, and we are still going.

I am telling you this to show you that the management—whatever the word management may mean—has to know how the man thinks, the superintendent thinks and the plant manager thinks; and that all have to work together. The plant manager has to help the foreman, and the foreman has to help the man; and when you get them all working together, as a tree should work together, you can bear fruit.

The cost to the company of these accidents has been a very, very great amount, but it is small compared with the savings in operations by the reduction of accidents and the increase in the health, the increase in the interest the workman has in his company and his plant. That has come about and been built up at the same time we have built up safety work.

I told you that when I was a foreman, there were many shutdowns due to accidents. I suppose that in a department working twenty-four hours, we averaged nearly two hours lost out of the day—that is I won't say two hours out of the day shut down, but if we were supposed to make twenty-four charges in twenty-four

hours, there were probably two charges a day that were lost on account of accident or an elevator breaking down or something of that kind.

Today the man in charge of that same department is allowed one hour and a half a month lost time on that department. Then he gets a bonus of so much a minute for every minute less than one hour and a half that that department is shut down during the month.

We have increased the output of this department; without changing the type of the men. The same man who is foreman of this roasting department today was one of the workmen in the accident that I told you about which happened twenty years ago. We haven't more intelligent men; we haven't men with more education; we have the same type of men. And still, from two hours a day then our shut-downs now are considerably less than one hour and a half a month.

I don't know whether you gentlemen go into the cost of production or not, but any foreman can get 98 per cent efficiency from his department. The extra 2 per cent is your profit, and it is what you get out of that 2 per cent which either makes a profit or a loss to your company on that plant. That is cutting it down pretty fine, and when we get our loss of time down from two hours a day to one hour and a half a month, we have our profits, the entire profit of the plant, on what we have saved in shut-downs. So that the profit of this plant might be said to depend, on the safety work that is going along with it to create a mental condition in the men that makes these time losses so small.

I say that the men have not changed. We haven't hired better men. I remember one accident when I was superintendent of construction. We were building a stack and passing the bricks up in the center of the stack. The man on top was a brick layer. He called down to one of the men on the ground. The man stuck his head in through a hole at the bottom of the stack. The brick layer moved over to talk to him, rushed back and pushed a half dozen bricks off the stack. The man down below was in a trap and broke 3 ribs. The man who caused that accident has no more education than he had that day but is now one of our superintendents, and one of the strongest men that we have for safety.

It is not the men, it is the management that has improved—that has taken the same man and educated him to the place where we can do these things. Today we have numerous ways of noting the change in the men. For instance, I was telling Mr. Quesnel at breakfast this morning that a couple of Sundays ago a man had gone away on an automobile trip about 125 miles. He had car trouble and couldn't get back for work Monday morning. He sent us a wire at his own expense that he was stalled and that he couldn't get back and he would be back at a certain time. He thinks just that much of his job. He didn't have to do that, but he wouldn't think of not being on the job Monday morning when the time came for him to take his shift, without letting us know ahead of time so that there would be a man in his place and it would not spoil the record of his department.

All these things, I call management; and without this management, and without the harmony between its different branches it is absolutely impossible for safety work to go on; and we would lose the benefits from it and they are so great that they are almost immeasurable.

I'll say another thing, that even if your plants are doing very well you must realize there are lots of plants that are not doing as well. I was talking to an old classmate of mine last Friday night and he told me that they had made a survey of a certain district of workmen in the United States and found that between 50 and 52 per cent of those workmen had lung adhesions or something else—spots. I thought that over. So, because certain plants are good, it doesn't mean that they all are. And you gentlemen who have good plants, and the workmen who are working under you gentlemen, must realize that you are not only working for yourselves, but you are working for districts that have not yet gotten out of the

hole. You are working for districts where 50 per cent of the workmen are afflicted with lung trouble at the present time. While in your own plant you may be helping a thousand men or five hundred or two hundred, you may be helping fifty thousand men outside your plant by the example which you set and the notice which you attract to this safety first, by your conventions and the published articles and the example.

CHAIRMAN NORTHWOOD: I want to know now if there is any discussion or any question that you want to ask Mr. Roosevelt. I think Mr. Roosevelt has given us a splendid talk, just the kind of a talk that we wanted, and there may be a number of men who have some questions to ask him at this time.

A. BERQUIST (Youngstown Sheet & Tube Company, East Chicago, Indiana): I would like to ask Mr. Roosevelt if the statement he made relative to that 50 per cent, was the country as a whole or was it confined to the zinc mining industry?

MR. ROOSEVELT: I didn't say that 50 per cent was subject to tuberculosis, because I do not know just what form of lung trouble these men have. I mentioned adhesions, which in my mind does not mean tuberculosis. I mentioned spots which do mean tuberculosis.

The only reason I mentioned this was to show you that there are places where the safety work has not gone on to the extent that it ought to; and while you are working your men and meeting here, you are not only improving things in your own factory, but you are pulling these other districts out of the rut, these districts which you have never heard from before.

H. J. WEEKS (American Steel & Wire Company, Cleveland, Ohio): Statistics prove that 95 per cent of the lost time and fatality accidents are among the foreign born Americans; and I would like to ask Mr. Roosevelt if, from the management viewpoint, a foreman or superintendent orders a laborer to do a certain piece of work, and in the estimation of this laborer it is too dangerous, should he be subject to dismissal for refusing to do the work?

MR. ROOSEVELT: I am trying to find some fitting way to answer your question. I know what the question is, but to say "Yes" or "No" is not a sufficient answer to you.

I remember a case in the war where a certain general came back and reported to headquarters that he had done everything he could to gain a certain objective: that he had laid out the plans; that he had ordered his men forward time after time, and still the objective was not taken. That man, high in rank as he was, was immediately relieved, and another gentleman, who happened to be an engineer, was put in his place, and that night the objective was taken.

I think a foreman or superintendent who orders a man to do anything that he is not willing to lead that man into, that he is not willing to do himself, should be relieved the same as this general was, and some one who will lead the men instead of ordering them to do a certain piece of work be put in charge.

I never ask a man to go in any place that I am not willing to go in first.

A. T. MOREY (General Manager Commonwealth Steel Company, Granite City, Illinois): I would like to ask Mr. Roosevelt if they have periodic examinations or just upon employment.

MR. ROOSEVELT: We have examination on employment. Then we watch our men pretty carefully and the foreman makes a report each month on how that man is doing his work. That is, he rates him 80 or 85 or 93 per cent on a card in the personnel department office.

We don't want to make every man go through a physical examination every month, but that man can go to the personnel department office and see his card any time he wants to see it. And he will see, if he goes there once a month, exactly how he stands with his foreman. On that personnel card the average or the rating is gotten from five different parts. That is, such as workmanship. I can-

not remember those things off hand, but they have the workmanship, the way he gets along with his fellow men, his disposition, and such things as that on that card; and then these are all averaged up and the total average is the standing of that man.

Now if that man's standing drops down, there is some reason for it. If he doesn't come in to see his card of his own accord, the personnel man sends out for him and shows him the card and asks him what the trouble is. If he says he has not been feeling well, he is sent to the doctor and it is found out why he has not been feeling well. If he has family trouble, the personnel director may go and see his wife. When I was doing that work I settled quarrels with one man's family as many as three times in one month, but I had to do that to get the desired efficiency out of that man. So that is the way we keep tab on the men without the necessity of putting them through a physical examination every month.

TOM McCARTUS (Standard Steel Works, Burnham, Pennsylvania): Mr. Roosevelt spoke about the company getting the men's teeth fixed up and putting him in a general state of good health. Was the cost of this included in the cost of accidents that he mentioned, or did the men pay for this out of their wages?

MR. ROOSEVELT: The cost of taking care of a man's teeth or sickness is not charged to the cost of accidents. It would not be fair, I think, to charge bad teeth or diphtheria, or any other disease, to the cost of accidents.

L. O. WHEELER (Union Carbide Company, Niagara Falls, New York): I would like to ask Mr. Roosevelt regarding the \$2.24 cost; how many men that covered?

MR. ROOSEVELT: That covers a plant. It doesn't cover our whole company. It covers the plant which I had charge of before I came to New York; and that covers from 200 to 250 men, according to whether production is going on or not.

S. E. SANKEY (National Tube Company, Elwood City, Pennsylvania): Can a manager or a safety department put safety over if the manager doesn't think more of the men than he does of the output?

MR. ROOSEVELT: I told you that management was like a tree. If you plant a tree in an orchard and it doesn't bear fruit within the first six months, you have to keep on watering it. You have to take care of that tree. You have to keep the ground spaded up around the roots. You have to keep the bugs off the trunk and you have to keep disease from getting in the leaves. You have to baby it just the same as you would a baby of your own before you can ever hope to get any fruit off that tree.

Now some people can cultivate other people. By that I mean, they can appear to be friends to them when they really are not, in order to get orders from them. I don't think that such a thing really can be done successfully. You have to like a person in order to mix with him or that person (unless he is dumb) will see that you are trying to cultivate him. You have to like a workman in order to take the proper care of him. You cannot dislike him.

If you have been a workman, as I have, and a foreman, etc., you can never be anything else except part workman and part foreman and part superintendent and part manager. If you have come down from the top, I hardly know how you can ever be successful in handling men. On the other hand it is possible for a man to think too much of or spend all of his time on the workmen without regard to whether the tree ever bears fruit.

If I should answer your question by saying he has to think more of the workman than he does of the output, or more of the roots than he does of the fruit, I don't think that would be a correct answer. Sometimes you have to top a tree to make the roots spread; sometimes it all goes to roots and you will never get any top or any fruit. There has to be a balance between these things.

MR. SANKEY: That is good for small companies, I am sure. Is it not your fertilizing that brought you up to think and put this safety over, as you say in your feeling for the man? Aren't there many managers who cannot see the neces-

sity for fertilization until they see the distress brought down to them?

MR. ROOSEVELT: I don't think anyone is capable of commanding unless he has served.

Now I'll go still further: when I first became foreman and had a very small plant I knew every man who was working for me by his first name. I knew his wife and I knew his children and all of his troubles. As I began to get more duties and went out of town a great deal, I could not make the contacts with these men the way I wanted to. That is the point where the break between what some people call "management" and the workman begins.

With me, I would not stand for the break, so I took a certain man and put him in as my personal representative with those men. Now that man handles about 95 per cent of the contact work with the men that I would like to do, and that I once did, but which I no longer have time to do. About 5 per cent of those things are a little too delicate or a little too important. They might establish a precedent or something of that kind, and he has to bring me in to consult on them. But he can take a great number of things off my hands, since he knows me well enough, and they can be decided upon without bringing them to my personal attention.

When I first put that man in I told the men that he was their attorney, that he was their pit committee. I have never had such a thing as a strike in my life, but if such a thing should happen I would send that man away until the strike was over. Then he would still be their man and not the company's, and would represent their side of the case to me. He would be their spokesman primarily, although he could not help but be my spokesman when he took my answer back.

CHAIRMAN NORTHWOOD: I think this discussion is very fine and we have received a lot from it.

STEPHEN KOROCO (Pittsburgh): One more question with respect to this address. You say from the management standpoint that you got to know your men, and that to get efficiency you must know your man by his first name and you must like him.

I would like you to explain, Mr. Roosevelt, about if a man is injured, instead of being discharged, he is taken into the roasting department. What do you mean by that?

MR. ROOSEVELT: The roasting department was the department in which the man referred to was hurt. The roasting department is not a department where we roast human beings.

I said that when I was foreman in this roasting department and men were hurt, that there was nothing that you could say to those men. It was the system that has wrong in some way. That they had not been educated to use their own minds, they had not been taught to think; they had not the proper safety consciousness.

If a man is safety-conscious and there are two ropes, he will be sure that he is pulling the right one, instead, as that man did, to grab either one of them. But it was the fault of the management that the men hadn't this safety consciousness; it was the fault of the management that the men had not been taught to think for themselves.

Today a foreman is not supposed to instruct a man how to do each one of his daily tasks. For instance, I never send out word and tell the foreman to do a certain thing; I never expect that foreman to tell the man to do a certain thing. I expect to tell that foreman that it is necessary to do a certain thing because we have a shipping order or something that makes it necessary. The foreman is supposed to know his job, and he is supposed to take whatever action is necessary; and I don't want to insult his intelligence by telling him what action to take.

When he tells the man that we have to get out twenty-four charges today, he tells him why. He doesn't tell him to go and take out twenty-four charges. He says that we are behind twenty-four charges, and need them to keep the furnaces run-

ning. We don't insult that workman by telling him what he has to do. We tell him the need of the action and we believe that workman is intelligent enough to do it.

We never fire a workman. That would be foolish. I don't think there has been, in this plant that I am talking about, a workman fired in the last ten years. Not one. A workman who cannot get along with one boss, comes to the personnel department and he is given to some other boss. If he cannot get along with that boss, he comes back and he is given to some other boss, and we try to find the notch or the hole in which that plug will fit and work. If after we have done that four or five times, there is no hole in which that man works, he will come into the personnel man, "Well, Jim, what the ——— is the matter with me?" And Jim will tell him what is the matter with him; and he will either correct it, or say, "I have tried to correct it and there is only one thing for me to do and that is to quit." But a man is never fired.

A man coming to the plant is carded. He is asked his ambitions, and there is a record kept of them. Different numbers for the different departments are put on the cards. If his ambition is to get an office job, he is tagged No. 1. He never needs to apply for a job in the office. Whenever there is a vacancy in the office, we go through the cards of these men who are tagged No. 1. There may be seven who are tagged for office jobs and we will pick the best. If the other fellows come in and say, "Why did you pick Jim instead of me?"—we will tell them why we picked Jim; and that if they would correct these things, maybe they would get the next chance. However, we never fire a man. That has passed out of existence years and years ago.

CHAIRMAN NORTHWOOD: We would like to continue this discussion for another hour. I know that it would be worth while, but we have the rest of our program to follow out.

I want to introduce our next speaker. We have heard from the plant manager's standpoint. The next speaker is the foreman. We are going to hear something from the foreman's standpoint from Mr. Dominic Samuel, foreman at the Youngstown Sheet and Tube Company, Youngstown, Ohio.

Safety from the Viewpoint of Supervision

By DOMINIC SAMUEL

Foreman, Tube Galvanizing Department, Campbell Plant, The Youngstown Sheet & Tube Company, Youngstown, O.

With the difficulty I experience in expressing my thoughts in English I hesitated for some time before accepting this invitation. I also feel that the men speaking before this convention are specialists on safety, and as I can only offer a review of safety as it applies to my own department it may be that many of my remarks are repetitions of safety ideas brought before this council on previous occasions.

Right at this time I wish to say that when this safety drive first started in earnest, our management, through our superintendent, instructed myself and other foremen what was expected of us, advising us also that we would be held accountable for the safety of our men. He also advised us that his office would give every possible assistance and backing, and explained that the safety first idea was to be given preference over production.

I am foreman in the tube galvanizing department, Campbell Plant, of the Youngstown Sheet & Tube Company. To those of you who are not familiar with the procedure in a galvanizing department I will mention that we have, as major hazards, caustic soda, salomoniac, muriatic and sulphuric acid, and also molten spelter to contend with, and until this safety first drive was in force the appear-

ance of the accident investigator was a daily or weekly occurrence in my department.

From my own experience, bringing this thought to sub-foremen and men was no easy matter; their idea at first being that it was only a fad and that it would soon die out. Needless for me to say that after attending meetings conducted by our superintendent, my ideas were different. As a foreman it was my duty to carry out the instructions of my superior, and I went into the matter heart and soul to eliminate as far as possible the hazards in my department. It was not long until I realized that our most serious hazard was the attitude of my men toward safety, and after making a few mechanical safeguards I set out to drive home to each man a safety thought.

After a short while I specified that on a certain day and hour each week I would conduct a safety meeting and advised the men that they would have to attend. What transpired at these meetings was recorded and a copy of the minutes was sent to the superintendent and the safety director. At these meetings I explained to the men the hazards of their work and how they could best guard themselves against danger. I explained the actions of the different acids used in connection with galvanizing, and how this material coming in contact with their bodies would cause serious burns, and how easily eye sight could be destroyed. With the exception of very few, the men in my department are compelled to wear goggles. In order to keep safety on the minds of my men I also placed signs at each pot bearing helpful safety suggestions.

As many first aid ideas as possible have been demonstrated at these meetings and on several occasions application of these ideas have been beneficial. Just recently the clothing of a man in our department caught on fire and, as seems to be the natural thing for many men to do, he started running; but one of his fellow workmen remembered the teachings as conducted in my office and immediately grabbed him and threw him to the floor, smothering the flames with his own coat. These acts are also given consideration by our management and this man was given a silver medal, and his act given publicity throughout the plant.

My men have all been instructed to be on the lookout for hazards and to make a report of conditions that they think can be improved upon. It is not unusual for my men to speak to their fellow workers if they, in their mind, think that they are not following the safety first ideas and practices as closely as possible; and I have had men report to me on several occasions where these men have resented having their attention called to this matter. I then make it a personal matter to caution these men, and if I could not thoroughly impress them with the importance of safety they did not remain long in my department.

I notified my men that, owing to the possibility of acids splashing, they would have to wear high top shoes and that the soles would have to be in first class condition. Inspections were made to see that these instructions were complied with, and if a man reported with shoes that were not in good condition he was immediately sent home. I do not hire my men direct. My calls for men are placed with what we call the "labor department," and it was only a short while until the foreman in charge knew it was useless to send a man to my department unless his shoes were in good condition.

Safety discussions at our meetings were not confined only to our own department but covered entering and leaving the plant, and also urged that the safety idea be carried back to the home. They were urged to explain the first aid ideas and artificial respiration to other members of their families. Men were cautioned that if they were placed in some different work that they were not familiar with they were not to proceed until they had been thoroughly instructed concerning the hazards of the job. Where men have been instructed concerning these hazards and violate instructions, even though no accident occurs, they are disciplined. I sometimes suspend or dismiss them depending on the attitude they take towards safety, or sometimes demote them.

It is difficult to explain here the proceedings of these meetings and the various items that we discuss, but everything that concerns safety as it applied to this department was given consideration; and, as stated before, my men did not take safety seriously at first but it was not long until they all realized and fully appreciated what we were driving at and they took a very active part toward furthering safety first. With all my men taking this active part in safety it is needless to say that accidents have been almost entirely eliminated and during the past year I have not had a lay-off case in my department.

In closing I want to say that I think we should talk to our men on the job, be careful to see that new men know how to do their work safely and right; and in our talks, go over and over the same safety ideas, told a little differently each time. I am voicing the appreciation of my men and myself for the insistent stand that our company took on the safety question, and I also thank this National Safety Council as the originator of this great move.

CHAIRMAN NORTHWOOD: We certainly want to thank Mr. Samuels for this paper. We have now heard from two sides of the game, the supervision and the management. Are there any questions you want to ask?

We have a question that was asked. "Have we yet outgrown the fatalistic idea that some accidents are inevitable? Do men control accidents or accidents control men?" I wonder just what your reaction is to those questions.

R. M. ROOSEVELT (Vice-President, Eagle Pitcher Lead Company, New York City): I do not think there is any such thing as luck. That is a personal opinion. The fellow that is lucky is generally the fellow who gets down and does some hard work, and I think I would stake a fellow any day that works hard against the fellow who trusts to luck.

If there is no luck, then accidents don't control the man. The man can control the accident, but he can very easily get careless. If he doesn't have any accidents for a long time, that's the time he has got to watch his step. Throw out your cautions and tell them that they have not had any accident for a long time, and you may be sure that some one is going to get careless; and generally he gets hurt pretty badly.

I have been all through this thing of the men saying that they don't get hurt of their own accord, because certainly they are the ones who get the worst end of it.

For example, we had a mechanical department and when we began analyzing we found that the mechanics composed about ten per cent of our plants and were having about 90 per cent of the accidents. They said that their duties were very hazardous, and that they could not get along without the accidents.

We didn't want to fire any of those men, but we posted the names of the fellows who were having accidents. That made them as sore as boiled owls. But those men whose names were posted quit having accidents. I don't know whether it is luck or what you call it, but our mechanical department that used to have 90 per cent, on September 7th, had gone 974 days without a single lost time accident.

CHAIRMAN NORTHWOOD: There is a whole lot in what Mr. Samuels said, getting the story right to the man down the line.

L. O. WHEELER (Union Carbide and Carbon Company, Niagara Falls, New York): I would like some information on safety committees. What they are worth and what they should do and how many there should be to a plant. How long a man should serve on a committee. This has worked out very well at our plant, and I want to get a few ideas, if there is any such thing.

Today we have a record we hung up last Saturday, 1,200 men in our plant working ninety-eight days without a minute of lost time.

J. M. WOLTZ (Youngstown Sheet and Tube Company, Youngstown, Ohio): I have here in my hand a report of the auditors of our employees' relief association that might contain some interesting information.

This organization is composed of the employees of the company and there are 11,873 in the Youngstown district who are members. In looking over these schedules I found that last year there were 88 deaths out of these 11,800 employees. They schedule 11 of those 88 deaths as accidents. Three of those are accidents that occurred in our mills. Eight fatal accidents occurred outside of the mills. Those were automobile accidents, street car accidents, and in two instances hunting accidents where guns were discharged and the men were killed.

Among the various things that we have been trying to put across to our men is the fact that their own work in the plant in reducing accidents and fatalities, makes our plants safer places than the streets and the home and we are using this report to show them that our statements during the last two or three years bear some measure of truth.

G. H. McCLAIN (Johnson and Laughlin Steel Company, Pittsburgh, Pennsylvania): We have a plant in Pittsburgh, called the Southside Plant. It is thirty months tomorrow at ten minutes to four since they have had a fatal accident (unless something has happened since I left home); and in that time we have positive proof through our employment office and elsewhere, of 12 fatal accidents having happened elsewhere to our employees of that mill on the South Side. There are about 5,800 men on the payroll in that mill.

Out of that thirty months without a fatality in the plant, I know of twelve drownings, gas asphyxiations in their own homes, automobile accidents which was the big thing, and so on. So when in our steel mills they are safer than when on the streets or in the homes.

TOM McKINNEY (Illinois Steel Company, Chicago, Illinois): While Mr. Roosevelt is here I want to ask for a little information pertaining to the last question that was sent up. I don't believe in luck either.

The question was, "Does the accident control the man or does the man control the accident?" Somewhere, some place, I read something about the right combination of causes. I cannot get that quite through my head. I would like to get some enlightenment on the right combination of causes. I got into an argument a short while ago with a gentleman with reference to that subject.

I argued that you can beat it, and their explanation of the right combination of causes was this: Here is a man who is driving an automobile for the first time over a road, and he comes to a crossing and crosses where the Twentieth Century is about to come, and the Twentieth Century is one minute late, or one minute ahead of time. Why should the man with the automobile meet the Twentieth Century at that particular time? The first time he ever went over the road, the Twentieth Century is a minute late or early, or whatever it might be. They call that the right combination of causes.

Can there be such a thing? I think the man driving the automobile could have protected himself. He could beat that right combination of causes by the proper protection, such as getting out and looking for the train.

Does that exist in the plant? You know that every day in our plants we are having a new kind of accident. We are trying to forestall and we are trying to protect ourselves, and we go along, and then we have another accident. We never had one like it before, and we get busy on it and we remedy it so we cannot have another one; and we don't; but in a short while we have another kind, a new accident, and we protect ourselves against that.

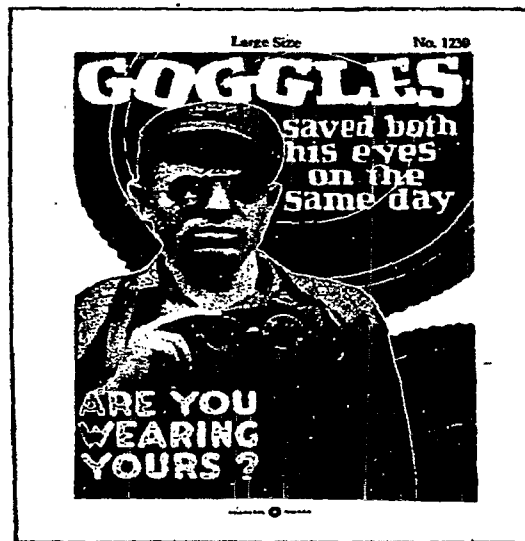
I just cannot get this right combination of causes into my head, and I think Mr. Roosevelt and Mr. Morey, and perhaps some of the rest of you gentlemen can give me a little information on the subject.

A. T. MOREY (Commonwealth Steel Company, Granite City, Illinois): I think where we have a principle involved, we do not have to start with the hypothesis that we have got to have that principle wrong. A thing that is wrong in principle

doesn't have to be. Where there is light, there is no darkness. A positive displaces a negative.

It seems to me that this matter of accidents is just a measure of our own growth. For instance, wood working machinery used to be considered the most murderous there was. Through intelligent study of the problem and through cooperating with you men in such meetings as this, we have learned to safeguard wood working machinery in our plant. In our new shop about 100 men have gone nearly 1,300 days without a lost time accident, and our old shop went 700 days before they had an accident. Now, it seems to me that was just a measure of our intelligence and understanding, as we rise above these conditions.

You take Tom's illustration; I don't see that there was any fatalistic condition there. The man wasn't experienced in driving and he didn't stop, look and listen.



If he had obeyed the safety rules that intelligence has taught us he wouldn't have been hurt.

We never get the same combination of circumstances. No two plants get the same combination. We keep having new kinds of accidents, but I think we can stick to the principle of the thing, and say the thing wrong in principles doesn't have to be.

When we get the wrong answer in mathematics, we know that the principle involved is right, and we persevere until we get the right answer because we know it is there; and if it isn't there you feel that it is your own fault that you haven't got the answer correct. That is what I think is in this accident situation. You get just as much safety as you intelligently think and understand, and as you circumvent so-called negative conditions.

E. T. TIMMERMAN (The Steel Company of Canada, Limited, Montreal, Canada) : Several speakers have spoken of lost time accidents. Will they tell me what they mean by lost time accidents, or what they classify as a lost time accident?

CHAIRMAN NORTHWOOD: The National Safety Council standard on lost time accident is a man failing to return to work on the turn or shift following that

during which he was injured. I think it is pretty general in all plants.

E GREEN (Louisville Car Wheel and Railway Supply Company, Louisville, Pennsylvania): I don't believe you have put quite enough in there. He has to return to his own job. Many of these men are being brought back to work as watchmen, etc., but he has to return to his own job on the next trip.

CHAIRMAN NORTHWOOD: My interpretation of the National Safety Council ruling is that if he returns to work he is not a lost time accident. Some plants hold to that religiously.

S. E. SANKEY (National Tube Company, Elwood City, Pennsylvania): There are only three elements in safety. They are these: For the company to do its part, cleanliness and education.

C. W. HANKO (Pittsburgh Steel Company, Massen, Pennsylvania): Mr. Roosevelt made the remark that he did not believe in discharging, or in other words, disciplining. I just wonder if Mr. Roosevelt meant that a man who does not live up to safety rules or otherwise, or is very indignant to his foreman, should be kept on the pay roll.

We had an accident which was very serious and which we regretted very much. After twenty-three months and two days we had a fatality in our plant of 4,200 men, that was caused simply because the man absolutely would not listen to his foreman or the men around him.

It was at a point that we knew to be very dangerous and we have a man stationed at that point to warn men of the dangers. This man said, "John, stay back there, because that bar of iron is liable to fall out of the chain." This man instead of staying there, stuck his finger up to his nose and kept on coming. As he came on, he looked up at this piece and sure enough it broke from the chain. The result was the man tried to get away but tripped and the piece of iron fell on him.

I think if a man takes the attitude that man did, it is best to get him before there is an accident; or do you think it is best to keep him at work, just giving him a talking to?

CHAIRMAN NORTHWOOD: I think the question of discipline is up to the management of the individual plant, dealing with the case as they find necessary, and remembering that we are making men as well as making steel or iron or whatever it is.

J. CHORE (Standard Steel Co., Burnham, Pennsylvania): When I hear these reports of the time elapsing since the last fatality and the last accident in your shops, I think that I ought to say something for my own plants.

I believe that the men of the Standard Steel Works are about as thoroughly sold on safety as are any plants in the country, and I believe that our men are, as Mr. Roosevelt said, proud of their jobs and proud of their plants.

Only a few years ago—I think about 1923—the Standard Steel Works was known as the slaughter house. Never a day went by but a man was taken to the hospital, and never a year went by but there was one or two or three or more, up to six in one year, who were killed. We employ in the neighborhood of 2,000 men. We have had one fatality in the last three or four years, and that was so manifestly a case of absolute carelessness that I would almost question whether it should even be charged to the plant.

About the twenty-sixth of January we had our second fatality this year and second lost time accident, and since that time we haven't had one single lost time accident in the entire plant.

I have heard some very nice reports of the time that has elapsed between lost time accidents in other departments. We employ in the neighborhood of 150 men in our own department, and it was three years on the twenty-sixth day of last April since we have had a single lost time accident.

A. BERQUIST (Youngstown Sheet and Tube Company, East Chicago, Indiana):

I heard a talk by Mr. Homer L. Ferguson, President of the Newport News Ship Building and Dry Dock Company, Newport News, Virginia, yesterday, in which he expressed just a few words concerning discipline, which I think expressed the attitude of any management.

He said, "Safety is the simplest problem of the management because he can be arbitrary about it without fear of criticism," and I think that expresses the attitude on discipline. It is their problem and they can handle it any way they see fit without having any fear of criticism.

ADJOURNMENT

October 3, 1928**J. A. NORTHWOOD, Chairman****Superintendent of Safety, Bethlehem Steel Company, Johnstown, Pa.**

The third session was called to order at nine-thirty o'clock by the chairman, J. A. Northwood.

(The members joined in singing a number of songs.)

CHAIRMAN NORTHWOOD: It has been customary at all our Metals Section Meetings to devote one of our sessions to foundry practice, and the meeting this morning will be turned over more or less to the foundry end of our work. Our first speaker is Mr. Nelson H. Kyser, Safety Engineer, Studebaker Corporation of America, South Bend, Indiana.

The Correction of Unsafe Practices in Foundries

By NELSON H. KYSER

Safety Engineer, Studebaker Corporation of America, South Bend, Ind.

Several hundred years ago, the idea was conceived that castings could be made from molten metal. At that time, no doubt, the process was very crude, and development up until now has been next to phenomenal, as the modern methods and devices for handling molten metal have been steadily improving each year. Even in the light of this remarkable progress, I am very firmly convinced that there is yet a world of room for further improvement.

In years past industry was conducted on what might be termed a "miniature basis." Our huge manufacturing monuments of today were mere blacksmith shops of one or two rooms. The foundry proudly boasted of a cupola of a ton capacity per day and the personnel consisted of a handful of men who were all very closely associated with their employer. Every one of these men was working with, rather than for, his superior. The amount of molten metal handled was small and the hazard negligible. Today with our foundries having a capacity of hundreds of tons per day and employing thousands, we are faced with the problem of correcting those practices which make for anything unsafe. The ultimate we are striving for is to obtain that same spirit, that same working together, which we had in years past in the small shop.

Several years ago the corporation which I represent constructed a very modern foundry which occupies 13½ acres of floor space and at normal times employs about 1,300 men and women. When we inaugurated our safety organization we, like all other companies, had our troubles in getting employees educated along lines of working safely and protecting themselves. However, we have made a very wonderful showing, due to the fact that everyone from the production manager on down to the floor sweeper is vitally interested.

This, I think, is the keynote to foundry safety. We must educate every soul connected with foundry work to think, act and live safety. The individual who does not think of his own personal safety or of the injury to others which might result from his negligence is criminal in intent and is the worst hazard a foundry can have. Quite often such a man exists simply because he has never been educated to safe practices.

The foundry superintendent, the foremen, the gang bosses, all hold their positions because they have a superior knowledge of foundry work and, secondly, because they are executives in some degree. It is with these men that the safety school must start. These men must get the safety habit

and believe in it. They in turn must pass it on to their men and in the case of a wayward one give him a little personal contact to show how much better off he and his fellow workers will be if they are all working safely. Men should be picked for the particular job for which they are most fitted and in case of an unsafe move should be shown where they are at fault. However, a man who is continually working unsafely is a hazard to himself and his fellow workers and should be discharged for his disobedience and unsafe practice.

The actual education of the men will vary according to the specific problems of each individual foundry, but there are a few fundamentals that will apply to foundries in general.

Every man must be taught to be a good housekeeper, as a clean, orderly shop means careful workmen and greatly reflects on the quality of the product. If aisles and passageways are blocked or are strewn with foreign matter the possibility of spilling a ladle filled with molten metal is greatly increased. If flasks are piled so that they may topple over, the hazard of crushing or badly lacerating a fellow workman is present. Many other instances might be cited where a poor housekeeper was the cause of an accident, but this is really a problem for each individual foundry to work out. If each foundry superintendent would call his foremen together and outline a program of getting clean and keeping clean, good housekeeping would no longer be a task and would become a habit and the unsafe practice of poor housekeeping would no longer exist.

Two Ways to Do the Job

There is always a safe way and a dangerous way to do a job. We may show a man the safe way to do the job by calling his attention to the danger of the different operations, but it would be folly to set forth a hard and fast set of rules for him to follow. In my judgment, it would be better to allow the man himself to develop the safest method of doing the job without injury to himself because of the vast difference in human element. It would be ridiculous to expect men of different status and temperament to work with identical movements. The employee should be cautioned against using a rusty skimmer or rod when skimming or stirring molten iron and should be told of the danger which results. The pouring of molten metal into moist ladles should also come in for its share of caution, as should the watching of a mould up through the risers without the necessary goggles. There are many other things in this connection which are dangerous and where the new man is very liable to encounter sorrow. Here again is where the executive in charge functions as a teacher.

Proper clothing must come in for its share of consideration in the correction of unsafe practice in foundries. We insist that all men engaged in the handling and pouring of molten metal in our foundry must have good, solid Congress shoes without the slightest defects; either asbestos trousers or slow combustion leggings; wool shirts preferably and regulation safety goggles. Without these articles they are not given any metal from the pour-off man who has charge of the large distributing ladle. This rule is enforced 100 per cent and the results are gratifying, as very seldom is a man denied metal due to his being unsafely clothed.

The time to teach the employee that burns and injuries caused from unsafe clothing result in intense pain; loss of time and money, both to himself and employer; and often permanent injury, is before he has to personally undergo these tortures. It is much easier to enforce rules relative to proper clothing if each workman realizes that he is not being made to wear certain articles because it is so much red tape, but as a safeguard to himself. We have

attempted to teach safety with kind words, and this always is our first method of attack, but in some instances we must resort to what is called "hard boiled" procedure, as it is strongly human for some individuals to disobey rules which have been inaugurated for their own welfare, and in rare cases we have resorted to immediate discharge of an old offender.

Thus far we have dealt only with personal education as a means of correction of unsafe foundry practice. Now we must turn our attention to the hazards which are directly due to the foundry layout. The more mechanical devices we are able to install the less will be the possibility of accidents. In our foundry we have attempted to do as much work by mechanical means as seems practical. Although we are not as yet 100 per cent, we hope in the near future to install mechanical means of doing certain jobs that further remove the employees from the danger zone.

Let us start with the raw pig and follow through until the castings are ready for machining. The opportunity first presents itself to do the work mechanically in the handling of raw stock. Magnetic cranes can be brought into use for the pig and scrap, while hopper bottom bins make a safer and easier way to handle the non-metallics. All the ingredients of the charge may be loaded into small cars, weighed and transferred to the charging floor untouched by the human hand. This practice will eliminate crushing injuries and also the possibility of hernia, which is frequently caused by the strain of overlifting.

After the charge is on the charging floor it should be mechanically dumped into the cupola. This method will avoid hand shoveling of the charge, where a man is apt to slip and fall into the mouth of that raging hell. Serious thought should also be given to proper ventilation, as the gases on the charging floor are very poisonous. In cases where the ventilation is poor or the ventilating system temporarily inoperative, the workman should be furnished with suitable respirators.

In the pouring of molten metal comes one of the most important applications of mechanical means and also one that is used the least. When a full ladle of molten metal has to travel hundreds of feet over the heads of a great many workmen the hazard of dropping and slopping over may result in serious burns. If instead of this dangerous practice of transferring the molten metal a great distance the conveyor system for carrying the moulds could be installed, one of our greatest foundry problems would be solved. The moulds could be placed on conveyors and transferred to a point 25, or not over 50, feet from the cupola and poured. This would bring but relatively few men into the danger zone.

The installation of a conveyor system of this type would require a sizable expenditure, which at the very outset might look somewhat unreasonable, but when we enumerate the benefits derived from its installation we can easily see where it would correct one of the most unsafe foundry practices. The peace of mind of all concerned would be without price; the inspection of long monorail systems would be eliminated; the danger of slop over would be cut to a minimum; and the use of hand ladles, with their many evils, would be history.

After the moulds are poured they continue on the conveyor to the shake-out, where extreme care must be exercised whether done mechanically or by hand.

The shipping and grinding department should be in a separate room from the rest of the foundry. This room should be well lighted and ventilated. All workmen should wear goggles and hard toed shoes to avoid eye and foot injuries. The various tools should be frequently inspected for their suitability and condition. The use of chisels with mushroom tops is very dan-

gerous and should always be avoided. The chipping room should be large enough to allow considerable distance between each chipper, as flying chips often are responsible for serious injuries.

In closing, let us summarize the high spots in the correction of unsafe practice in foundries. First of all, the safety engineer can only be the watch dog and must have the cooperation of every foundry employee. To obtain this cooperation every man must be educated in the school of safety to be a good housekeeper, a safe worker, to dress properly and, where the occasion demands, wear his goggles or respirator. Secondly, the management itself must give serious thought to the safest layout possible in order that it may make use of all possible mechanical means, thereby removing the employee from unnecessary and avoidable dangers.

Our ultimate aim must be to safeguard our foundries so completely that when day is done and the rank and file are homeward bound that each and every wife and mother may anticipate, without the slightest trace of fear, the greeting of their loved ones, whole and unmaimed; that every man, robust and strong, healthy and of a light heart, may caress his own little ones as the sand-man comes, knowing that on the morrow they will not be sorrowing his untimely injury or death.

CHAIRMAN NORTHWOOD: Gentlemen: You have heard this splendid paper read by Mr. Kyser. We now have time for discussion, and if there are any questions you want to ask Mr. Kyser, please make them short and concise, and let's have a quick-fire discussion.

L. O. WHEELER (Union Carbide Company, Niagara Falls, New York): I would like to ask Mr. Kyser regarding safety shoes. He speaks of Congress shoes and hard toe shoes. What is your problem in getting the men to pay the price of a hard toe shoe when they can get a cheaper shoe? The majority of the men can buy a cheap working shoe for about \$2.25, and our shoes are about \$4.50 a pair.

MR. KYSER: That is absolutely optional with the employees. We have those things for sale in our storeroom and he is at liberty to go there and get them. If he doesn't want to buy them of the Studebaker Corporation, he can buy them anywhere he pleases, but he must have them before he goes on the job. It doesn't make any difference to the Studebaker Corporation where he gets them or what he pays for them, but he must have them before he starts to work, or he doesn't start. There is no compromise on that.

I want to say right now that I believe in the straight-line foundry, absolutely. I want to see the day come in my life when the molten metal is not carried, because I don't believe that is necessary. Let's thrash that out right here. I know it can be done.

Our foundry is a very modern place, and cost a lot of money. It is sometimes necessary for us to go to Pueblo to get two tons of metal. It travels down here a block and a half and this way two blocks before that metal is poured, and when you try to keep every employee out from under that ladle you have some job on your hands. It cannot be done. Some jaywalker is bound to walk under there despite all you can do, and those are the corrections that I would sometime like to see brought about. A system universal all over the country whereby the metal can be taken from the cupola just a short distance and poured, put in conveyors, and travel your molds on that, and if necessary put in smaller ones—smaller units. Let them scrap the big units.

J. A. COLTRIN (National Radiator Company, Johnstown, Pa.): The speaker brings out something rather new in the idea that more machinery will make the place safer. That has been my idea all along, but I never have had the nerve to express it. Most people will tell you that the more machinery you get in the place, the more accidents you are going to have. I think the speaker, however, illustrated

very clearly, especially in some of the operations that he named, that a foundry can be operated more successfully and safer with machinery than by hand.

RALPH W. HAYS (Employees' Liability Insurance Corporation, New York City): One of our insurers has recently installed a mechanical equipment in connection with pouring molten iron and I am glad to say that they have reduced their accidents over 75 per cent; which bears out what the speaker has just said.

JAMES WARRACK (Ohio Brass Company, Mansfield, Ohio): The speaker made a statement about wearing goggles when pouring metal. We have had much trouble in finding the proper kind of goggle, one that will not steam up. Will you kindly tell us what you use?

MR. KYSER: We use several different kinds of goggles. When I became the safety engineer of the Studebaker Corporation we had a houseful of goggles—all kinds. Some wanted this kind and some the other, and finally we decided on two different goggles. They are both very good, and I will be glad to answer that question to you by mail, brother. I don't like to boost anybody's game before this convention—only the Studebaker car.

J. A. COLTRIN (National Radiator Corporation, Johnstown, Pennsylvania): I have studied the subject of goggles rather thoroughly. I am not going to boost anyone's goggles, either, only a type of goggles. I find that all goggles steam. Any gentleman in this room who wears ordinary spectacles with all the ventilation possible around them, knows that when he gets into atmosphere under certain conditions his glasses will steam. Therefore, you cannot expect goggles that are enclosed not to steam. There is no argument there.

You can, however, use little devices that will prevent goggles from steaming to some extent, such as putting ordinary white soap on the goggles and wiping them off with a soft paper. That will prevent goggles steaming for several minutes. Another thing that we use in the goggles is a green colored lens. It is expensive and will cost you twice as much as the others, but we find that the men will wear this type of goggle when they won't wear others.

It seems that there is an annoying and probably harmful ray that comes out of molten iron that really hurts a man's eyes. It makes his eyes tired before the day is over, and if you can take this annoying ray away from his eyes he will wear his goggles. You can buy this green glass from a number of goggle manufacturers.

Then you must have goggles that are light and comfortable, and we have found that the most comfortable goggle is one that fits over the man's ears rather than a band around his head, and the enclosure is made of leather rather than metal so that they are light and comfortable.

MR. WARRACK: It wasn't a question of the kind of goggles so much as it was the question of the safety of the goggles. We have found in our business that wearing goggles is a safe practice.

We have gone one year in our factory without a lost time accident. We think this is very good for a foundry, in the safety movement only two years.

CHAIRMAN NORTHWOOD: How many men?

MR. WARRACK: Three hundred.

MR. KYSER: We have about 1,300 men, and I think in August we had 21 men out of these 1,300 go into the hospital with something in their eye, nothing serious at all. We have no trouble at all. We don't have any trouble with them breaking and we don't have any trouble about their wearing them, because it is goggles or no job.

CHAIRMAN NORTHWOOD: In the state of Pennsylvania when doing the various operations mentioned, regardless of whether we as a company are in favor of the goggles (which we are) the state department insists that we provide them. We could do these various operations without goggles.

N. V. B. ZEIGLER (United States Aluminum Company, New Kensington, Penn-

sylvania): The gentleman from Ohio must have been lucky last year. We insist on our men wearing goggles where we think they are necessary, and if we had them here we could show you goggles that without doubt have saved three eyes.

CHAIRMAN NORTHWOOD: That is the answer.

In line with Mr. Kyser's paper I have a question that was sent to me, which reads: "Organized safety has accomplished much in reducing accidents in industries, but cannot some of the decrease in accidents be attributed to modern improvement and development in machinery, methods of operation, improved physical conditions of the plant and shorter working hours?"

Unquestionably I would say, "Yes;" they all help. There isn't any question about that, but there is nothing that will take the place of definite safety operation even with all our machinery. We can have some mighty serious accidents without safety practice.

The Problem in the Small Foundry

N. E. GREEN (Louisville Car Wheel and Railway Supply, Louisville, Kentucky): Our problem is entirely different from Mr. Kyser's and the rest of you gentlemen here because we have such a small foundry. We don't have over a hundred men, and these discussions here are about mass production, so that we don't come in contact with the same problem.

Mr. Kyser has mentioned the mechanical shop. That is all right where you can get out the production, but where you have these small shops and a few men it is entirely impractical, from an investment standpoint, to put in all that machinery.

I agree with everything he said. It will be a grand day when everybody can have a mechanical shop. If you can run your molds right up in front of the ladle and pour the metal, you are getting away from carrying the metal and its incident hazards; but I would like to have somebody who is running a small shop come to these meetings and tell us about it. Most of the men are running large shops and they don't have the same problems that we smaller fellows do.

We have been very fortunate—of course we have done a lot of work too in our plant—in having gone over 500 working days without a lost time accident.

We have adopted the method of counting a lost time accident if the man cannot report for his job—not just for any job—the next day. I don't know whether we are handicapping ourselves or not.

I do hope, however, that some of these years you will have a speaker here who will attract more of the smaller employers.

CHAIRMAN NORTHWOOD: I might say in answer to your inquiry that that is one of the biggest problems of our National Safety Council today. Interesting the smaller plant, the hundred man and under, and getting them organized in safety work.

They go on the basis in some cases that the insurance companies are handling their compensation, and others say they are not having any accidents. They say they never have an accident; but man after man goes to the hospital and man after man is injured, and they don't remedy it because they are not paying direct compensation bills. You get my point on that?

It is mighty hard and we are taking steps, I know in the National Executive Committee, by furthering and encouraging various types of competition work, awarding trophies and prizes and so on, with the idea of getting the smaller company interested in the safety work. Does that answer your question?

The next order of business on our program is the election of officers, and Mr. Jim Woltz, of the Youngstown Sheet and Tube Company, was some time ago appointed chairman of the Nominating Committee. I am going to ask Mr. Woltz to at this time report.

Report of the Nominating Committee

J. WOLTZ (Youngstown Sheet and Tube Company, Youngstown, Ohio): Mr. Chairman and Gentlemen: Your committee has had two or three meetings and we presented a report at Atlantic City in July. There were one or two changes made after that meeting, and we now have the complete report to submit for your consideration.

Chairman—E. G. Quesnel, Commonwealth Steel Co., Granite City, Ill.

Vice Chairman—John P. Eib, Illinois Steel Co., Joliet, Ill.

Secretary and Editor of *News Letter*—Earl F. Blank, Jones & Laughlin Steel Corporation, Pittsburgh.

Chairman Program Committee—E. R. Rose, Republic Iron & Steel Co., Youngstown, Ohio.

Chairman Poster Committee—H. G. Hensel, Youngstown Sheet & Tube Co., Youngstown, Ohio.

Chairman Membership Committee—John P. Mudd, Midvale Co., Nicetown, Philadelphia, Pa.

Chairman Publicity Committee—W. E. Megraw, H. H. Robertson Co., Aimbridge, Pa.

Chairman Slide Committee—John A. Oartel, Carnegie Steel Co., Pittsburgh, Pa.

Engineering Representative—J. M. Woltz, Youngstown Sheet and Tube Co., Youngstown, Ohio.

Chairman Statistics Committee—J. E. Culliney, Bethlehem Steel Co., Bethlehem, Pa.

Executive Committee to consist of the officers, F. G. Bennett, Buckeye Steel Casting Co., Columbus, Ohio, and J. A. Northwood, Bethlehem Steel Co., Johnstown, Pa.

These are the last and the next preceding Chairmen of your section: J. A. Voss, Central Alloy Steel Co., Massillon, Ohio; C. M. Brading, Wisconsin Steel Co., Chicago, Ill., and Homer J. Weeks, American Steel & Wire Co., Cleveland, O.

MR. GREEN: I would like to move the adoption of the nominating report, and that the Secretary be instructed to cast one ballot.

(The motion was seconded and carried.)

CHAIRMAN NORTHWOOD: I so declare that the officers as put before us by our Nominating Committee are duly elected as executives of our Metals Section for the coming year, and I would like to at this time introduce your new Chairman, Mr. Ed. Quesnel, of the Commonwealth Steel Co. Mr. Chairman, congratulations, and I want to say that he is a real Chairman and a real man.

MR. QUESNEL: Good morning! You can take that for what it is worth. I am not going to make a speech, but now you can see what you have done. You have me and you will have to put me to work this year. I see a lot of wild Indians eyeing me, so I am afraid that I am going to have to do some work. I want you gentlemen to help me.

Seriously, I appreciate the honor of being elected as your Chairman. I also appreciate the fact that this office carries with it a great deal of work and obligation, and I will do my part to further the interest of the Section for the coming year.

I think we are all concerned in the fact that 1929 is going to be a rather remarkable year. From the records already quoted here you know that some wonderful strides have been made, and that in 1929, in order to surpass our 1928 record, we are going to have to do some very clear and practical thinking. The nearer we approach perfection, naturally the harder we will have to work, and I think the Metals Section will show the way in accident prevention this year.

I just want to leave one thought with you and I hope that you will concur

with me in it. That is, in attacking the problem of accident prevention, let us think this year in ideas and not so much in personality. I think we are not concerned so much about who gets hurt, but why was he hurt and how was he hurt? And that brings us down to this one thought: There are no industrial accidents other than those we create ourselves. Now if we can create them we most assuredly can prevent them. I want you to take the thought back with you, that if these conditions are created by ourselves and our associates, we should be clever enough and wise enough to have the forethought to prevent them.

CHAIRMAN NORTHWOOD: I would also like you to know Mr. John Eib, the incoming Vice-Chairman. I think if there is any one man whom you probably know better than anyone else of the Executive Committee of the Metals Section, it is Mr. Eib, through his splendid *News Letters* of the past year.

The News Letter Deserves Your Cooperation

Our new Secretary is Mr. Earl Blank. Mr. Blank, I wish you would come forward just a second, please. We are just acknowledging your election as secretary of the Metals Section and as editor of our *News Letter*, and I am going to ask all the members of our Section to help you in getting out that *News Letter*, because I know it is a real job and anything that you fellows can do to make that *News Letter* more interesting and more helpful will be appreciated. Just drop Earl Blank, of Jones and Laughlin Co., Pittsburgh, a letter or a note and tell him that you are with him.

I am not going to ask any of the other gentlemen just elected to stand, due to lack of time. I would like very much for you fellows to know them all but I am afraid we are going to have to continue with our program.

Mr. Woltz has something for us at this time.

MR. WOLTZ: At our first Executive Committee meeting in Chicago, the matter of seeking the responsibility for accidents and attempting to find some way by which they could be prevented was brought up and that has been continued in our discussion at our meetings since.

At that meeting it was suggested that the Metals Section attempt to develop a series of safe practice pamphlets applicable to the work of our Section. It was suggested that the first one be on coke plant operation, and I was asked to head up the committee to do that work.

It is going to mean that we will have to have the assistance of everyone operating a coke plant. They are not all the same and the problems are different in the different plants, and later in the year we shall send out letters asking the cooperation of every person who has any knowledge of coke plant operations, and for a summary of their accidents and what they have done to prevent similar accidents or other accidents that might happen.

We want to make this a practical safe practice pamphlet. We want to make it something that is easily understood, and we want to make it something that is going to be of help to us. So when you get these letters kindly respond as promptly as you can and give us all the information available.

CHAIRMAN NORTHWOOD: I have an announcement to make that I regret. Our Program Committee has invited Mr. L. A. Hartley, Director Educational Department, National Founders' Association Chicago, to be our next speaker. Just before leaving for the convention we received a telegram from Mr. Hartley that due to unforeseen circumstances he would be unable to be here.

He, however, has written his paper and forwarded it to us and I am very pleased to introduce to you Mr. Fred Bennett, of the Buckeye Steel Casting Co., who has kindly consented to read Mr. Hartley's paper. Mr. Bennett is one of our past chairmen of the Metals Section and I think most of you fellows know him.

Developing a Safe Human Factor

By L. A. HARTLEY

Director of Education, National Founders Association, Chicago, Illinois

Safety is a direct result of constructive thinking. Constructive thinking is a result of progressive experience. As science is an orderly arrangement of facts, so safe conditions are the evidence of orderly habits. "As a man thinketh, so is he." Shiftless thinking always accompanies shiftless actions. Unsafe thinking always results in unsafe conduct. The supreme task of the safety engineer is to lead workers to think constructively. When workers and employers "think safety," workers will be reasonably safe. These are well-known facts and every safety operator is acquainted with them. These statements may be said to be fundamentals of the great safety movement.

A fundamental is a principle upon which all normal individuals agree. For example, normal persons agree that one must eat, that sufficient clothing should be worn, and that mankind should have adequate shelter. These are known as the fundamentals of physical life. Normal persons agree upon marriage as an institution, recognized government as a means of social organization, and observance of law as an aid to order in community life. These are known as fundamentals of social life.

Persons of regular habits of thinking agree that industrial organizations as we know them, organized trade and commerce, and our present systems of manufacture and distribution are effective means of progress which have been developing since history was first recorded. These are fundamentals of production and distribution.

Occasionally persons are found who disagree with the opinion of the majority. Occasionally some one conceives the idea that eating is unnecessary or that clothing and shelter are unessential. These persons are objects of ridicule or sympathy. As long as their peculiar mental attitudes do not interfere with the comfort or safety of others, they are allowed to remain at large. Whenever a person or a group of persons actively ignores an accepted fundamental, such person or group is deemed to be a menace to the welfare of organized society and immediate measures are taken to restrain that individual or group.

Since safe thinking is generally known to be fundamental to safety, the real question is *how to promote safe thinking*. It is with this question that this discussion is concerned. All regular persons believe that sound thinking leads to safe operation, and they want to know how to get people to think safety.

Since a fundamental of safety is that the human factor must be guided into safe thinking, it follows that those who are directly responsible for safety organizations should know at least as much about human beings as persons who operate and maintain equipment are expected to know about this equipment.

This is all the more important since it is commonly understood that there is no such thing as a perfectly safe man. Equipment is designed to perform certain operations; and before it leaves the factory where it is produced, it is thoroughly tested to insure its performance. No such complete test is applied to workers. Indeed, it is questionable as to whether tests can be devised which will reveal the full extent of human possibilities.

Safety is a relative term. Production must be carried forward if human beings are to live, and every operation carries with it the possibility of danger. The inexorable fact that all human activity incurs a relative risk is the reason for continuance of safety programs. In the absence of dependable tests regarding human beings there is only one course of procedure which promises success. Human beings must be trained for safety; and before training is begun,

those responsible for this training must study the whole situation of which safety is but one of closely associated parts.

The first great fundamental of industrial safety work is that improved measures of safety always result in improved production. Mr. L. A. DeBlois, in his "Industrial Safety and Production," has well said, "Safety and efficiency are unquestionably linked together." Industrials who tolerate unsafe conditions are agents of inefficiency. In other words, efficient production and distribution and safe working conditions go hand in hand.

Sidney J. Williams, in "Waste in Industry," comments strikingly on this phase of the subject: "A piece of material falls off a truck and injures the workman's foot. We call this an accident and we know that it results in an economic loss. But there are other times—perhaps a hundred or more—when a piece falls off the truck but does not happen to fall on the workman's foot." This is the heart of the great safety program. Safety in industry is irrevocably linked up with every other industrial problem.

When industrial leaders understand that safe working conditions promote efficiency they appreciate the second fundamental which is that those working conditions under which the average man does his best work are also the safest conditions. The development of a safe human factor becomes therefore a matter of general development of production environment.

In the language of Dr. Harry Myers, of the Frigidaire Corporation, "It has been demonstrated that a healthy, happy, contented worker is a better worker than an unhealthy, unhappy, discontented worker," and it is just as accurate to say that a healthy, happy, contented worker is a safer worker than an unhealthy, unhappy, discontented worker. If this fundamental is accepted, the way is opened for a broad constructive program which should interest not only the specialist in safety but should stir the imagination of every type of industrialist.

What are the things that promote health, happiness, and contentment in production? Of all the reasonable answers that might be given to this question there is one upon which all thoughtful persons will agree: Genuine interest in the work at hand will do much to promote health, happiness, and contentment. How may this interest be developed?

No man is safe who is not interested in his work. A high authority has stated that "A double minded man is unstable in his ways." No man can be safe and be out of sympathy with his co-workers or his employers. The blame for this lack of interest should not always be placed at the door of the worker.

Too often employers have endeavored to purchase the interest of workers by distribution of Christmas turkeys and prizes for the observance of rules and regulations. Such a system of open rewards, which is usually accompanied by punishments for violations of the code, cannot be expected to appeal to the higher type of employee who wants to do right for the sake of being right. The whole idea of reward and punishment as a means to promote production and distribution is based upon the principle of coordination. Cooperation must come from within. Cooperation cannot be enforced. There are great possibilities in rewards intelligently given but considerable harm may result from too open reward for services and cooperation which should ordinarily be expected from employees.

All that needs to be done to secure the interest of normal workers is to practice exactly the same neighborliness with workers that is practiced in the neighborhood and in the home. Personal neighborliness is not possible in the case of busy managers who seldom have opportunity to meet workers. Their friendship must be reflected. One difficulty sometimes observed in modern industry results from the lack of adjustment to new methods. The old-time machine was a two-wheeled affair—the manager and the worker working side by side. Then the manager rolled around to the front office and the foreman was placed on the main axle opposite the workers.

These three groups are as fixed by circumstances as are the wheels on some powerful three-wheeled truck. The manager gives the directions and the foreman and workers respond. As industry has grown, many other intermediate wheels have been introduced under different names—personnel, welfare, education, safety, medical service, pension plans, housing programs, and others too numerous to mention.

Every one recognizes the value of this additional industrial equipment, but there is ample reason for the belief which is rapidly growing in industry that the foreman should be given more responsibility in the general plan. Foremen should be given a larger share in all personnel activities. One factory has been highly successful in having the foreman assume direct responsibility for all personnel work. Instead of referring workmen of his departments to the personnel department for loans or other assistance of this nature, the foreman takes such matters up with the personnel superintendent who decides in the light of the foreman's recommendation. The management of this plant has let it be known that foremen are responsible for maintaining agreeable relationships in their departments. If production falls off or unusual accidents occur, these foremen look to home conditions as well as to plant conditions. It is assumed that worry over home conditions such as sickness, unfortunate financial situations, or accumulated bills may be reflected in production. This plant has a very active safety department. Its employment department is even more energetic than most, for it works both ways. It selects men for the plant and endeavors to find work elsewhere for every applicant who is good enough but who cannot be placed in the plant.

Men are not urged to observe safety regulations as a means to their own protection. Instead, there is a continual program of training designed to interest employees in their work and in the business. Along with this interest-arousing campaign is a consistent program of education the aim of which is to acquaint every one in the organization with such information as will make it easier, cheaper, or more interesting to perform the various operations necessary to the manufacture and distribution of their products. Safety rules are presented as operating information, together with methods of performing various jobs.

The system of rewards in this plant is interesting. Punishment seems to have been overlooked except as it may be recognized in the absence of reward. Apparently foremen are not on the lookout for violations of rules. On the other hand, they are constantly on the lookout for unusual achievements and the moment a worker is known to have demonstrated unusual interest in any kind of activity which will make it easier, cheaper, or more interesting to produce and distribute the products of the plant, he is marked up for a suitable record. These rewards are not always material. Neither are rewards announced.

Everything in this connection is done very quietly. The foreman confers with the personnel superintendent and department heads immediately interested. The first aim of this conference is to decide, if possible, the kind of reward that would be most satisfactory to the one who has earned it. In one case, it may be advancement to another job; in another, it may be a few days off on pay to go hunting or fishing.

In one instance, a man who had proved himself unusually interested and cooperative was advanced funds for the purchase of a small grocery store which a member of his family operated until it was sold at a neat profit. This man simply was asked by his foreman to go to the office of the superintendent of personnel where he was told that it was understood that he wanted to buy the little store. When the information was confirmed, the man was informed that the company would advance the money to make the purchase. This seemed to be quite acceptable, and the loan was made returnable by installments from his wages. After the loan was completed and the company representative had advised

regarding the details of the purchase, the subject of the unusual service which led to the reward was casually mentioned and the workman was given to understand that such cooperation is appreciated.

The methods pursued in this plant are cited merely as examples of the application of fundamental principles to plant operation. The plant has an excellent safety record. Many companies duplicate certain methods followed in this plant and the general principle of human development as a means to safety is well understood. This example is cited because in this particular plant there is a systematized program based upon fundamentals of human development.

The third great fundamental which should govern all programs of human development is that human progress is a result of reasoning in given situations. Safety cannot be promoted to any great extent without taking steps to insure that those who are to improve conditions reason upon the need for improvement.

Man is distinguished from the beast by his capacity for reasoning. A man's mental activity marks his degree of intelligence. The progress of the race has not depended upon the strength of the bodies of men nor upon the memorization of rules. Progress has depended upon the strength and activity of the minds of men in connection with the skill of the human hand. The brains and the hands of a race indicate their relative development. Developed brains and skilled hands are associated in gaining increased control of environment. While man has developed but few really new ideas, beginning with the use of fire and of the continuous lever or wheel, he has gained control of many of the scattered details of a planet, he has assembled the ocean liners, the thundering locomotive, and the marvelous structures and inventions of our civilization.

Safety programs, like all other human activities, are dependent for success upon obedience to natural laws. There are many such. Only one will be mentioned as an example of another application of fundamental information.

One of the many natural laws which apply to safety programs is that of action and reaction. Every action is inevitably followed by its corresponding reaction. If fear or other strong emotion is used to stimulate man to act above his usual performance, he can be depended upon to descend in his effort to a correspondingly lower level of achievement as soon as the inevitable reaction has set in. Safety programs which depend upon fear or other strong stimulants as interest factors, in reality accomplish little and eventually reduce the ability of workers to respond consistently to the requirements of safety.

The need for closer coordination of safety programs with every other industrial activity suggests that there should be a more specific relationship between medical departments and safety departments. It cannot be expected that foremen and leading workers will possess information which some one connected with every plant should know about human beings as such.

To illustrate the possibilities of understanding of special biological information by some one directly connected with safety development, two physiological facts will be used as examples: (1) The brain requires an adequate supply of blood in order to function normally. If the brain does not receive an adequate supply of the right kind of blood, the individual will not be normal in his thinking. (2) Directly related to this is the fact that ordinarily blood is distributed throughout the body according to the activities of different parts.

For example, a laborer who uses the large muscles of his back, thighs, shoulders, and legs must have sufficient blood for those parts in order to rebuild the muscles. Furthermore, the blood must be of such quality as to insure the rebuilding process. Long ago Mosso demonstrated that carrier pigeons after long flights were less able to see clearly, and found their wings and breast muscles dark with blood while their brains were pale because of inadequate supply of blood. Many of the cases ordinarily known as fainting are simply the result

of insufficient supply of blood in the brain. This may be caused by a number of things, but the fact remains that ordinary fainting is a temporary condition of insufficient supply of blood to the head.

Workers who perform hard manual labor cannot be expected to see every detail as clearly nor think as accurately while doing this work as after they have rested and there is opportunity for diversion of the blood supply to their brains. Numerous experiments upon birds and other animals suggest that many of the industrial problems involving the human factor are due to a considerable extent to pale brains. This again suggests an approach to the problem of human relations in industry which should lead to understanding appreciation of the human factor as such. All sorts of questions arise in the wake of understanding of even one fundamental physiological fact like the circulation of the blood. What makes blood of good quality? What foods produce good, rich blood? What is the effect of worry and fatigue upon body-building processes? What is the effect of fear on the maintenance of a healthy body? To what extent do living conditions affect maintenance of bodily health? What about agreeable working conditions? These physiological facts point the way for new appreciation of the broader scope of medical service to industry.

To summarize: That method of procedure which assures the greatest number of workers thinking most constructively about their jobs is the safest method. When executives and foremen see the safety program from a broader angle than mere accident prevention, safety work will mean more to production. Since disinterested and untrained workers are unsafe workers, every effort made to develop workers along right lines is in the interest of safety and of production for human service.

CHAIRMAN NORTHWOOD: We are indebted to Mr. Hartley for this paper, and we regret very much that he could not be here to deliver it himself. We are also indebted to Mr. Bennett for the splendid way in which he read this paper.

I am sure there are a number of things in it which you fellows would like to discuss. This is the vital part of our safety game as I see it today—the development of the human factor in our industries, and I think there is a lot of good meat here for a good live discussion.

N. E. GREEN (Louisville Car Wheel & Railway Supply, Louisville, Kentucky): In the beginning of the paper it stated that it was practically an insult to the worker to bribe him by rewards and prizes, and later on, as I understood it, he told us specific cases where they gave rewards, etc.

We have been very successful in giving rewards. Of course, we have a number of colored people working for us and possibly they are more susceptible to that kind of thing than many of the people in the Northern plants. I don't know, but I do think that you have to take all that into consideration when you are laying out your program. We cannot lay down a program that would be applicable to Buffalo or Cleveland or Chicago, any more than they can do the same for us.

We have found by giving the men a package of cigarettes when we hold our monthly meetings, which doesn't cost very much when you spread it over the whole month, that they appreciate it. They sit down and smoke. Men like to be comfortable. We have these safety meetings and they are comfortable when they are smoking. That wasn't mentioned in the paper but I think it is something for us to think about in our safety get-togethers.

Might I take just a little time to cite two instances in Louisville?

We have this last year started safety in the high schools. Heretofore we have not been able to do very much, but we found that we could get an opening in the girls' high school—we separate the sexes in Louisville—and we have the girls' schools and the boys' schools. We have a full time safety program in the girls' schools, and those in the English department write essays and speeches on safety.

In May we had several of the best speakers speak in our industries. In those industries where the men were comfortable we got results.

In the industries where they didn't care much about safety and they made the girls talk out of doors with the wind blowing and the dust flying in their eyes, we didn't get results. I don't know if any of you today are trying to hold outdoor meetings, but if you are I don't believe you are getting very far. If you can have your meetings indoors where the men are more comfortable you will accomplish, well, I'll say 1000 per cent more.

I thought it would be nice if any of you could put over a program like that with your girls, and of course most of you have co-educational schools. Our men were intensely interested in these two young ladies who came and spoke to them. They didn't tell them anything that they didn't know. They didn't bring a program. Their first statement was, "We do not intend to tell you how to guard your plants." Most of it was public safety, and as brought out by Mr. McClain and a few others, more of your employees are being killed on the way to and from work than are killed while at work, and we must impress upon them that safety is to be carried not only in the plant but on the streets and in the their homes. I believe that if some of you can put this program across in your schools in some form of safety advertising that is novel, you will get results.

F. G. BENNETT (Buckeye Steel Casting Co., Columbus, Ohio): I think the writer of the paper brought out a very interesting point on that reward system. He states, "There are great possibilities in rewards intelligently given, but considerable harm may result from too open reward for services and cooperation which should ordinarily be expected from an employee."

I think the big point he is bringing out there is the abuse of the reward system, and using it where there is no need.

CHAIRMAN NORTHWOOD: Right in line with that, I believe at one of the first Metals Section meetings I was privileged to attend they had a debate on that reward system, between Carl Smith, of the Inland Steel, and Phil Stremmel from down in St. Louis; and we brought out some tremendously interesting points of that award side of our safety work.

It does work in one place and not in another. Some fellow may get it over with awards and another fellow may get it over some other way, but any way just so we get it across to the men. Dealing with the human element is the vital end of our safety game as I see it.

Are there any further discussions on this paper?

We are dealing with the man from day to day and your committee felt that our program would not be complete without having something from the plant surgeon, and we have asked Dr. A. W. Colcord, Plant Surgeon, Clairton Works, Carnegie Steel Co., Clairton, Pa., to discuss with us, the placement of men. It gives me great pleasure to introduce Dr. Colcord.

The Placement of Men or What the Plant Surgeon Can Do for Safety

By A. W. COLCORD, M.D.

Plant Surgeon, Clairton Works, Carnegie Steel Company, Clairton, Pa.

I do not need to waste any time on this audience telling you that the physical and mental condition of the worker have much to do with his getting hurt. You were convinced of this years ago. Stoeckel, Commissioner of Highways of Connecticut, has well shown in a recent paper that a large proportion of automobile accidents are due to the mental condition of the driver. This is no more true of motor accidents than of those in our mills. The saying: "A sound mind in a

sound body" is as old as civilization. If we accept the newer psychology basing every mental action on an external stimulus and a response through the reflex arc, we may change our saying to: "A sound mind is a sound body."

There are accidents that are accidents in the pure sense of the word. Then there are accidents due to wrong environment of the worker—faulty machinery, poor guards; poor lighting; slippery floors; an untidy mill; the carelessness of the other fellow, etc. But a certain percentage of personal injuries is due to the mental condition of the fellow who gets hurt *at the time* he gets hurt. There may be worry, fatigue, hunger, thirst, loss of sleep, pain, physical weakness, effects of heat, cold, or poisonous gas. There may be bodily disease as tuberculosis, syphilis, Bright's Disease, diabetes, cancer, heart disease, and so on through the long list. Any of these will tend to make the man let down in his safety habits.

The worker's day is made up of a thousand reflex acts unconsciously done as a result of years' of training and experience until they have become fixed habits. The causes above enumerated break into these habits all along the line of efficiency and safety. When a new situation arises one must *think*. Intensive attention is called into action. If this situation involves danger, his safety will depend on his alertness—on his ability to keep cool and think clearly in spite of fear and excitement. If we analyze those accidents in group III, depending on the mental condition of the injured at the time of the accident, we will often be able to find the cause. One man had been up all night with a sick child; another had an aching tooth; another was recovering from an attack of influenza; another was developing tuberculosis. There is more than one concrete instance of a passenger locomotive engineer wrecking his train with loss of life and property from a beginning paresis. Syphilis of the brain and nervous system is no doubt responsible for a considerable number of industrial accidents.

I have recently had a severe case of toluol and Benzol poisoning requiring long and vigorous use of the pulmotor to get him to breathe at all—then some two hours of oxygen and a prolonged convalescence. He claims he needed money badly and had starved himself for weeks before the accident. He knew better than to enter alone the chamber containing the poisonous gases. We don't know why he did it, and believe that this starvation was responsible for three things:

1. His lack of caution.
2. His lowered resistance to poisonous gas which came near being fatal.
3. His slow convalescence.

The question of lowered resistance is a broad one—of great importance to all of us who have to do with safety. There is an interdependence between the effects on the human body of fatigue, hunger, heat, cold, shock, infection, mental strain, poisons, or disease. Each one of these lowers resistance to the rest. A man affected with any one of these has his safety affected in two ways:

1. He is more apt to get hurt on account of less caution and alertness.
2. His resistance is lowered to the effects of any injury. He is more apt to have his wounds infected, is in greater danger of dying from shock or poisons, and will be longer recovering from an injury.

The industrial surgeon can do much to prevent them in two ways:

1. Watch for these hazards in the mill and not only keep the hazard away from the man but keep the man away from the hazard.
2. Keep the man in the mill physically fit so that when exposed to such a hazard he will have a high resistance.

The first of these covers the whole ground of sanitation and safety as far as these can be influenced by the industrial surgeon. I believe the company surgeon can and should get out into the mill from time to time, study the conditions under which the men work—heating, lighting, ventilation, toilets, rest rooms, lockers, shower baths, drinking water and eating places. He should study special hazards; danger to eyes, where goggles, colored glasses, etc., are needed; danger to skin

from chemicals, oil, etc.; danger from poisonous gases or dusts. He should study the exposures to heat, cold, electricity, etc. His contact with the men who come to the emergency hospital will enable him to observe the effects of these various hazards and confer with the management or safety department as to their betterment.

The surgeon should be a valuable member of the general plant safety committee; he should attend all meetings and take an active part. This contact with the general safety committee is one of the most valuable the surgeon has. These men are always interested in safety. It should not be hard for the earnest, enthusiastic surgeon to sell them the idea of better health in industry.

In his talks to first-aid classes, he should devote a certain time to personal hygiene, home sanitation and even community health. One of the valuable things about employment examination is the personal contact with the men. The surgeon can not only find out the man's bad habits and his correctible defects, but he can advise him how to get rid of them. Just after examining a man's heart, a word of warning about his excessive use of cigarettes has a telling affect. It is not enough to teach the men about health. We must *sell* them health. To sell a thing we make a man want a thing he didn't want before—to want it so badly that he will give up something valuable to get it. To sell *industrial health* we must be thoroughly sold ourselves. The industrial surgeon must not stop at the mill. He should make his influence felt through the whole community. The worker spends sixteen hours outside of the mill. What he does and how he lives have an important bearing on his health and safety, and the surgeon should take a keen interest in the employee's family, his wife and his children, the workers of tomorrow. He should direct the work of the welfare nurse in her health teaching in classes and in the homes. He can use clubs, churches, schools, newspapers, boards of health and the other doctors of the town to spread the gospel of good health.

My views on periodical examination, have already been given before the National Safety Congress. They have been twice published and may be found in your Transactions of the Milwaukee Meeting of 1920.

It costs about \$2,200 to raise a boy in Pennsylvania, send him through the eighth grade of school and get him old enough for a job in the mill. It costs several thousands of dollars to train him for a skilled job. When trained, his earning power for his life expectancy is from \$15,000 to \$40,000. The human machine, the most perfect of all machines, is the most delicate, the most easily injured. More and more our great corporations are becoming convinced that it pays to conserve their greatest asset, man-power—to examine it periodically, to keep it in repair and to raise it to the highest point of efficiency. Such an examination should include:

1. A thorough general physical examination—chest—abdomen—nervous system.
2. Eyes and ears including vision and hearing tests.
3. Urinalysis and blood pressure.
4. Functional heart test.
5. A Wassermann where syphilis is suspected. Some would do it in all cases.
6. Teeth and tonsils.
7. A follow-up in each case to urge the correction of bad habits; the cleaning up of the mouth and throat; correction of errors of refraction; treatment of curable disease. Especially the case of incipient tuberculosis should be aided in every way—needed period of rest—adjustment of job—care of his family—institutional care when needed—freedom from want and worry—medical advice as to sunshine, fresh air, climate,

food, medicines, personal hygiene, and avoidance of exposing others to contagion.

I am not sure whether it pays and is really wise to have, at the company's expense, our employees' teeth repaired, their diseased tonsils removed, their error of refraction corrected with glasses, and their salvasan given. All these, I feel are still in the experimental stage. The company may aid its men to get this service at a small cost, and if it desires, pay a portion without going to extremes of paternalism. The all important thing is *to follow up every case and see that the men get this service when needed.*

In the placement of men when employed the surgeon and chief employment officer should work together. The prospective job is written at the head of the examination card and the surgeon keeps this in mind when examining the man. When any doubt arises he should confer with the employing officer. There are some jobs that require special fitness, as cranemen or locomotive engineers. The work of this group involves more than usual responsibility with special hazards to themselves, to their fellow-workmen or to property.

The examination should include:

1. An estimate of mentality as to
 - (a) Alertness.
 - (b) Power of attention.
 - (c) Reactions. These should be prompt, certain and accurate.
2. There should be freedom from syphilis, epilepsy, apoplexy, alcoholism, drug habit, uncompensated heart lesion, uraemia, or other serious disease.
3. The standard for vision and hearing should be well above that of the ordinary employee.
4. There should be periodical physical examinations—best annually.

In our employment examination, we find three main groups:

1. The sick man—too sick to work—we either defer his acceptance or reject him and try to aid him or advise him as to his care and treatment.
2. The well man—the normal—who grades as well as the average physically and mentally.
3. The subnormal, mentally or physically. If we can use him, we should select his place with care. He should be watched by superintendent and foremen to see how well he does his work; by the surgeon to see how he stands it.

The placement of men after recovery from disabling injury requires unusual tact and hearty cooperation of the management, the employment officer and the department superintendent. These men fall naturally into four groups:

1. Minor injuries with short disability period returning to former work.
2. More severe injuries, usually general hospital cases with prolonged disability. These usually are best put at some light work for a few weeks before going back to the old job. This is "occupation therapy," a very important part of the treatment. It is not good for man to loaf—or, conversely, it is wise to get him back to some kind of work at the earliest moment consistent with his recovery. During this period he is watched and treated and the surgeon and department superintendent keep in close touch. There is a tendency on the part of many men to try to prolong the hospital period, the loafing period and the light job period. The surgeon must cut each of these short at the proper time.
3. In a third group the man is so maimed or crippled that he can never return to his old job, and must be taught another one. A large plant affords ample opportunity for this. Great care should be taken in its selection—it should be one the man likes and is fitted for mentally and physically. One of our brakemen lost a leg. We gave him three years of apprenticeship in our roll shop. He is now a full-fledged roll-turner

getting within 2 cents per day as much as he would get as brakeman.

4. A fourth group which is rare in the larger mills consists of men who can find no place in their own mill and must be turned over to the community or the state for vocational training. In my 26 years at the Clairton Mills, I have never found one of these.

If we study the workman in his relations to himself, his fellow-workmen, his employers and the company surgeon, we find four important things that stand out. On these things depends largely his success or failure in life. On these depends almost entirely his value to the company:

1. Loyalty.
2. Health.
3. Efficiency.
4. Safety.

These four things are so interwoven that we can hardly think of one without thinking of the other three. If the company surgeon is the right kind of a man; if he has the confidence of the men in the ranks, of the department superintendents and of the management, he can do much to promote all four. Every contact with the men is his golden opportunity. He may get this confidence:

1. By being fitted by *nature* and *training* to be a real company surgeon, falling in love with his work and putting his soul into it.
2. By having his department *organized for efficiency*.
3. By being *up-to-date in equipment and methods*.
4. By securing
 - (a) Full support of the management.
 - (b) Hearty cooperation of superintendents.
 - (c) Obedience of rank and file.
5. By being *square* with every man. *See that he gets "his."* Let the surgeon stand up for the man's rights just as honestly and fearlessly as he does for those of the company. If the man has tried to put across something crooked and deserves penalizing it should be swift and certain.
6. By having a *real interest* on the welfare and happiness of *every man* and his family.
7. By being kind, without coddling, courteous, without being obsequious, painstaking, dignified and firm.
8. By *making good*—getting results—"Nothing succeeds so well as success."

CHAIRMAN NORTHWOOD: Dr. Colcord, I want to thank you very heartily for this splendid talk that you have given us. I believe it touched us all where we live. We all have had practically the same problems that you speak of, and I am sure it has done us a world of good to have you speak so frankly and so earnestly on these things that are so vital to us in our industries and in our various plants.

JAMES TEAIGY (National Cash Register Co., Dayton, Ohio): I might say that our safety department works in conjunction with our medical department, and our system is practically the same as outlined in Dr. Colcord's paper.

We have one other item, though, that I think helps a great deal to keep our accident record and lost time record down as low as it is. So far this year we have had 83 lost time accidents which averaged about one hundred hours each. Our supervisor or foremen or job foremen all are requested when a man or woman in the employ of the company gets lax on their work for any reason, to send these people to the medical department, and in this department is thrashed out whether it is physical sickness or whether it is some home condition that causes him to be lax in his work.

I have spent practically all my time in the factory—that is about seven hours a day—among the employees; and there are numerous cases where employees have

noticed this in some other employee. As I said, we call these people into the medical department, and it is astounding how many cases we find that come from home conditions.

In order to overcome these, we make an investigation and if it is necessary the company advances money (if it is money that is causing the trouble) and they take so much out of his pay each week. I think that is one of the best ways of reducing accidents and lost time.

N. E. GREEN (Louisville Car Wheel & Railway Supply, Louisville, Ky.): I just want to set myself straight on the question of rewards, etc., and I am glad that the Doctor mentioned it.

We have long since done away with the individual reward. Ours are all mass or team work, and I am glad that he brought it up because I feared you might have had the wrong impression.

C. B. KING (Wickwire Spence Steel Co., Worcester, Mass.): We have a problem of a man earning a high wage developing a physical condition which made him a hazard to himself, but probably not the other employees. We could find no work on which he could earn as much money as he was earning, and he had a large family to support.

What are you going to do with a man like that?

CHAIRMAN NORTHWOOD: Sometimes those cases seem pretty hard. Doctor, what do you say?

DR. COLCORD: The answer to that would depend largely upon whether that condition was one for which the company was responsible.

If his was compensable, then if he could not go back to a job that was worth as much as he had been earning before, give him the kind of a job where he is the most useful—that is an important thing from the psychological standpoint—and then pay him in compensation the difference between what the old job was worth and what his new one is worth. I think that is fair to the man.

If the condition was outside of compensability then I don't know that the company can do anything for him, unless they want to do it in the way of charity. Their obligation to him is to furnish him with the best kind of a job they possibly can. If it isn't one that he can support his family on, then there is the question of help from somebody.

CHAIRMAN NORTHWOOD: A few years ago we had a man who lost both legs in our plant. A brakeman and a man of very little education. We helped him learn typewriting and shorthand. When he first started to typewrite for us his fingers were so wide he would hit about three keys at a time, but he persevered. That is what I wanted to bring out, and he was able to graduate from the business school to which he was sent by the state of Pennsylvania Rehabilitation Division, which provided that course for him. When he finished his course we gave him a job in one of our offices and today he is earning more than he did as a brakeman.

CHARLES W. WIENER (Union Rolling Steel Co., Union Falls, Ohio): Dr. Colcord mentioned psychology in connection with his talk. I believe that is a subject that is not generally understood by the layman.

I think it can be illustrated by this little story. There was an old Darkie being told that every person had a time and place where they had to die.

He came back at this man, and said, "If that is the case and I just knew when and where that was, I wouldn't be there at that time."

I think that is a good thing to remember in connection with safety. If we could foresee these things, accidents wouldn't happen, and Dr. Colcord brought that point out by saying that the safety committee or the safety engineer had to do the thinking.

It is a pretty hard job for the safety committee or the safety engineer to be around to do the thinking before the accident happens. After it has happened, it is an easy matter to figure out a way to prevent another accident like that. My

thought is to get the employees to try to foresee accidents on their particular jobs.

A. T. MOREY (Commonwealth Steel Co., Granite City, Ill.): If we knew when an accident was going to happen, we would be there. We can know when an accident is going to happen. I think that is a big point that we have worked on this year. As a general rule the first carelessness does not produce an accident. If that is true, it gives us a chance to head it off. If we will watch the careless tendencies and be strict when the first carelessness occurs, we won't let that go on until the law of averages operates and eventually an accident happens.

I think it will give us a great deal of hope to attain the goal of no accidents by working with the idea that the first carelessness doesn't produce the accident. It is the repetition that finally results in an accident; so we can, as a rule, know

Time To Get Dressed



Tools like these
should go to the
repair shop or
junk pile. They
are dangerous.

where and how it is going to happen and circumvent it. I don't see how we could hope to attain the perfect record without some such situation.

MR. WEINER: The gentleman seems to have objected to my statement that a man cannot foresee the accident. I didn't mean that we couldn't, those of us who are imbued with the idea of safety. I realize that we can see it, but we cannot think for the other fellow unless we know what he is going to be up against.

J. J. HOBAUGH (Pittsburgh Plate Glass Co., Ford City, Pa.): I would like to ask Dr. Colcord how he handles employees who have hernia, or men for employment whom the examination discloses have some hernia, or employees who have incomplete hernia.

DR. COLCORD: Some years ago I made quite a study of hernia. I examined 9,000 employees with regard to hernia. I made a record of all open rings, and of cases of hernia. I found that one man in 60 had an open ring, or about one man in 1,100 one or both open rings, and one man in sixty had a hernia, and its discussion would be a long one.

The word potential hernia I am getting away from. Of these 9,000 cases that I examined, in the next three years, 25 hernias developed among those who stayed with us. They didn't all stay; and of those 25 hernias, only three were recorded as having had open ring at all. I have come to the conclusion that we cannot recognize a potential hernia.

I don't know just what you mean by potential hernia. If you mean open ring, there is a type of senile hernia occurring in Greeks and Turks and Armenians which is due to a sloppy condition of the whole belly wall which produces hernia. When we find an extremely thin wall developing at about thirty-five or forty, that comes nearer to being a potential hernia than anything I know of. But open rings is not to me an indication that the man is going to get hernia—somewhat the opposite.

If you brought me a man and said, "Here's a man who has never had smallpox although he has been exposed many times," I would say probably he never will get smallpox. But if you brought me a man with an open ring and I know he climbed trees and played football, and a good many other things, and had not got hernia up to the age of thirty, I don't care if he has an open ring, I don't believe he will get hernia.

You ask what to do with the man. If I examined a man whom I thought had that potential hernia I should hesitate about recommending him for employment. Either he has a hernia or he hasn't. I classify them a good deal as Grant did music. He could recognize two tunes. One was Yankee Doodle and the other wasn't. If the man has hernia and we are not hiring hernias, we won't hire him. If he has an open ring I do not advise against his employment.

MR. DREY: I would like to ask Dr. Colcord if he considers some hernias as being sudden?

DR. COLCORD: If I were to answer that I would have to say "Yes" or "No." There are two kinds of hernias: hernias of slow development and traumatic. Just what proportion are traumatic depends upon what you mean by traumatic, and in my hernia paper I dodged the question by making three groups. The intermediary group I called sudden hernia. The sudden is one of slow development in which the sac has never had anything in it but a dilation, which acts as a wedge and through the year slowly forms and stretches the sac, getting it ready for the entrance of a gut later on. Perhaps it would be two or three years before that gut would enter the sac under normal conditions, unless the man goes to lift a heavy casting, weighing 600 pounds, with four or five other workmen, and the foreman gives the signal to drop it and they all drop it but the one, and the sudden weight forces the gut into the sac which was not ready for it. There is pain and there is soreness. I have proved in such a case that it was a hernia of slow development, and yet that is nearly a traumatic hernia, so near that I would advise payment of compensation in such cases.

The ordinary hernia of slow development usually comes to us when the man appears in the office and says, "I lifted something last night and this morning I felt a lump in the loin." You examine him and you find that he has a hernia. Now if there is a well developed sac, and I think the trained fingers can detect one before it opens, it doesn't grow in five hours any more than an oak tree grows in twenty-four hours. It is a matter of years for a well formed hernia sac, and we classify those as hernias of slow formation.

I. S. PERRY (Ohio Brass Co., Mansfield, Ohio): About four years ago I had a man working for me who lifted a heavy weight and claimed he sprained his back. He was in bed for something like a year. We had several doctors and the state doctor, and we finally put him on enforced treatment and got him back on his feet and to work. We gave him light work and almost forbid him to lift anything. For some reason he insisted upon lifting and he claims he sprained his back again. The man can get out and walk and everything, but the doctor claims that we are

going to go through the same thing that we did before. It will take probably a year to get him back to work, and the last time it cost us about \$1,800. -

I would like to ask the Doctor what he would do in that case?

DR. COLCORD: I perhaps wouldn't do anything different from what you did. The problem of lame backs is with us. When I say "us" I mean all of us. I see Dr. Foster smiling over there.

Dr. Foster and I know about one case that has put crow's feet around our eyes and grayed our hair. A man came to me just last week whom I had worked hard with for a year, and he wore two or three kinds of braces and he came to me and said, "I have sprained my back." I said, "I thought I told you if you were going to hurt yourself again, to do it in a place other than your back." "Yes, I promised you but I did sprain it again." I have him on my hands again.

There are all kinds of sprained backs. There are genuine sprained backs and they are quite a serious matter and they have to be put to bed and treated; but I find a great majority who say they have a sprained back, really haven't. They either have a congenital weakness of the lower spine, a lumbar on the sacrum, or they have what I call auto-intoxication. I look at the man's tongue when he comes to me with a sprained back and if I find a dirty tongue, decayed teeth and rotten tonsils and signs of intestinal trouble, I feel more like giving him a dose of castor oil. And about 70 per cent (I don't think I am exaggerating) of the cases of sprained back are some form of intoxication or intestinal.

ADJOURNMENT

October 4, 1928

J. A. NORTHWOOD, Chairman**Superintendent of Safety, Bethlehem Steel Company, Johnstown, Pa.**

The fourth session was called to order at nine-thirty o'clock by the chairman, J. A. Northwood.

(The members joined in singing a number of songs.)

CHAIRMAN NORTHWOOD: It has been customary for a number of years for us to receive a report from Dr. Chaney of his work from a statistical standpoint, particularly our metals section end of the game, and it gives me great pleasure this morning to introduce Dr. Chaney to this Section. Dr. Chaney is of the Bureau of Labor Statistics, United States Department of Labor, Washington, D. C., and he is to be our first speaker this morning.

Accident Experience in Iron and Steel to End of 1927

By DR. LUCIAN W. CHANEY**Bureau of Labor Statistics, Department of Labor, Washington, D. C.**

For some time it has been the custom of the Bureau of Labor Statistics to present an annual review of the accident experience of the Iron and Steel Industry. For this purpose two groups of concerns have been considered.

The first consists of plants which were pioneers in efforts at accident prevention and have maintained continuous and vigorous effort in that direction to the present time. The second group includes both the plants of the first group and all others for which information has been available.

You will, of course, readily see that the purpose of this selection is to present to you the most outstanding achievements in accident prevention—the very best that the iron and steel industries have been able to do. The general trend of matters in the iron and steel industry has been satisfactory, but this group of plants which have been longest in the game and have developed the most successful methods is an illustration of the best that can be done.

Compare the Year 1913 With 1927

In group 1 the changes which have occurred are best illustrated by comparing the year 1913 with 1927. This comparison is limited to frequency rates since the data necessary to the computation of severity rates could not be obtained.

From 1913 to 1927 frequency rates changed as follows: *fabricated products* from 100.3 to 18.0; *wire and its products* from 59.3 to 3.5; *sheets* from 61.6 to 8.4; *tubes* from 27.2 to 2.5; *miscellaneous steel products Group A* from 70.9 to 5.1; *miscellaneous steel products Group B* from 41.3 to 2.7; *all products* from 60.3 to 5.3.

Comment is scarcely necessary to enforce the remarkable character of these results.

Another view may be taken of the data presented above. It is always possible that an unsatisfactory condition is concealed by the association of several of different conditions. To shed some light upon this question rates have been developed for the various accident causes to show how they have changed from year to year and what is their relative importance.

This treatment of the material brought out very clearly the fact that the effects of accident prevention effort are distributed with surprising uniformity among the different causes.

It has been a popular impression that with the progress of the safety movement machinery has become relatively less important as a cause of accident. When it

is noted that from 1913 to 1927 the frequency of accidents due to machinery dropped from 7.3 to 1.3 the popular impression seems to be justified by the facts. A further scrutiny of the rates however discloses that there are a number of other causes which register an equal or greater decline. It becomes evident that machinery is influenced by accident reduction effort quite like other causes. For example while machinery declined some 83 per cent the handling of objects dropped down 90 per cent.

The fact that these plants, and indeed the entire iron and steel industry, has made a commendable record is something of an offset for the discouraging fact of increased cost in general industry which has been noticed in recent years.

We are now to consider the more extended group which includes these special plants and all others for which information was secured. For a portion of this group it has been possible to determine both frequency and severity rates for a five year moving average beginning in 1907 and ending in 1927.

The insurance companies have been having trouble, and you will recognize that it is quite serious trouble when I give you a figure. In a period of about five years the returns from premiums have been \$44,000,000 less than the payments for casualty insurance. Now it happens that the insurance companies have other resources than premiums, and so they haven't had to go over the hill to the poor house on account of this loss. But you will recognize, I think, that it is not possible at all for a concern like an insurance company to go on indefinitely taking in less in premiums than is going out in its payments, and for some years past the insurance companies naturally have become a good deal exercised as to what the cause may be. They are hesitant to raise the premium rates if it can be avoided, and I think that the outcome on the part of the insurance companies is going to be a very much intensified effort on their part of accident prevention and reduction; and if you get the cooperation of that particular insurance company it is going to be a great help to the industrialists who are carrying on this accident prevention work.

For the first five year period ending in 1911 the industry showed frequency of 69.2 and severity of 5.0. When the five year period ending in 1927 is reached frequency has dropped to 24.7 and severity to 2.4.

The changes which have occurred in the departments of the industry from the five years ending in 1911 to the five years ending in 1927 for frequency, blast furnaces 76.1 to 28.7; Bessemer 101.5 to 16.7; open hearths 84.2 to 28.3; foundries 60.1 to 62.8; heavy rolling 61.0 to 16.6; plate mills 69.4 to 25.6; sheet mills 44.1 to 30.6.

The changes in severity are blast furnaces 10.6 to 4.7; Bessemer 7.6 to 4.0; open hearths 7.5 to 4.6; foundries 2.7 to 3.2; heavy rolling 4.4 to 2.6; plate mills 5.1 to 2.6; sheet mills 3.1 to 1.8.

There is one feature of this showing which must be mentioned with regret. That is the fact that neither in frequency nor in severity do the foundries register any improvement. This is the more regrettable since the experience of some foundry companies and of individual plants has amply demonstrated that foundries can be operated as safely as any department of iron and steel.

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I think that is enough to indicate to you what has happened. We consider it in this way. Possibly the term "moving average" is unfamiliar to some of you. We know that the volume of material on which you work statistically is an important item. If it gets too small, then the figures have no particular value as an index, and by doubling up in this way and taking five year intervals, we get volume enough in each interval to be indicative of what actually has happened.

The five year periods of which we have been speaking are over-lapping five year periods. They differ from each other by single years.

For some 18 years the Bureau of Labor Statistics has maintained a record of annual accident rates and has computed rates for consecutive five year periods upon their completion. *Period 1* extends from 1910 to 1914; *Period 2* from 1915 to 1919; *Period 3* from 1920 to 1924. Three years of a fourth period have now elapsed. The greater volume of data involved in these periods makes them more reliable than the individual years. For this reason further comment will be largely directed toward them.

Rates for the Industry

Frequency *Period 1*, 59.2; *Period 2*, 41.6; *Period 3*, 33.6.

Severity *Period 1*, 4.1; *Period 2*, 3.6; *Period 3*, 2.8.

In 1926 frequency declined and severity increased. In 1927 both frequency and severity declined.

Blast Furnaces

Frequency rates: *Period 1*, 62.3; *Period 2*, 39.0; *Period 3*, 30.7.

Severity rates: *Period 1*, 7.0; *Period 2*, 6.1; *Period 3*, 4.5.

In 1926 both rates rose slightly and in 1927 frequency dropped sharply while severity remained stationary.

You will notice that the decline in the severity of injuries is by no means as rapid as the decline in frequency, and that is perfectly natural. Minor injuries, those which we include in our consideration, not undertaking to bring in those cases which have no lost time. The frequency of accidents can much more readily be influenced than the severity, for which reason I believe that it is still true that the severity of accidents deserves a larger share of attention than they are getting.

The cost of the accident, which we mentioned a moment ago as troubling the insurance companies, is a matter of greatest importance. They need to cut off the deaths and serious injuries if they are going to cut down their costs, and I am going to say again what I have said a good many times to this Section: If you want to cut off the serious injuries you must improve the conditions of your plants. Improvement of conditions in the plant itself is the most effective means of cutting off serious injuries, outside of course, of the attitude of the men themselves which you need to cultivate most assiduously.

The blast furnaces have a deserved reputation for hazard. If an extra hazardous operation like that of the blast furnace can show such improvement as that indicated by the rates shown above any department should be able to show improvement.

Some of you, I presume, heard what Mr. De Blois had to say with regard to the significance of our long periods of operation with no lost time accidents. That indicated that it is perfectly possible over a very considerable period to reduce the hazards to zero. Now I remember vividly the time when it wasn't believed at all that you could get below 50 cases per million hours of exposure. That was regarded as highly satisfactory, probably the best we could do. We have gone a long way beyond that, but we still have a considerable way to go.

Bessemer Converters

Frequency rates: *Period 1*, 89.8; *Period 2*, 57.7; *Period 3*, 24.9.

Severity rates: *Period 1*, 6.4; *Period 2*, 6.9; *Period 3*, 2.6.

In 1926 both rates rose while in 1927 both rates went down sharply. Such erratic behavior of the rates is rather characteristic of the Bessemer. The operations of this department are particularly difficult to safeguard. For some time the Bessemer process has been becoming relatively less important and exposure has declined to a degree which contributes to unstable rates.

Open Hearths

Frequency rates: *Period 1*, 75.0; *Period 2*, 50.5; *Period 3*, 32.9.

Severity rates: *Period 1*, 6.6; *Period 2*, 6.5; *Period 3*, 4.2.

In 1926 frequency declined while severity sharply increased. In 1927 a marked decline occurred in both rates.

The safety problem in open hearths is much complicated by the associated transportations.

Foundries

Frequency rates: *Period 1*, 63.6; *Period 2*, 61.0; *Period 3*, 62.7.

Severity rates: *Period 1*, 3.6; *Period 2*, 3.4; *Period 3*, 2.8.

In 1926 both rates somewhat decline. A further decline occurs in 1927. When the details are considered it becomes evident that on the whole the foundries have not kept pace with the other departments of the industry. This is the more disappointing when it is observed that some foundry organizations have made an excellent record.

No. 10, p. 5. Following the paragraph on "Foundries."

However, the figures are cast up, whether we look at the changes in causes in foundries, or whether we look at the frequency of accidents, they all run pretty much the same way, almost on a level and 63.6 is a rather high rate as steel plants go; so that something needs to be done so far as the foundries are concerned. I have an idea of my own, that this is part of that problem which the safety council is now facing—how to reach the small concern. The point being that the operators of small plants, not only in foundries and others, but throughout industries, are not conscious of the fact that they are making a bad record. Their occurrences are so widely scattered that naturally they don't have any idea that their record is an excellent one.

I am showing you these figures so that those of you who see them will be stimulated to inquire: What are the difficulties so far as the foundries are concerned, that they make the only unsatisfactory record in the whole group of iron and steel industries? It certainly cannot be true that the natural hazards of the foundry operations are greater than the natural hazards of the operation of blast furnaces, but their record is considerably less satisfactory than that of the blast furnace.

Heavy Rolling Mills

Frequency rates: *Period 1*, 46.1; *Period 2*, 32.4; *Period 3*, 21.2.

Severity rates: *Period 1*, 3.6; *Period 2*, 3.9; *Period 3*, 2.3.

In 1926 both rates declined and a further decline occurred in 1927.

The 15 years which are under consideration include the war period with its extraordinary demands upon the industry. There can be no doubt that under such industrial stress there is a strong tendency to rising accident rates. It is very probable that in this case changes which were made in the mills in order to meet the situation created by the war were a considerable factor in a reduced hazard. With the calling of many workers into war service it became necessary to substitute mechanical devices for the manual power which had before been used. In the development of machine design attention was given to safety of operation with the result in many cases the tendency to rising rates was held in check.

Plate Mills

Frequency rates: *Period 1*, 49.9; *Period 2*, 39.2; *Period 3*, 29.4.

Severity rates: *Period 1*, 3.9; *Period 2*, 2.5; *Period 3*, 2.4.

In 1926 both rates declined and in 1927 a further decline of both rates occurred. The plate mills have shown about as regular a lowering of the rates as has happened in any of the departments which have been covered.

Sheet Mills

Frequency rates: *Period 1*, 51.1; *Period 2*, 32.7; *Period 3*, 35.1.

Severity rates: *Period 1*, 2.6; *Period 2*, 1.5; *Period 3*, 2.1.

In 1926 both rates declined and in 1927 there was a further sharp reduction.

Tube Mills

Frequency rates: *Period 1*, 40.5; *Period 2*, 22.4; *Period 3*, 22.7.

Severity rates: *Period 1*, 2.2; *Period 2*, 1.8; *Period 3*, 1.9.

In 1926 frequency slightly increased and severity slightly declined. In 1927 the reverse was the case. These changes are not sufficient to be of great significance.

The foregoing give an idea of the trend of events in the iron and steel industry to the close of 1927.

J. S. BENNER (Carnegie Steel Co., Munhall, Pa.): I would like to ask Dr. Chaney a question on the foundry proposition, whether it is possible for you people in Washington to segregate foundries one hundred men and under, and in the other group any foundries above one hundred men, to see whether your figures prove out that you are getting it all in the small foundry or you are getting it in all kinds of foundries.

DR. CHANEY: We have done that, but not so thoroughly and completely as we desire to do it, and our indication is that the small foundry has the least satisfactory rates, right along, right through. Now whether it is sufficiently pronounced to be the real explanation, we don't know.

MR. COFFEE (Department of Labor and Industry, Philadelphia, Pa.): The question has come up at different times about statistics on light foundries and heavy foundries, and I would like to know whether you have any statistics in this respect.

It is brought up especially in regard to insurance rates. The fellow who is engaged in the light foundry work claims that he shouldn't pay the same rate as the fellow in the heavy foundry work, that his hazards are not so great, and I have never heard any statistics.

DR. CHANEY: We haven't anything to offer as yet. There are a number of these things which we propose to go into as soon as we can. So far as we have any indication at all, it is that the light foundry man is justified in insisting that he ought to have a better rate, as the heavy foundry is naturally a greater hazard.

HARRY GUY (Keystone Roller Co.): I would like to ask why it is that there are no statistics on the small foundry proposition, employing 100 or less men?

DR. CHANEY: The reason is, so far as we are concerned, that it never suggested itself until recently, that it was a factor in the case. We thought a foundry was a foundry, and we hadn't thought that there might be a serious difference between those employing under one hundred and those employing up to five hundred. We ought to have thought of it sometime ago, but we didn't.

We are trying now to segregate the returns which we get and see what the indication is. Of course, you are aware that the National Safety Council made some investigation along this line. It is confined to foundries, and inasmuch as foundries are the spot where the safety effort has apparently been the least successful, it demands some more thorough and careful attention, and we are going to try to give it that.

RAMAGE EDGAR (Thompson Co., Braddock, Pa.): With reference to the \$44,000,000 premium loss that the insurance companies are claiming, I would like to ask first if your statistics show how much is foundry and how much is steel plants; and whether it is through their own inspection or through the plant inspection that they operate?

DR. CHANEY: So far as that is concerned, I really don't know anything but the

figures. Those come from the insurance companies—that they paid out so much and took in so much.

MR. EDGAR: I was wondering if they could help the Safety Council any if they gave in their figures the kind of plants in which these losses occur, and possibly the size of the plant.

DR. CHANEY: I think the rate making council of the insurance companies is undertaking to do something of that sort to determine where that loss arose. We haven't been able to touch it yet.

F. G. BENNETT (Buckeye Steel Casting Co., Columbus, Ohio): We operate one of the largest type foundries and are having a very satisfactory accident experience. Our rate now in the industrial commission (I think throughout the country) is a thirty-one cent rate—extremely low. I say that our experience has been very satisfactory for a large foundry. I am sure that is true with the Commonwealth Steel Co.

What I believe we had better do, is to pay attention to these figures and facts that Dr. Chaney has presented this year and last. Last year I was presiding at the meeting and had to stand on the platform and listen to Dr. Chaney tell how disappointing the foundry interests were. It wasn't very pleasant and was the only sore spot in the entire meeting.

I think, Mr. Chairman, that the Executive Committee of the Metals Section during the coming year should give special attention to this matter of the disappointment in the accident statistics of the foundry operation, dig into it from every source possible to see what can be done, and try to bring in a definite report next year.

I think it is the small foundry that is causing the trouble, as there is an extreme hazard in the handling of molten metal that we don't have in our foundry at all. It is all over-head pouring. I move, Mr. Chairman, that this matter of foundry accident experience be taken up at the first meeting of the Executive Committee of the Metals Section, and be made a special order of business for investigating during this coming year by a special committee on foundries.

(The motion was seconded and carried.)

CHAIRMAN NORTHWOOD: I believe that Mr. Bennett would be a good man to put on as chairman of that committee. I think that is real constructive work and getting right down to the source.

S. A. SANKEY (National Tube Co., Elwood City, Pa.): I can give you a miniature start with just these figures. Here's what happens to shops employing one hundred men and under. Those men are required to do combination occupations, forge work, lifting the metal, etc., and it requires several different kinds of safety devices to protect them. A man doesn't want to change each time as he goes from one occupation to another, and as a result he doesn't wear any safety devices, and he goes right at it, bullheaded, without any guards whatsoever. In the larger plants you stop manufacturing until he puts on his chin guards, goggles, or whatever it may be, and you come out ahead of the small man.

One thing more—there are not enough small foundry men who belong to the National Safety Council and learn that they should protect human life.

RICHARD L. SLOSSON (Lamrox & Hammis, Buffalo, New York): I just want to say for your benefit that the insurance companies have divided industries into three groups, and they know what the rate shows for each group and that can easily be obtained. It shows not only in the metals industry, but textile, and everything else, that the small industry has the high rate.

MR. EDGAR: As far as Pennsylvania is concerned I understand from the rating bureau that the same rate applies to the light iron foundry as applies to the heavy as far as Pennsylvania is concerned.

I know of one case where a foundry, engaged in light work, appealed for a better rate, claiming that they should not pay the same rate as the heavy grade foundry,

and they couldn't get it. Of course that foundry was forced to self-insurance, and their record for ten years has been wonderful.

J. M. WOLTZ (Youngstown Sheet & Tube Co., Youngstown, Ohio): Doesn't the experience have something to do with it? If you have a bad experience, you pay for it. Simply because one plant was able to have a good experience, that fellow was paying for the other man, and it pays to educate the other man to help you out. There is the secret of the whole thing, to my mind.

MR. EDGAR: In answer to that, I claim (and I would like to hear this discussed further) that there isn't the same hazard in the light foundry as there is in the heavy. Therefore, they should have a different rate, a lower rate of insurance than in the heavy foundry.

MR. WOLTZ: If your rate is based upon experience, that would be true, but evidently it isn't.

MR. EDGAR: As far as the rate goes, they have the same basic rate and then they are given credit on experience, but the experience is based on that one rate, on that flat rate or basic rate covering all foundries, and the man with the good foundry gets it better than the fellow with the bad foundry. He is credited with a good record, but at the same time the basic rate in the light industry is the same as in the heavy, and they claim it should not be.

MR. SANKEY: You are mistaken. The fellow with the small foundry says, "Why should I do anything? I don't get any reduction." And therefore he doesn't do anything and produces those figures. Now the danger of a larger foundry and a smaller foundry is they don't prepare the floor properly. They don't give them the proper equipment; therefore the small foundry is just as dangerous as the larger, because the large foundry sees to the occupation of the man and that he has devices to wear for the occupation he does.

MR. EDGAR: There seems to be a misunderstanding on this. I am not speaking about the small foundry employing a few men. I am speaking about the foundry doing light work compared to the foundry doing heavy work.

MR. SANKEY: Suppose we tell a man to fill up the cupola, he goes there for a while. Then we have him work for an hour on the floor, and maybe in the foundry, and he goes up and turns on the gas in the cupola; he may have six occupations in one day, and therefore he disregards all safety devices.

CHAIRMAN NORTHWOOD: We were discussing the light and heavy foundries and not large and small.

MR. WOLTZ: I am afraid that the only way we can dispose of the proposition you have is to get the insurance man on the platform and ask him about it. I don't think we can settle that question here.

CHAIRMAN NORTHWOOD: Is there any other discussion regarding Dr. Chaney's figures.

H. G. HENSEL (Youngstown Sheet & Tube Co., Chicago, Ill.): I would like to ask Dr. Chaney if his figures show that all of the foundries are reporting their accidents. Are they getting the reports from all the foundries listed?

DR. CHANEY: No, we are not, but we are getting what we believe to be adequate examples. We get about 85 per cent, and we think that is enough to show how things are going. The probabilities are if we got all of them, they would look still worse. I think you can see how that would be. The man who has a bad record is the one who is going to be slack about reporting. The good plant is going to report. But here's the situation: If any are left out, it's the poor plants.

CHAIRMAN NORTHWOOD: We could go ahead and discuss this the rest of the morning, but we are going to have to go on with the rest of our program. I am sure that Dr. Chaney will be glad to answer any questions that you send to him personally, and to give you any information that he can.

T. MCKINNEY (Illinois Steel Co., Chicago, Ill.): We have had Dr. Chaney with us for many years, and I think that he has done more than any man in the

safety movement to bring to our section his concrete figures. The doctor said a few moments ago that perhaps this might be the last Metals Section convention he would participate in, and I would like to take this opportunity to make a motion that we give a rising vote of thanks to Dr. Chaney for the splendid assistance he has given the Metals Section.

(The members arose and applauded.)

DR. CHANEY: Thank you. I have in an unfortunately small way been able to assist you, as our division in Washington has not been able to put on a staff to do all the things we would like to do; but we have made an effort, and I am very grateful and touched at the spirit shown.

CHAIRMAN NORTHWOOD: The next number listed on the program for this morning is a debate on the subject, "That the Foreman Is Responsible for Accidents that Occur in His Department." While this number is listed as a debate, it is in reality a dialogue. The gentlemen who have prepared this subject and who will present it to you are both men who have had prominent parts in the safety movement for a number of years.

The Foreman Is Responsible for the Accidents Which Occur in His Department

By MICHAEL P. GRADY

Foreman, Pennsylvania Shops, Canton, Ohio, and President, Stark County Foremen's Club, Canton, Ohio

By J. A. VOSS

Director, Safety and Compensation, Central Alloy Steel Corporation, Massillon, Ohio

ACT I.

Mr. J. A. Voss, Director Safety & Compensation, Central Alloy Steel Corp., Massillon, Ohio, takes the part of the safety agent. He has made a life study of the safety movement and he is President of Stark County, Ohio, Safety Organization.

Mr. Michael P. Grady, who takes the part of the hard-boiled foreman, has been in the employ of the Pennsylvania Railroad for eighteen years as a shop foreman. He has a national reputation as a poet, humorist and philosopher, and is widely known for his writings, lectures and poems on the safety first movement.

The presentation is being made (supposedly) from a machine shop, but the same can be applied in any kind of a shop, in any department in any kind of an industry. The safety man's problem in industry and the foreman's problem in industry are generally universal.

JOE — Hello, Mike! How is everything this morning?

MIKE—Hello there, Joe! What are you doing around here? Want to look around the shop I suppose. Well, go to it, you'll find we're all right.

You know you safety guys remind me of a fellow that died. His name was O'Brien. Like all good Irish he had to die. They held a wake and the neighbors came in to look at him one after another. And they felt sorry for him and they said what a good man he was—you know they never knock a dead one—and the women came in and condoled with Mrs. O'Brien, and there was one woman in particular—her name was Mrs. Murphy—and she said, "Mrs. O'Brien, Mike was a fine man."

Mrs. O'Brien said, "Indeed he was, Mrs. Murphy."

"He was an excellent man, Mrs. O'Brien."

"He was Mrs. Murphy."

"In fact he was just the finest man on this street, Mrs. O'Brien."

"Yes, Mike was a good man, Mrs. Murphy. He brought his pay envelope home to me every Saturday night. It was always empty, but it was the principle of the thing."

And so it is with you safety men coming around here. You get good pay and you kinda want to make a bluff that you are earning something. Sort of the principle of the thing.

Well, do you want to go out into the shop? Come out, you'll find we're all right!

JOE — I certainly would like to look over the shop, but before doing so would like to talk over with you our Safety plan, as well as the standing of your accident record. If you can spare a couple of hours this morning I will show you how you can get your department out of last place on the Plant Safety Standing Report.

MIKE—Can't do it now; too busy. Smith, my assistant, has been off for a couple of days with a sore eye; got emery in it.

JOE — That's too bad. How did that happen?

MIKE—Right over there on the grinder. He had a pair of goggles in his pocket but failed to wear them while grinding.

JOE — That is very often the case; goggles are furnished to protect your eyes not to carry in the pocket.

MIKE—Yea, great stuff. If we made fits on our machines like you guys make on the goggles we couldn't give them away; they wouldn't even start. When you fellows furnish goggles you got the same width goggles for a hunkie with a big wide head as you have for some little narrow panned guy. A number two head or a number eight head all the same. That's why Smitty couldn't wear the damn goggles; they didn't fit.

JOE — That is a good point. I will look into the fitting of goggles on the faces of the men. You know we get special lenses for those who require them. Mike, I know you are a busy man and have very little spare time, but inasmuch as I have set aside the morning for you, let's do it now.

MIKE—All right, Joe. I see that I can't get rid of you this morning. You are like all other safety men I know. So persistent that I can't refuse you. Some of you fellows could sell electric fans to the Eskimos. Let's go in the office.

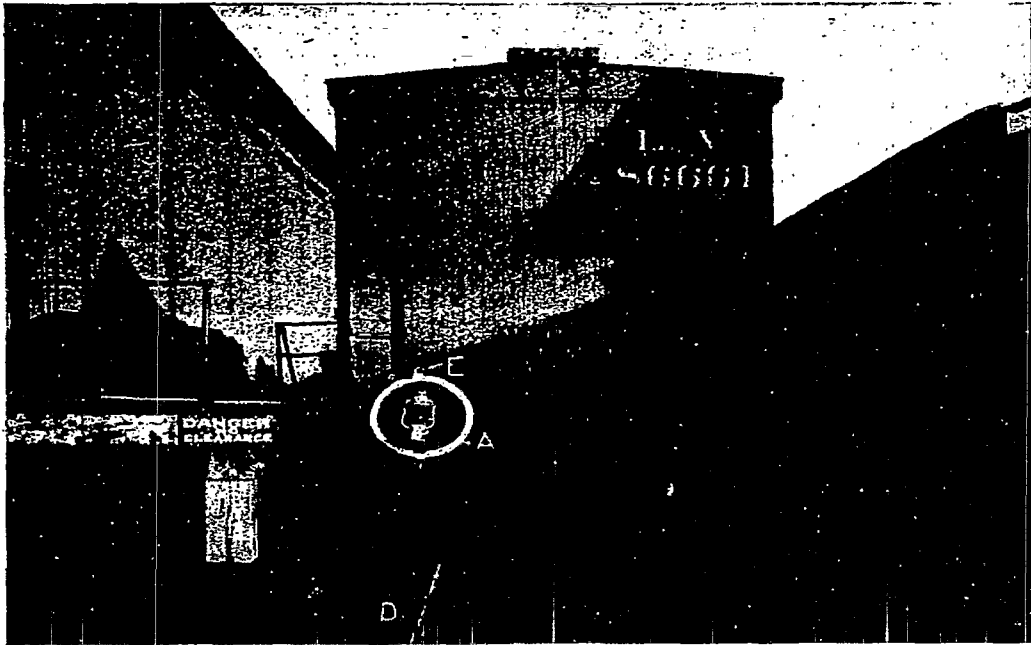
JOE — All right. Now you are talking. I never tried to sell electric fans to the Eskimos, but I am going to try to sell you the idea that safety work if properly enforced by the foremen will reduce accidents in their department, and will take you out of last place on the Safety Standing Report. Look here, Mike; here's the last-month's report for the Corporation, showing your department in last place with a severity of 1.05 per cent. That is not a good advertisement for your department and I know that you would feel very proud of your department and your men if you could move up in the first division. And, Mike, others have done it and there is no reason why you can't do likewise in your department.

MIKE—That's all right, but some of these departments don't have the hazards that exist here in our shop, and we are bound to have more accidents in this department because of the large amount of work that we are required to handle here and everybody is busy all of the time. What I'm paid for is production. This company don't sell safety. It sells a manufactured product that people buy because they can use it to an advantage.

JOE — I can't agree with you, Mike. If your department is as hazardous as you claim it is, that is all the more reason that you should put forth greater efforts for safety than any other foreman. Furthermore, safety will assist you to increase your production rather than retard it. You have under your direction about 200 men. If your men fail to get out their work, operations

of the entire plant will be slowed down. If the work they turn out is not right, production in some other part of the plant is stopped, or at least delayed. It takes a real man, Mike, to keep things going in a shop of this kind.

MIKE—You're right. I know it takes a real man to run this place, and I have 190



The "Ferguson" Track Target for night and day service for protection of employees working on or near cars undergoing repairs, loading, or unloading; also used by section foremen to indicate unsafe track.

A—Track disc painted red with outer ring of white. Lantern in center of disc to show red light in both directions at night.

D—Clamp for securing target to rail. Padlock is used in pin for holding keeper in place, making it impossible for the target to be removed by any person other than the one placing same in position for protection.

E—Padlock on lantern to prevent removal of same from target.

men in this shop, some of them have been with me a long time. Things are different than they used to be. There was a time when every machinist was a good mechanic. I served my time and worked on every piece of machinery made before I could call myself a machinist. Nowadays a lathe hand can't run a planer or a shaper, much less cut gears and I am constantly changing men and getting new men in the department. Nevertheless, we haven't killed a man in this shop for five years, and the cause of our department being in last place is largely due to some of these fools that won't keep out of trouble. I tell you a man has to look out for himself around a place like this.

JOE—That's just the idea that we want to get across to every man in your department. Get them to think safety, work safely, report dangerous conditions and dangerous practices and cooperate with you in preventing accidents.

MIKE—Well, that's your job, big boy.

JOE — I know that is my job, but I need your help to put it across, and I am going to show you why the general superintendent wants every foreman to guard his safety record in the same manner that he guards his production record. Do you know that the general manager and general superintendent holds each foreman responsible for accidents that occur in his department?

MIKE—How do you figure that? It's my business to get out the work. It's my business to have that work accurate and get it out on time. It's my business, as you say, to do my work so that production will not be delayed. And production, Joe, is what we're getting paid for. This place is no pet charity for the stockholders, we got to make money. We don't aim to hurt men, but I can't be eyes, ears and mind for all these men. Who takes care of me?

JOE — I am just as interested in making money for the company as you are, and as I said before safety will increase your production and accidents are very costly to your department, the company and the workmen. Accidents cause delays, disturb the morale of your organization and may cause suffering and hardships to your best men and if you and I work out these safety problems in this department and reduce your accident severity, we will both feel proud of our accomplishments, in that we have saved your men suffering and misery and saved the company delay and expense caused by accidents. I know that I can reduce the days lost by men in your department 50 to 75 per cent the first year if you will give me your support, and if you would view this safety work from the proper angle.

MIKE—That 50 to 75 per cent reduction sounds interesting. What do you mean by giving you my support?

JOE — I mean just this—that I will require your assistance in properly safeguarding your machinery; that you must encourage your men to report unsafe conditions and unsafe practices and instruct every man in your department that you will not tolerate any more dangerous practices.

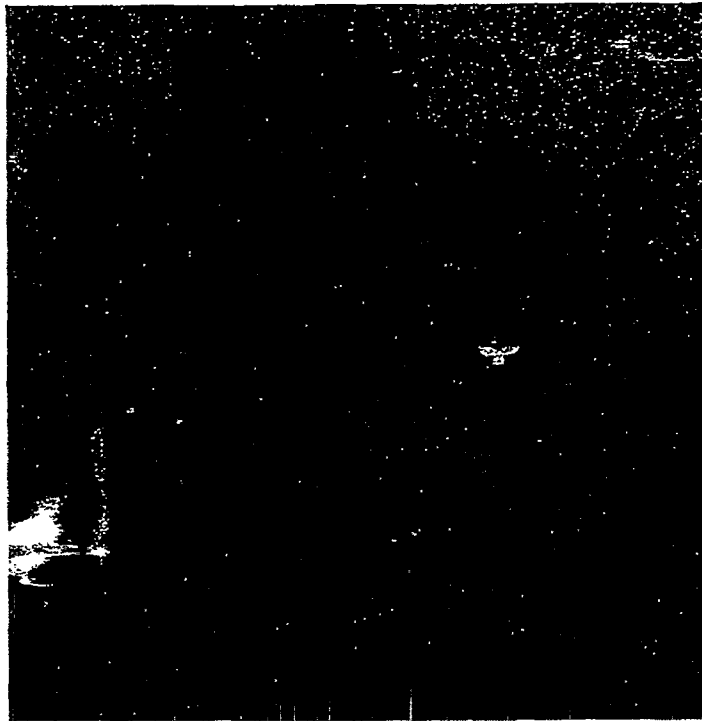
MIKE—You are laying out a big job for me. We need quite a few safeguards that I know of in this department and they are going to cost considerable money. I can't charge this large expenditure to my operating and maintenance cost.

JOE — That's easily taken care of. Our management sets aside every year an appropriation for new safety devices and installations and whatever guards or new devices you require I will send you a Safety Order on this form and your work will be charged to the account number of the appropriation. The account number will be marked on this order and, therefore, all expenditures on account of new safety guards and devices will be charged against this account and not against your operating or maintenance account.

MIKE—That's a fine idea. The management must be strong for this safety work if they make an appropriation every year to take care of new safety installations.

JOE — You said it, Mike. Our management does not want accidents in our plant and they are willing to make necessary expenditures to make working conditions safe, and as long as you and I have the backing and support of the management in this work there is no reason or excuse why you should continue having accidents due to unsafe conditions and unsafe practices. I want to make a survey of your shop and select the most dangerous conditions first and issue Safety Orders for them so that we can immediately

proceed in going ahead with the guarding of dangerous equipment, as I feel that it is the first thing necessary in showing your workmen that the company and the management is behind the safety movement, not only in word but also in action, and that they are willing to spend money to make working conditions safe.



Bench Sander Guard and Exhaust System. Bench Sanders of the type illustrated here are used by the Westinghouse Electric & Mfg. Co. All moving parts are completely enclosed and in addition a small vacuum system is attached to each unit. The vacuum operates automatically with the sander and removes all dust, etc. Each vacuum system has its individual dust collector or bag which is emptied at regular intervals.

MIKE—I like your system regarding the installation of safety devices and I want to tell you right now that I tried to get some of these machines guarded but could never get any action. Let's go out in the shop and look things over.

You know, Joe, this old bunk about management being willing to spend money for some guy's humanity and all that kind of stuff is peddled around a lot. The management is in business to make money. Just like a fellow told me last summer at the National Foremen's Convention we held in Ohio about one of those spell-binders talking about management being willing to do this and that. That is great stuff, he said. I was working for a Scotchman in a small shop, and it was the last day of the year. I was the only one in the shop and the boss called me in and said, "Bill,

this year I have had the most successful year I have ever had since I have been in business. I have cleared over and above all expenses \$30,000.00 and in a great measure you are responsible for this wonderful success I have had, and to show my appreciation for the effort you have put forth I am going to write you a check for \$1,500.00 and if we do as good next year as we did this year I'll sign it."

JOE — All right. Mike, in my experience I have seen many cases wherein men have been killed, lost a hand, arm or a leg on account of unguarded gears and belts and projecting set-screws, and it is, therefore, that I dread to see unguarded gears and belts or projecting set-screws anywhere. Many lives and limbs could have been saved for the sake of a \$10 safeguard. Do you know that in many states today the laws compel employers to guard unsafe machinery, and if the employer fails to do so it may cost him a large amount of money, in addition to crippling his employees if he fails to properly guard machinery.

MIKE—You're right, Joe. I know of some of my best friends who are crippled today because of the lack of safeguards, in fact I got a shot of it myself; 23rd of August, 1901; caught it in backgear of a lathe. Went to put my hand on cone to stop machine after I had shoved the shifters, talking to a fellow on the lathe back of me telling him about a girl I had a date with that night, and got the old finger pinched. All my own fault. I don't blame anyone but myself. I never paid a great deal of attention to unguarded machinery, as I always felt the man operating the machine understands it and would protect himself from getting caught in any unguarded moving parts, but I am commencing to believe we had better guard the machines in the shop and if you will send me a Safety Order to guard all the gears on the lathes, planers, boring mills, milling machines, slotters, shapers, gear cutters and drill presses, I will issue a Service Request to have this work guarded immediately. I never knew so many unsafe conditions existed in our shop until you pointed them out to me this morning, and while I cannot have it all done at once, nevertheless I will pick out the most dangerous places and have them corrected.

JOE — Inattention, girls and work don't mix. You certainly must have learned your lesson and your men can profit from your sad experience and should be taught to keep their minds on their work at all times. Inattention to regular duties causes many serious accidents. I will send you over a Safety Order right away covering this work and our guard man will be over to see you and will build the guards according to your instructions. I won't take up any more of your time this morning, but if you desire any information regarding the guarding of these machines I will be glad to come over if you will call me, otherwise I will see you some time later.

MIKE—All right, that's fine. Whenever you are ready to make the next move, come over. I am going to give this safety work a whirl and see if it will have any effect on our accidents. I suppose I'll have to work like H— to make up the time I spent with you this morning, but I guess it is time well spent. So long.

ACT II.

(One month later)

JOE — You look as though you haven't a care in the world this morning. How are things going?

MIKE—I see you're right on the job this morning, Joe. Things are going pretty good this morning and I want to show you some of the machinery that has been guarded. The boys are very much pleased with these guards and are

glad to see that the company is taking action to guard them against accidents.

JOE—That's fine. I am glad to hear that, and I believe that your next move is to let your men know that you are going to have real safety in this shop from now on. The first move in organized safety work is to interest the manage-



Car shifter constructed with a "Rex" steel heel which "bites" the rail with practically no slip. For detail of large end of bar see picture, page —.

A—Steel disc five inches in diameter, x 1½ inches thick, located 14 inches from end of bar. It may be welded in place with an acetylene welder or pinned. In case bar should slip or turn and man should be thrown forward, no matter how bar may strike the head of rail or ground, this disc provides a stop which prevents injury to fingers.

This bar was originated by employees at the Lorain Works. Note in inset picture the four cornered piece of "Rex" steel inserted in the forging. When one corner of this steel becomes worn it is driven out, turned around, and another corner is used. A very efficient tool and easily kept in repair.

ment; second, superintendent; third, foremen; and fourth, the workmen, and I believe if you could arrange to call your men together one-half hour before lunch time we could arrange to explain to them the company's policy regarding safety work.

MIKE—I can't talk and you might have sold the management and superintendents on this proposition, but how do you know that I am sold. I can't see the idea of wasting one-half hour of a man's time in explaining safety work.

If there is anything wrong in this shop, I know it, but how can you educate some of these fellows against dropping material on their feet and getting emery in their eyes or getting their fingers hurt on cutting tools by merely talking to them.

JOE — Our accident statistics show that 25 per cent of accidents are preventable by safeguards and 75 per cent by education, and there is no better way of getting your men trained to do their work safely than to call them together every two weeks and discuss safety problems with them. I know that you are pretty well sold on this safety idea from the fine treatment you gave me last month and you have a very good start, so let's call this bunch together at 11:30 and tell them what you are going to do and what you expect them to do toward safety. I would like to have you start the meeting by making a few remarks and then you can introduce me and I will explain the company's policy regarding safety and if you have any suggestions to offer or points that you want me to bring out while addressing the group, I will be glad to do so.

MIKE — I can't talk and I resent standing before that group and telling them about this safety work as they will think that I am getting cold feet, but if you say so I will let past be forgotten and start out from scratch.

JOE — Forget that, Mike. This same plan has been followed by every department in the plant and it is not an experiment. Your men will think more of you as a leader if you take a definite stand to guard them against accidents, so let's line up a meeting for 11:30 today.

MIKE — All right. I will see you at 11:30 and will have the men gather directly in front of the office where we can talk to them.

(Same day—11:30 a. m.)

MIKE — Fellows we called you together here this morning because the Safety Man is here and he wants me to introduce him, but I'm just wondering like an Irishman did one time—I'm just standing here wondering who is going to introduce me.

You know there was an Irishman who had a peculiar experience in this introduction stuff, back in the hard-coal regions of Pennsylvania. The great Senator Potts was running for re-election and he was going to a little mining town and hold a political meeting. They built a big platform in the center of the town, and it was just about time for Senator Potts to arrive. The fellows wanted to know who was going to introduce the Senator, and one fellow said, "Not me, I don't want to do it," and finally a fellow named Mike Maloney was told that he would have to introduce the Senator, "Sure, I don't know anything about that kind of stuff."

The fellows said, "You must introduce him," and some fellow produced a prescription that had half a pint in it, and he took a couple of swallows, and then he knew that he was going to introduce the Senator.

Finally the Senator arrived and was climbing upon the platform and the people pushed Mike up to the front, and the fellows gave him the remainder of the prescription, and said, "Now, Mike, there are two towns in Pennsylvania named after this fellow, two towns named after him."

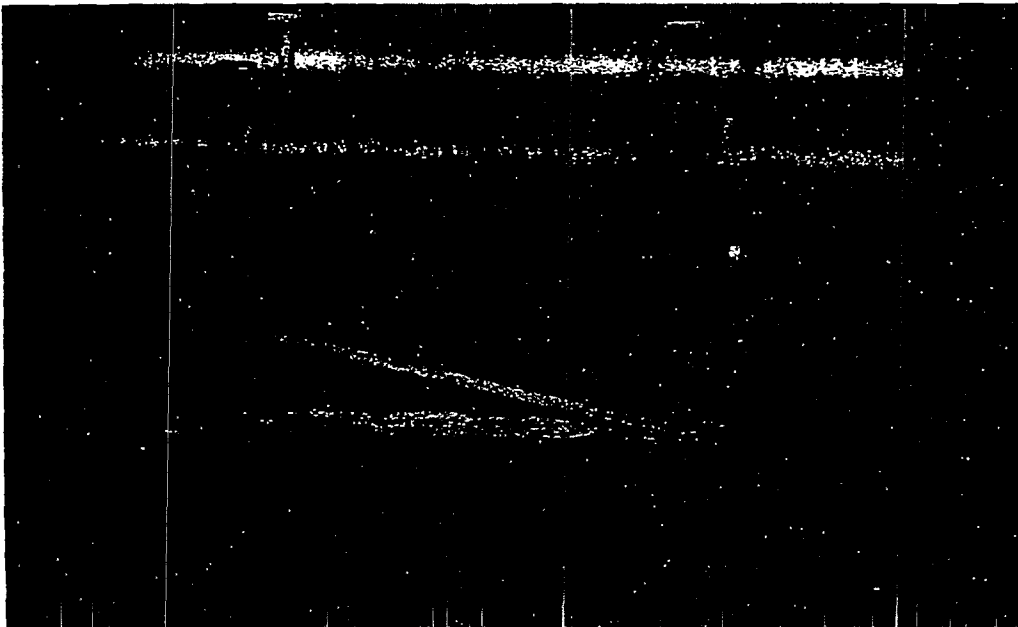
So Mike got up and when they became quiet, he said, "Gentlemen and Mike: We are here today to listen to the Great Senator Potts. He's Senator now and with the help of God and your votes, he'll be Senator again."

"There is three towns in Pennsylvania named after him. There is Pottsville and Pottstown, and—and Chambersburg."

Gentlemen this safety stuff, I got to hanging around with this Safety Agent a couple of months ago and there is more to it than I thought there was. I'll tell you what converted me to the thing entirely and that was about a week ago when he brought me over to poor old Bill's house. You

know Bill lost his leg—everybody knows that and there was poor Bill without a leg. The company gave him a good settlement as far as the law goes and they are going to give him a job, but there was Bill's six kids and they are going to have a one-legged daddy all the days of their lives. No matter how much money they acquire, their father will still be a one-legged man.

You know that safety fellow I thought he was the bunk at first, just trying to draw his pay and get a raise if he could, but I have been hanging around a little with him and its kind of a religion. This fellow talks this



Safety Tie for Piling Rounds. The safe piling and tying of round stock has always been a problem. However, at the National Tube Co. two shaped irons have proved satisfactory. These irons are made of $1\frac{3}{4}$ inch square stock and in assorted lengths to suit the stock being piled. One end of the iron tie hooks over the bottom tier and the other end holds the round being piled. Wooden blocks (2 x 4 inches) are placed between tiers to assist in placing or removing crane chain.

kind of stuff. He believes that he's dedicated his life to the commandment that we are our brother's keeper, and there's a lot in a guy like that when he gets through, and I tell you fellows it's a pleasure for me to introduce to you today the Safety Agent, Mr. Voss.

JOE — Boys, I was highly pleased when your good boss, Mike, asked me to come over this morning and talk to you on the subject of Safety. Most of you fellows have seen in the last month or so that Mike has been taking an interest in the shop and he's fixing up the machinery and trying to make working conditions safe.

He has decided that inasmuch as his department is in last place on the Safety Standing Report that he is going to have real safety in his depart-

ment, and, of course, you know he cannot do it alone. He must have your help. Don't get the idea that we are through when we put the safety guards on the machinery. That's only 25 per cent of the job. The other 75 per cent is safe work, and if you are going to reduce accidents it is right in

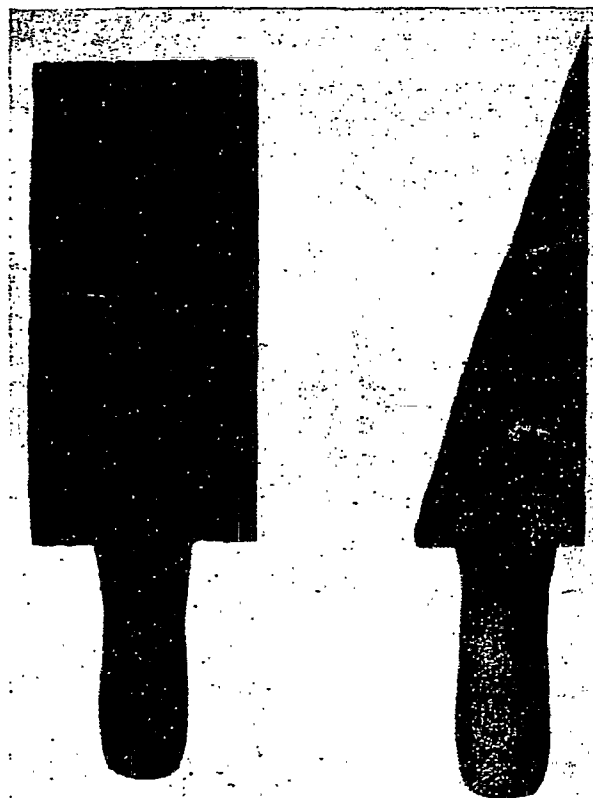
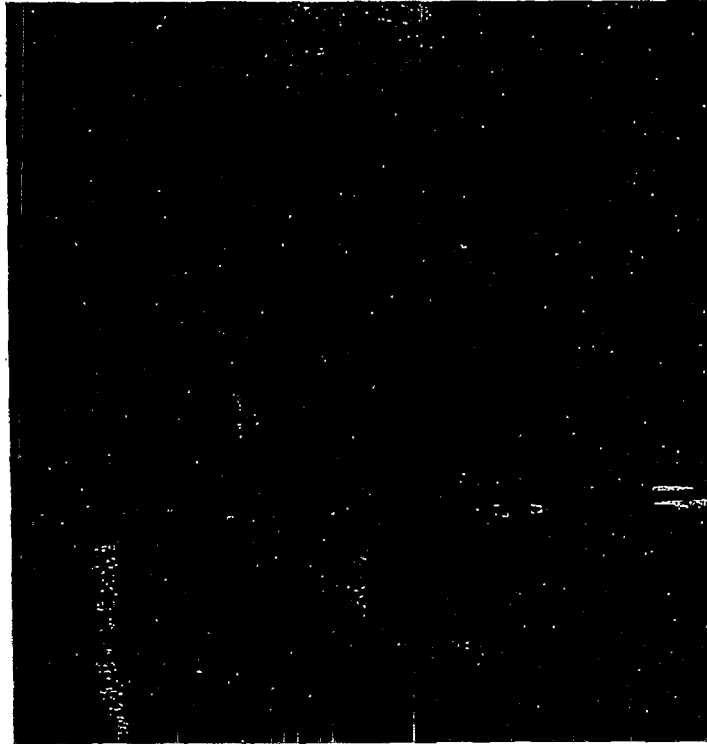


Plate Wedge. Wooden wedges of the type illustrated are used by the Carnegie Steel Co. for separating steel plates during sorting and inspection. The design of the wedge is such that the hand of the operator is protected against cuts or bruises from the sharp edges of the plates.

the hands of you men standing before me here today. It is up to you whether or not you are going to reduce accidents in this department. It is up to you to cooperate with your foreman, to give him support and to view this safety problem from the standpoint that it is good business for you and your fellow-workmen.

If I sell you on the idea of safety this morning, I would feel that it was time well spent. If I could take you into the hospitals or into the homes of some of the men who have been hurt in this shop, some that you person-

ally know, and you would listen to the tale of woe, the misery and the suffering caused on account of the indifferent attitude toward safety, on account of carelessness, I know that each and every one of you would take an active interest and cooperate with your foreman in this great humanitarian work.



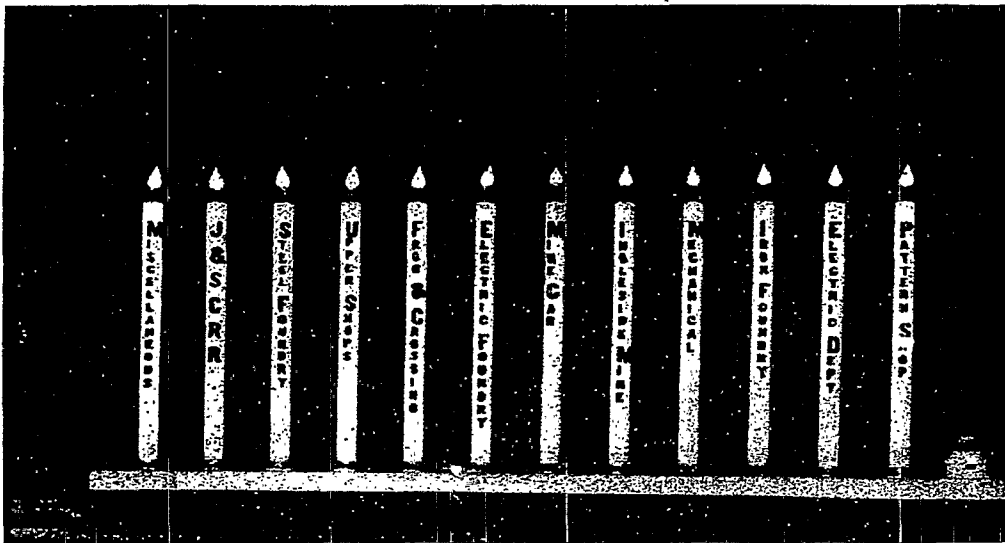
Realizing the possibility of the crane hook slipping out of place and allowing the tin plate carrier, when landed, to topple over, the Youngstown Sheet & Tube Co. have filled in the hook eye with a solid plate. Thus the usual "slack" is eliminated as well as increasing the efficiency of the unit. As an added feature the jaw tips of the carrier are rubber covered. This prevents slipping and has an operative feature in that the tips do not mark or damage the tin plate.

Now some of you fellows have the idea that safety is a fine proposition for the company because they are going to save money that they would have to pay out for compensation in case of accident. I want you to clear that from your minds. This safety movement is sponsored by the management not for monetary reasons but from the humanitarian point of view.

If any one of you men could sit in the office of the general manager and every morning see the reports that come in from the safety man—Bill was killed, Jack lost an arm, Frank lost a leg, and if you had at your command authority and supervision to stop conditions of that kind, what would you

do? You would take action to stop accidents because there isn't anyone from our management down that wants to see any man get injured and that is why we are appealing to you to help us in this safety work.

It is good business for the company, it is good business for you men, and inasmuch as it is good business for all, why not put it across? Why not help your foreman to accomplish a real safety record? It can be done. Other departments have done it, and I know that each and every one of you if you take the proper attitude in this safety work, that you are going to



At main entrance to the Plant of the Lorain Steel Co., Johnstown, Pa., "Safety Candles" are kept burning with a green bulb or light to indicate that there has not been a lost time accident in the department. Should there be a lost time accident a red bulb or light is placed in the candle representing the department in which accident occurred and the red light remaining until the end of the month when it is again given a clean slate with a green candle. Each candle is 3 feet and 6 inches high.

establish a record in this department that your foreman and that you men will feel proud of, and you will look back to the day when we had our first meeting, and you will say, "Why didn't we start this sooner. This is a mighty fine proposition."

Another thing, boys, that I want you to do. I want you to feel that the safety problem is not a one man's job. It isn't the safety man's job alone. It isn't your boss's job. We must all work together, and if you see anyone taking a chance, or if you see any unsafe conditions report them to your foreman immediately. Don't tell your buddy, "Jack, be careful." Show him how to be careful, and if you are doing that, you are cooperating with safety.

Above all, don't take chances. Chance-takers eventually get hurt, so don't take chances.

In regard to safety suggestions. We don't care what you have on your mind, whether it is mechanical or electrical or operating, you are not going to be criticized if you make a suggestion for safety in this plant. Now, boys, if you know of any unsafe conditions or unsafe practices, we would like to have you tell us about them.

SHOPMAN—Mr. Safety Man and Foreman: I have something I want to suggest. I have worked in this shop about a year. I was in the shop across the



Pit Stairway Housing. Realizing the hazard of men being struck by loads, flying cobbles from mill, etc., when ascending or descending pit stairway, the Youngstown Sheet & Tube Co. have housed these entrances as illustrated. The housing is made of heavy sheet steel and reinforced with angle iron so that it will withstand a heavy blow.

street. He has lots of safety over there. Here I see that our lathes don't have belt shifters. Why can't we have those here like Smith & Co.?

JOE — That's a fine suggestion, Jack. We were talking about that this morning. Get that down, Mike.

SHOPMAN—Hey, Safety Man! I have been working in this place a long time and maybe I get the air for talking now, but I'm going to tell you. I saw a fellow on that planer over there almost get pushed to the wall by the planer bed. He gets so close it pushed him over. I don't care if I get fired, I think maybe some day I get it.

JOE — That's all right, that's a mighty good suggestion. Don't you ever worry about getting fired for making safety suggestions.

SHOPMAN—How about locks? We want locks to lock open these switches. We had them in the other mill when we were working on machines. That company gave us locks. You don't give us nothing. We want our locks on



Skelp Mill Interlock. The hinged gates bar "A" secured by latch "B" closes off the space between end of roller table and face of shear housing on mills in the National Tube Co. When necessary for a man to enter this space, gate "A" is opened which automatically breaks the controlling circuit, located behind gate "A" near latch "B." This deadens the roller table and thus prevents the plate being run onto the man working in this space.

the machines so a fellow cannot come along and throw in the switch. That's the kind of stuff we want.

JOE — That's a good suggestion. We'll see that you get locks when you are oiling or repairing a machine. (To foreman) Did you get that suggestion.

MIKE—Get locks.

SHOPMAN—Do you care if I say something, boss?

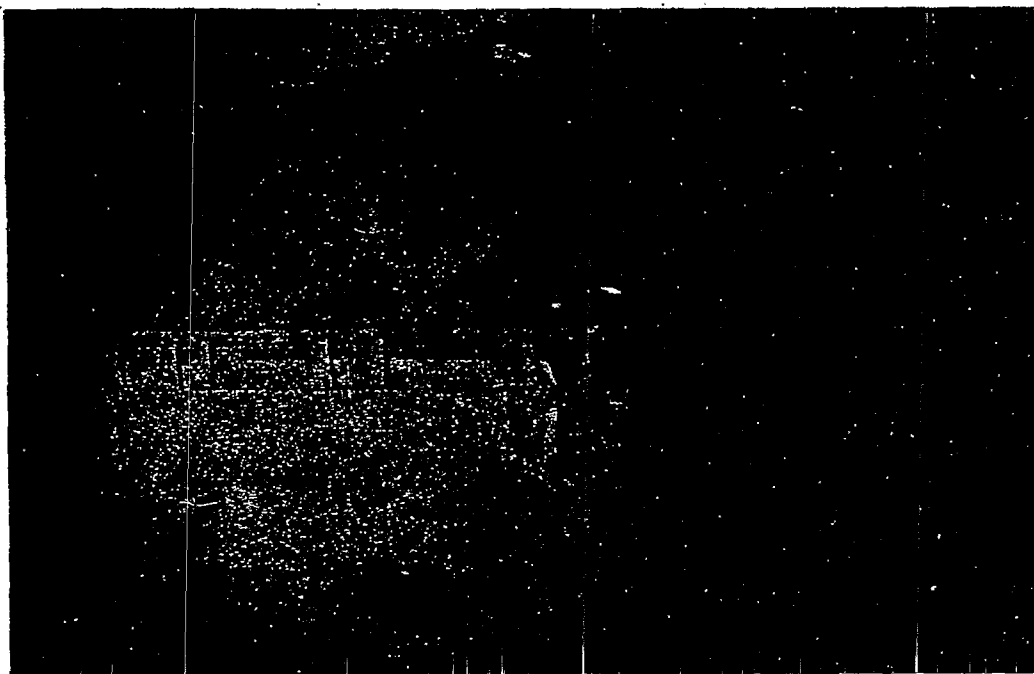
I work in that machine shop for about twenty-five years. Over here on the drill press in the corner of the shop, I was working yesterday and had a brand new pair of gloves on and got caught in the drill and it pulled me

around. I didn't get hurt. I didn't go to the hospital and I didn't say anything about it, but I would like to know what can be done.

JOE — We can get brushes to remove those drillings. (To the foreman) Better take that down.

JOE — Anybody else?

SHOPMAN—How about goggles? There's only one pair of goggles hanging on the stand there and everybody is using them. Everybody wants a pair of goggles.



Adjustable plate shields to enclose the top of the cupola when the cupola is not in use or when men are working inside. This is done at Lorain Works, National Tube Co., to avoid the possibility of material being dumped into the cupola for thoughtless charges.

JOE — That is the way it is going to be handled. We are going to carry goggles in the storeroom and every man will have his own pair.

SHOPMAN—Mr. Safety Man, when we get hurt why do we have to wait until we go home to get fixed up. Why can't we go to the First Aid right away?

JOE — Why, don't you go to the First Aid?

SHOPMAN—The boss won't let us go.

MIKE—Some of these fellows have four first-aids, one on every corner right out there.

JOE — Anything else this morning, boys? It's about twelve o'clock now and time for lunch. I certainly want to thank you for your attention. I think you will find that your foreman is going to hold meetings with you men at least once a month. If you have any safety suggestions or know of any unsafe

conditions, don't hold them over until the safety meeting, because some one may get hurt.

There is nothing more today. So we will see you sometime later. Thank you.

(Immediately after the meeting)

JOE — The boys were very much interested in what you said and you certainly put across the idea in fine style. From the way they responded when asked for suggestions and the interest displayed, I believe you're going to have real safety cooperation in this shop. You know when the old boss stands before them and talks to them like a daddy as you did today they are not going to be hesitant about cooperating with you. I have always found that the foreman is the back-bone of the safety movement and he is going to have just as much safety in his department as interest shown by him in the work.

MIKE—Like all safety men, you have a good line and you are certainly making it stick with me. I hope that I can make my line stick with the men as well as you did with me. I never thought I could stir up so much enthusiasm in safety within one month's time and the way the men are taking to it I am commencing to believe that the foreman is responsible for safety and for accidents in his department. What are you going to do with these suggestions you received today?

JOE — You and I will check them over and if they are approved we will cover same with a Safety Order.

MIKE—That's fine. I am going to lunch now. See you later.

ACT III.

(One month later)

JOE — You look as though you haven't a care in the world this morning. How are things going?

MIKE—Everything is going along just fine. Smith, my assistant, came back after losing time on account of the sore eye and believe me I lined him up and told him what was to be expected of every man in this shop from a safety standpoint. He said he learned his lesson and from now on he is for safety. Do you know that since we started safety work two months ago everything seems to be different around here? I am having less trouble, getting better and more work out of the men, and I have more time to look after work other than the regular routine work of the shop. I hope that this enthusiasm will continue and that it will not dry-rot as it has several times in the past, because I have learned now that it is going to be a great help for everyone in the department.

JOE — Our company is strong for safety work and as long as the general manager is behind the movement, you need not fear about safety losing its enthusiasm. However, don't forget, Mike, that while the management and superintendents may be ever so enthusiastic about safety, the foremen must be just as enthusiastic and must constantly plan and scheme in keeping every man in his department enthusiastic. I see that your safety work is moving along in fine style and the safeguards certainly make a neat appearance in the shop.

MIKE—Yes, everything that has been started so far is going along nicely. What do you have up your sleeve for us this morning.

JOE — I want to talk to you about appointing a Safety Committee.

MIKE—I heard about the committees in the other departments, but go ahead and tell me what you want.

JOE — Safety committees are organized to assist in preventing accidents and securing the ideas and cooperation of all employees. In addition to a permanent general committee, a committee should be appointed in each department. The duty of each committee is to take note of defects in machinery, buildings, methods of working or handling material, or of any conditions throughout the work, which may be the cause of accidents to employees, or which may be detrimental to their health. Members of the committee shall at all times bear in mind that the prevention of accidents is one of their most important



A crane wheel fender in use at Lorain Works, National Tube Co., consists of a cast steel Shoe "A" hung in front of wheel by Adjustable Bolt "B" and Links "C." Shoe "A" is of sufficient width to entirely cover the exposed part of the wheel and flanges, and is adjusted by "B" to clear the rail by $\frac{1}{8}$ inch. The Lugs "DD" project down on either side of the head of the rail, preventing a man's hand from being caught between the rail and the fender. The shoe is designed to fit the tread of the wheel on one side and the curve of the bumper on the other side, so that no change is required to bumpers as used at the Lorain Works.

duties. Inexperienced employees and those found indulging in dangerous practices shall be cautioned. Reports on what has been done to promote safety and prevent accidents, as well as safety suggestions, should be turned in to the chairman of the committee each week. The committee shall investigate and file a written report in regard to all serious accidents and should carefully study all accidents in order to prevent their recurrence.

MIKE—That looks like a big job for somebody. How many men should be on this committee and who should be on this committee?

JOE — The work of this committee is very important and I would suggest that you select about five of your best men to serve on this committee, and this committee should make a weekly inspection of your department and the

chairman should send a report of their inspection to you, and, of course, you should take immediate action on their recommendations. You should also meet with this committee once each month and go over their reports with them and advise them as to the action taken upon their recommendation.

- MIKE—Say, Joe, why do you want to rob me of my best men on this committee? Don't forget, boy, I got to get out the work. Why wouldn't some persons other than my best men do the job?
- JOE — The best men in your department, Mike, are none too good for serving on safety committees. Our manager and leading superintendents of the corporation find sufficient time each month to meet with their General Safety Committee and discuss safety matters.
- MIKE—I'll think this proposition over and will follow your suggestions along this line and will endeavor to give this work the necessary attention.
- JOE — All right, Mike; that's fine. One other item I would like to speak to you about this morning and that is installing two safety bulletin boards in your department where we can post bulletins, reports, etc. These boards will be maintained and changed weekly by our department and if you will show me where you would like to have them placed, I will have them installed.
- MIKE—That's fine. I know two good places where these boards can be installed. One at the tool room window and the other on the east wall.
- JOE — I will see that they are installed in the next day or so. The only other item I want to talk to you about this morning is that of safety rules. I have prepared a rough sketch of safety rules for your department and would like to have you go over them carefully and make such corrections and additions as you deem necessary. As soon as they are approved, we will have them printed on "crystalloid" and placed at conspicuous places in the shop.
- MIKE—I will go over them with the members of my safety committee and will return them to you as soon as they are approved. You fellows certainly give us plenty to do.
- JOE — That's all right. After you get going in this work we won't crowd you so much. Have you anything else on your mind this morning?
- MIKE—No, nothing that I can think of this morning. Everything is going along fine.

ACT IV.

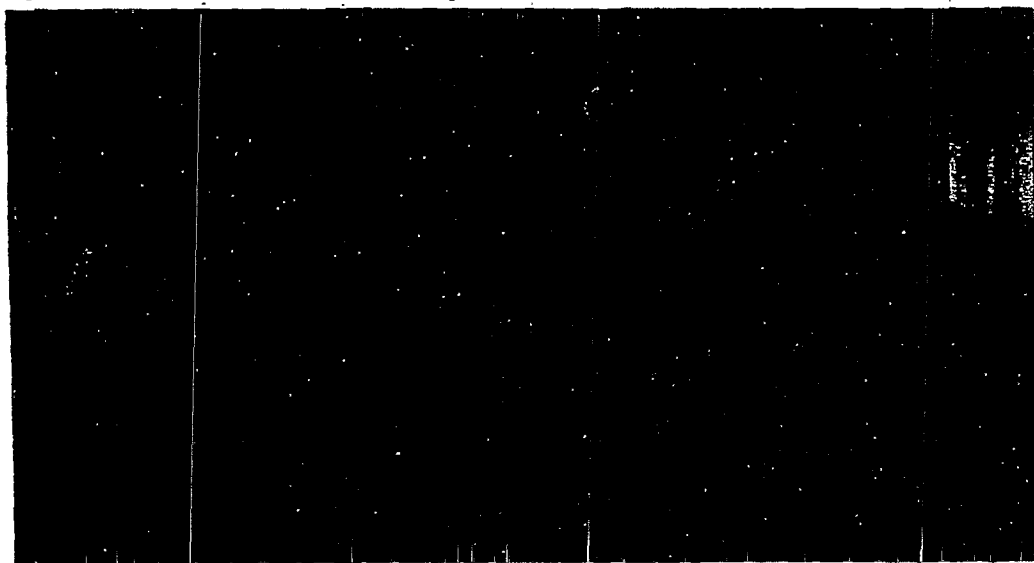
THREE MONTHS LATER

- JOE — What are you doing?
- MIKE—Writing a little Poem. What's on your mind?
- JOE — Don't get excited, I am not going to take very much of your time this morning, but I am going to leave a few pads of this "Foreman's Report of Unsafe Practices Corrected Daily" form with you and wish you would distribute them amongst your foremen and explain to them that they are to report daily any unsafe practice existing in their particular unit. You will find that this report if properly used by your foremen will bring to your attention many dangerous practices that are going on in your department unbeknown to you. I might also suggest that you discuss this report with your safety committee. Also whenever you have your gang together like we did the last time I was here, you want to read those dangerous practices and when you have a meeting of your safety committee, discuss them.
- MIKE—I think you're right on this dangerous practice business. Since I became interested in this safety work I found quite a few dangerous practices that

were going on in this department, and I'm going to get my committee and all the rest to use this form.

Want to tell you we're having safety meetings every month and I meet with them. Got it down to once a month, and every week the shop committee inspects the shop. And things are all right. They're going pretty good. Everybody seems to be kind a happy about the thing. It's going along better, and I'm pretty well sold on the idea of safety now myself. I believe I have learned that the foreman is responsible for the accidents that happen in his department.

JOE — Mike, I'm glad to hear you say that! A foreman should be interested in



The safe method of breaking out a runner gate. A shield protects the man from splash of metal, and he is also protected by wearing leggings and face mask. A device used by National Tube Co., Lorain Works.

accidents that occur in his department, because accidents decrease production and increase costs. A foreman is the determining factor in safety, and the attitude of the workmen depends absolutely on the attitude of the foreman.

A safety foreman must have certain qualifications—

He must believe in safety.

He must be sincerely interested in the welfare of his men.

He must be a leader capable of winning the confidence of his men.

He must be informed on safeguards and safe practices.

He must have backbone.

He must be square with his men and show appreciation of their efforts.

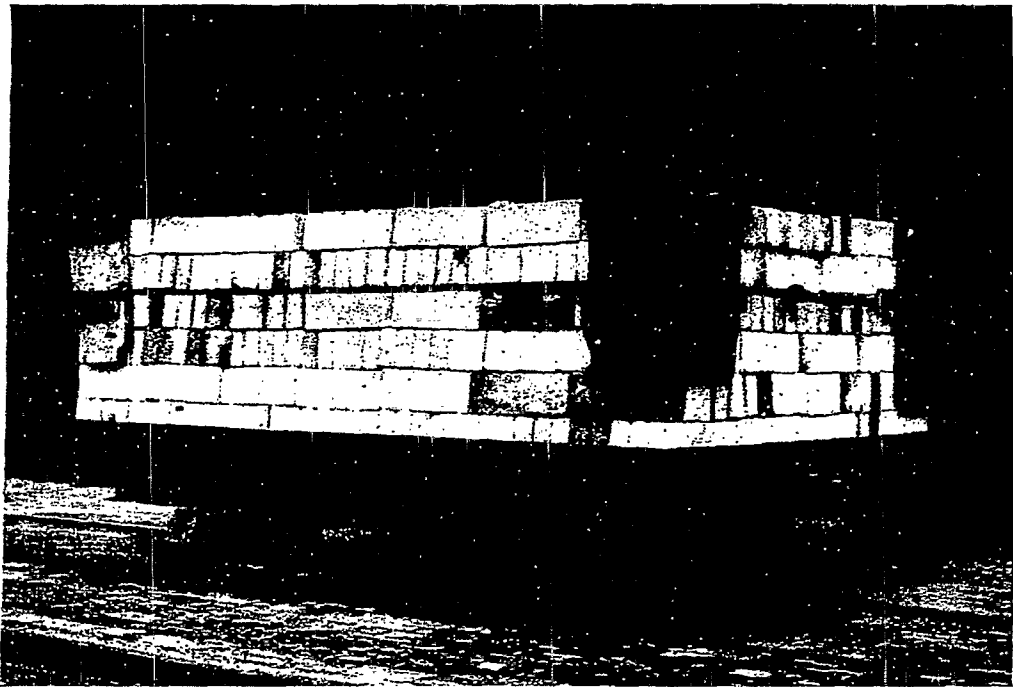
A foreman can do a great deal to prevent misery and suffering to his workmen—

He can interest his men in safety by studying their jobs and giving specific directions as to the safe methods of work.

He can start new men in the right direction by showing them that every one in the shop is pulling together for safety.

He should understand and present safety to the workmen as a business proposition.

He should know every dangerous place or practice in his department.



When fire brick is being transported on flat cars there is a great probability that they will be jolted loose. As a precaution the National Tube Co. load the car so the pile is "cross-bonded" and in addition require that wooden corner supports be securely roped in place. Thus the load is handled safely and efficiently.

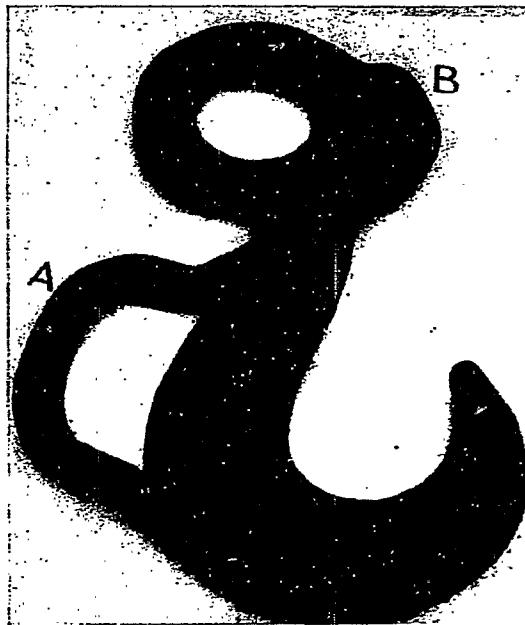
He should be responsible for safeguarding and should act promptly.

He should see that tools and machines are kept in proper repair and adjustment.

He should insist on the care of slight injuries.

And, Mike, the real foreman of the day is the one who is capable, competent and efficient in his work. A man who is a leader in safety. A man who can lead his men into safety rather than drive them, and a man who has learned that the foreman is responsible for accidents that occur in his department.

MIKE—Well, I guess you're right. Accidents will happen but I don't want any more of them! You know since I finally got that safety spirit of yours in my nut, after two or three months of hard pounding on your part, I never put so much thought to a thing in my life as I have to that, and I think that the greatest service one man can do for another is to preserve human life. You know after all it is a question of how we should live, how we shall make the most of our life and put it to the best use. This is not politics or trade or war, it is pleasure.



Safety Chain Hook for Pipe Mill Cranes—Handle "A" enables operator to manipulate hook without placing his fingers where they might get crushed between hook and loop or link into which it engages. (A National Tube Co. device.)

Hump "B" prevents hook from accidentally engaging any object. This style of hook is applicable only in special instances, such as the above.

The primary consideration is not how one shall make a living but how he shall live, for if he lives rightly whatever his need he will easily find. Life is opportunity; therefore, it's whole circumstance can be made to serve the purpose of those who are bent on self-improvement, on making themselves capable of doing thorough work. Opportunity is a word like so many others that are excellent. We get it from the Romans. It means "near port," "close to haven." It's a favorable invitation to seek safety, to refresh. An appeal to make an escape from that which is low and vulgar and to seek refuge in higher thoughts and worthier deeds. It is omnipresent. What we call alleviating poverty, neglect and suffering, or otherwise opportunity for good.



Valve pit marker, bolted to the manhole cover to plainly identify the valve, so that in case of emergency, by consulting the charts of the water lines, which are posted throughout the works, the proper valve can be located quickly. A bar may be passed through the holes "A" in pipe to lift off the cover. These markers also serve to prevent material being piled on top of manhole cover, and are especially serviceable in winter when there is snow on the ground. The cover is chained underneath to manhole ring, to prevent danger of exchanging covers where two or more manholes are close together.

When you leave for your work in the morning,
 After bidding your family good-bye,
 Always heed well your wife's gentle warning,
 "Do be careful!" is ever her cry.
 Watch each man just like a relation;
 Other workers place great faith in you
 Let's give them safe co-operation—
 Then this great safety dream will come true!

CHAIRMAN NORTHWOOD: I want to introduce your incoming chairman of the Metals Section, and we are going to ask Mr. Ed Quesnel, who will take over the guidance of the Metals Section for the next year, to take charge of the balance of this meeting so that you will have an opportunity to get acquainted with him and help him.

I am going to ask for him the same kind of cooperation that you have given me during the past year, and I want you to know him and know that he is a good

fellow. If you will all help, we can make a big success of your Metals Section for the next year.

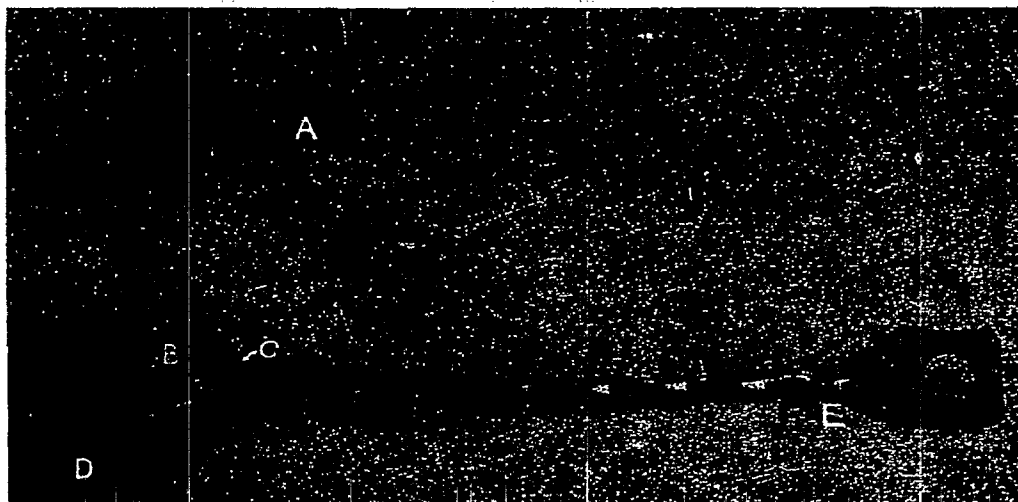
(Mr. Ed Quesnel assumed the chair.)

CHAIRMAN QUESNEL: We will now go on without any further preliminaries.

I wish to entertain the motion that we give a rising vote of thanks to our retiring officers and chairman and Executive Committee for the wonderful work and the wonderful success they have made of our section.

(The motion was seconded and the members gave a rising vote of thanks.)

PAST CHAIRMAN NORTHWOOD: In behalf of the Executive Committee I thank you.



Special grease cup for use on crane bearings and other bearings in elevated positions where there is danger that an ordinary cup would work loose and fall on workman below. A—Portion attached to bearing. B—Cup free to turn easily in wire loop "C" located in a circular groove. D—Two lugs on cups for screwing same. E—Washer and chain for anchoring grease cup to some fixed bolt (say cap bolt) on the machine. If cup works loose, it cannot fall. (National Tube Co.)

CHAIRMAN QUESNEL: I think, gentlemen, we are all well repaid for our trip to the Congress by what has just transpired. I think that the experiences and the lessons we have learned from this debate are most valuable and it is good food for thought to take back with you. Use it in your own plant. You can use it in your industrial meetings with good effect.

I would like to take this opportunity to cover the recommendations that were made in regard to appointing a committee on foundry accident experience, so that you men may all know that we are going to take action on it.

I will ask Mr. Fred Bennett to act as chairman. Along that same line I would like the new officers of this section to please remain a few moments after the adjournment of this meeting, in this room.

Now our *News Letter*. Those of you who are receiving the *News Letter* know how valuable it is. Mr. Earl Blank is our new secretary and editor of the *News Letter* for this coming year. He can be reached by addressing him Jones & Laughlin Steel Co., Pittsburgh. I hope you will all remember the name and the place. Let's support this letter, gentlemen. The more we can furnish ideas to our fellow-workers, the better it will be for this section.

I wonder if you know that you can have as many copies of this letter as you desire. Some plants have found it very advantageous to send out copies to each of these department heads. I think in our case we get seventeen copies, and the part in them that pertains to any particular accident and the whole letter is sent out to the department head. That saves circulating the letter around through the shop and permits them all to get the letter at the same time. There is no extra charge. You can get as many copies as you like by writing to the National Safety Council. Just write and tell them how many copies you would like to have mailed to you regularly each month.

Now we will go on to another very interesting part of our program. That is the matter of learning what has been done by actual observation. Our good old friend, the Carnegie Steel Co., has taken a great deal of pains to gather pictures throughout the United States showing safeguards and their methods of use. It gives me great pleasure to introduce to you Mr. John A. Oartel, Chief of Safety Bureau, Carnegie Steel Co., Pittsburgh, Pa.

JOHN A. OARTEL (Carnegie Steel Co., Pittsburgh, Pa.): This is a visual tour of the country on special lines of safeguards or new stunts which have proven successful in many plants.

I want to thank those who have sent in nearly one hundred photos.

(With this brief introduction, Mr. Oartel began to show a series of lantern slides of extraordinary interest, which comprised, in all, more than 80 pictures. It is impossible, of course, to reproduce in the Transactions all of these pictures, but a few have been selected which appear in the preceding pages. In each case, an explanation of the picture is given below it, which is a summary of the running remarks with which Mr. Oartel presented the picture.)

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Mining Section

New Section Officers

General Chairman—GEORGE MARTINSON, Pickands, Mather and Company, Hibbing, Minn.

Vice-Chairman—A. W. DICKINSON, The Union Pacific Coal Company, Rock Springs, Wyo.

Vice-Chairman—J. P. HODGSON, Phelps Dodge Corporation, Bisbee, Ariz.

Vice-Chairman for Statistics—RUSH N. HOSLER, Pennsylvania Compensation Rating and Inspection Bureau, Harrisburg, Pa.

Vice-Chairman—F. C. MILLER, The Colorado Fuel and Iron Company, Trinidad, Colo.

Secretary and News-Letter Editor—DANIEL HARRINGTON, United States Bureau of Mines, Washington, D. C.

Poster Committee Chairman—FRED H. NESBITT, Tri-State Zinc and Lead Ore Producers Association, Miami, Okla.

Membership Committee Chairman—C. A. McDOWELL, Pittsburgh Coal Company, Pittsburgh, Pa.

Publicity Committee Chairman—J. M. CARMODY, Coal Age, New York, N. Y.

Slide Committee Chairman—H. G. HENSEL, The Youngstown Sheet and Tube Company, Chicago, Ill.

Program Committee Chairman—THEODORE MARVIN, The Explosives Engineer, Wilmington, Del.

Entertainment Committee Chairman—J. T. RYAN, Mine Safety Appliances Company, Pittsburgh, Pa.

Executive Committee:

B. C. YATES, Homestake Mining Company, Lead, S. D.

B. F. TILSON, The New Jersey Zinc Company, Franklin, N. J.

H. I. YOUNG, American Zinc, Lead and Smelting Company, Mascot, Tenn.

Retiring Officers

Chairman, C. A. McDOWELL, Pittsburgh Coal Company, Pittsburgh, Pa.; *Vice-Chairman*, GEORGE MARTINSON, Pickands, Mather & Company, Hibbing, Minn.; *Vice-Chairman*, A. W. DICKINSON, The Union Pacific Coal Company, Rock Springs, Wyo.; *Vice-Chairman*, J. P. HODGSON, Phelps Dodge Corporation, Bisbee, Ariz.; *Vice-Chairman*, F. C. MILLER, The Colorado Fuel & Iron Company, Trinidad, Colo.; *Secretary*, DANIEL HARRINGTON, United States Bureau of Mines, Washington, D. C.; *Poster Committee Chairman*, H. C. HENRIE, Phelps Dodge Corporation, Bisbee, Ariz.; *Membership Committee Chairman*, H. I. YOUNG, American Zinc, Lead and Smelting Company, Mascot, Tenn.; *Program Committee Chairman*, THEODORE

MARVIN, The Explosives Engineer, Wilmington, Del.; *Publicity Committee Chairman*, C. A. CALLEN, "Coal Mine Management," Chicago, Ill.; *Entertainment Committee Chairman*, J. T. RYAN, Mine Safety Appliance Co., Pittsburgh, Pa.; *Slide Committee Chairman*, H. G. HENSEL, The Youngstown Sheet and Tube Company, Chicago, Ill.; *Engineering Committee Chairman*, J. M. CARMODY, Coal Age, New York City; *Statistics Committee Chairman*, RUSH N. HOSLER, Pennsylvania Compensation Rating and Inspection Bureau, Harrisburg, Pa.; *News-Letter Editor*, DANIEL HARRINGTON, United States Bureau of Mines, Washington, D. C. *Executive Committee*: THE OFFICERS AND B. C. YATES, Homestake Mining Company, Lead, S. D.; B. F. TILSON, The New Jersey Zinc Company, Franklin, N. J.

October 2, 1928

C. A. McDOWELL, Chairman

Safety and Personnel Manager, Pittsburgh Coal Company
Pittsburgh, Pa.

The first session of the Mining Section was called to order at nine-fifty o'clock by the chairman, Mr. C. A. McDowell, Manager Safety and Personnel, Pittsburgh Coal Co.

CHAIRMAN McDOWELL: The Council has rearranged the program for this year to the extent that the report of the past year committees will be made by the chairman. I accordingly wrote each chairman to get his report and I will give you the reports as briefly as possible.

Report of the Poster Committee

Immediately following last year's Safety Congress, we requested your chairman, Mr. McDowell, to appoint certain members of the Mining Section as a Poster Committee; and in order to give individual members an opportunity to express their views, a letter was addressed to each member of the Mining Section, requesting his suggestions and ideas.

During the past year, material for one hundred sixty-three posters was submitted to Mr. Gardiner, Director of the Poster Division. From the material submitted, twenty-four Mining Section posters have been issued, in addition, four other posters of general nature have also been issued. About one-half of the material submitted is still on hand and available for future use.

We wish to take this opportunity of thanking the members of the Committee who have cooperated so effectively with us during the past year and also to express our special thanks to Mr. Gardiner, Director of the Poster Service for his excellent cooperation and assistance throughout the year.

H. C. HENRIE, Chairman.

Report of the Membership Committee

Your Membership Committee begs to submit the following report:

Number of Members in Mining Section, Sept. 14, 1927.....	236
New Members During Year.....	34
Members Transferred from Other Sections.....	4
Memberships Cancelled During Year.....	28
Total Number Members in Mining Section, Sept. 12, 1928.....	246

The above shows a net increase of ten members for the year, four of which were transferred from other Sections, leaving an actual increase of six.

It has been the policy of your Membership Committee not to confine its activities entirely to securing members for our Section, but rather to try to induce industries and schools to join the Safety Council, regardless of the classification under which their membership might come.

A very comprehensive membership campaign was proposed by Mr. P. N. Bushnell, Director, Service Extension. The various letters and circulars put out during this campaign were approved by the officials of the Mining Section. I feel that the program outlined by Mr. Bushnell is responsible for the greater part of the increased membership of this Section.

As you appreciate, the condition in the Coal Industry, where we have lost the greater part of our members during the year, has been such that all companies are attempting to reduce expenditures to an absolute minimum, and some of the coal executives have the erroneous idea that costs can be reduced by cutting off National Safety Service. We, who are thoroughly sold on Safety, know that costs are reduced by expending money for Safety, rather than increased; and we believe that if it were possible for some person representing the National Safety Council to call on the various companies who have dropped their membership during the past year, they could be shown where it would be profitable to continue their membership.

I want to express my appreciation of the wonderful cooperation given by each member of our Committee, and to Mr. Bushnell for his part in connection with the activities of our work.

H. I. YOUNG, Chairman.

Report of the Slide Committee

My report as Chairman of this Committee will necessarily have to be confined to suggestions for next year's work. Practically all that was done during the past year was to meet with the members of the staff of the headquarters of the National Safety Council and to go over the plans of the coming year with them.

An experiment has been tried out in several other sections regarding the gathering of slides to be used by members throughout the year and to be shown at the Annual Congress. It is the belief of the headquarters staff that it would be of much value to the members of this Section to have available film strips which can be borrowed by them and used at their own office and returned to the headquarters to be used at this Annual Meeting. The idea is that a number of members should be selected each year, as members of the Slide Committee, and they are to furnish, to the headquarters staff, photographs on a particular phase of safe and unsafe practices in mining. Each film strip should show a dozen to fifteen photographs, and if a certain member of the Mining Section is assigned a certain phase of safe and unsafe practices in mining, he should furnish from a dozen to fifteen photographs which the National Safety Council will have made into film strip. This seems to have worked out very well in other Sections and we are to hear from Mr. Burns of the headquarters staff and from a member of another section who has successfully gathered pictures for these film strips of safe and unsafe practices and they will no doubt explain to this Section, very clearly, how the job should be done.

It seems that the National Safety Council Headquarters has quite a large number of photographs on hand that display safe and unsafe conditions; also numerous safety devices, all pertaining to mining, but there have been very few photographs furnished showing safe and unsafe practices, and an analysis of most all accident records now-a-days proves that these accidents have been due to unsafe practices and it seems well worth while to make a drive against these unsafe practices.

It would seem to be of much value to all of us who are interested in Mining to be able to send, from one mine to another, pictures furnished by other people showing how they do their work safely and how they have eliminated some of the

unsafe practices. It would seem that such pictures, if shown to foremen under the proper supervision of the management, would do much to stimulate activity to stop unsafe practices in any mine.

I am sure that our people would be very glad to use such film strip on safe and unsafe practices if they were available, and I will be only too glad to assist in furnishing pictures on any phase of this that may be assigned to us.

H. G. HENSEL, Chairman.

Report of the Program Committee

THEODORE MARVIN (The Explosives Engineer, Wilmington, Del.): I would like to acknowledge the assistance of certain gentlemen who aided considerably in being the liaison between our desires to secure the service of certain men and those men; and it is a pleasure to acknowledge the assistance of Dr. H. Foster Bain, Secretary of the A. I. M. E.; Dr. T. T. Read, Assistant Secretary, A. I. M. E.; Mr. Harrington, Mr. Huntress of the National Coal Association; Mr. J. M. Carmody, Editor of Coal Age; and, of course, Mr. Jack Ryan, of the Mine Safety Appliances Co.

Mr. Ryan, as you know, is chairman of the Entertainment Committee, and has arranged some rather interesting breaks in the program which I am sure you will all enjoy. It is due to these gentlemen's assistance that the program has been arranged as interestingly as it is. I am sure it will help. I certainly thank them through you, Mr. Chairman, for their help.

CHAIRMAN McDOWELL: As Chairman, I desire to thank you, Mr. Marvin, and your associates for the program and I assure you that we greatly appreciate your sincere effort and your part in helping to make up such a program.

Now, we have the Chairman of the Engineering Committee, Mr. Carmody, Chairman of this Committee, reports that there is a bulletin in process of review by several experienced safety engineers, and no doubt this will be brought out and accepted in due time by the Mining Section. The committee also approved and sent through one safe practice pamphlet. We thank you kindly, Mr. Carmody, for your time spent in helping the Chairman in this work.

I have attached to this report (appearing on page 233) a statistical analysis of ordinary fatalities from falls, 1920 to 1927, showing the relative pillar hazards and this will be shown with our yearly report. We thank you kindly, Mr. Hosler, and I am sure the membership appreciates your efforts.

The News Letter editor. I think this report of mine would be rather incomplete without thanking our good secretary, Mr. Harrington, for the splendid inspirational and worthwhile *News Letters* which he contributes monthly for our benefit. I am sure that the membership appreciates these *News Letters* greatly. I dare say it is without doubt the best *News Letter* that any section puts out. Thanks, Mr. Harrington, for your work.

I also think the report would be incomplete and we must not overlook another committee that was appointed last year and added to the official family of the Mining Section, and I refer to Mr. Ryan, Chairman of the Entertainment Committee. We do not know what is in store for us this year but I think it would be well for us to keep our eyes open, get to our meetings on time, stay until they are over and don't miss anything. Thanks, Mr. Ryan, for what we may expect and your past record on entertainment committees is such for us to express our thanks at this time.

That, gentlemen, is the report of the various committees and report of the chairman. What is your pleasure?

(Motion that report be accepted and adopted was seconded and carried.)

Ordinary Fatalities from Falls—1920 to 1927—Showing Relative Pillar Hazard

Year	All Ordinary Fatalities	Ordinary Fatalities from Falls Occurring in:				Per Cent of All Ordinary Fatalities from Falls				Per Cent of Fatalities from Falls Occurring in:			Per Cent of All Employes Insured Mines		Per Cent of Men on Coal Working on Pillars (16)
		All	Advance Working Places	Pillar Working Places	All Other	All	Advance Working Places	Pillar Working Places	All Other	Advance Working Places	Pillar Working Places	All Others	On Coal	On Pillars	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
1923-1927	1,703	1,024	424	494	106	60.1	24.9	29.0	6.2	41.4	48.2	10.4	66.5	16.3	23.8
1927	353	206	89	97	20	58.4	25.2	27.5	5.7	43.2	47.1	9.7	67.3	17.4	25.6
1926	355	225	92	113	20	63.4	25.9	31.8	5.6	40.9	50.2	8.9	67.0	17.1	24.7
1925	306	178	70	90	18	58.2	22.9	29.4	5.9	39.3	50.6	10.1	66.5	16.5	23.8
1924	295	172	64	92	16	58.3	21.7	31.2	5.4	37.2	53.5	9.3	66.0	15.7	22.9
1923	394	243	109	102	32	61.7	27.7	25.9	8.1	44.8	42.0	13.2	65.7	14.8	22.0
1920-1922	1,000	544	266	209	69	54.4	26.6	20.9	6.9	48.9	38.4	12.7	66.9	14.2	21.2
1922	313	161	87	60	14	51.4	27.8	19.2	4.4	54.0	37.3	8.7	65.8	14.0	21.2
1921	277	152	69	62	21	54.9	24.9	22.4	7.6	45.4	40.8	13.8	65.7	14.0	21.3
1920	410	231	110	87	34	56.3	26.8	21.2	8.3	47.6	37.7	14.7	69.3	14.6	21.0

The next part of our program covers a speaker, and the subject is "Safety Pays." At this time, we are glad to hear from Mr. Robert M. Lambie.

Safety Pays

By **ROBERT M. LAMBIE**

Chief of the Department of Mines, State of West Virginia

It was a surprise indeed to me to get a telegram from my friend, Mr. C. B. Huntress, a few days ago to address this meeting. I have been extremely busy for the past several weeks, and I didn't get home in time to answer that telegram. I realize my limitations and that I am not, in any measure, a talker. I did not know whether I should answer in the affirmative or not. However he was so insistent, I did acknowledge it.

Coming from West Virginia, I am rather proud of the fact. I just want to give you a little background of the State before discussing whether safety pays.

West Virginia is a mountainous state. Pioneers of that State had many obstacles to overcome in settling. During that process the spirit of daring was built up within the folks that lived there. They had to battle fiercely against the beasts of the forest and the elements of that country. After many years, one of the greatest geologists, as you know, discovered coal in West Virginia. It was of such quality and such magnitude it attracted many men from all over the world. All of those men brought systems from their own sections of the world, that they had used, and they tried to work those systems in West Virginia. Some of them have been successful. Most of them have not. The result was until the last few years, that they have not been able to really get into what we term a West Virginia system of mining, and that is not universal today.

These men who came to our State had to depend largely on those who already inhabited the mountains. As I say this spirit of daring was built up within them. We had a high accident rate, minor, serious and fatal.

I went with the State Department of Mines in 1918, during the war period. During that time we were making lots of money. We could easily put men on to supervise the work and we had a great number of green men. Supervision was so close that our accident rate during that period was lower than it had been up to that time. However, some of us could see what was coming in the future and today, as you all know, we have every facility for producing and marketing coal. There is no price for it. The result is that coal companies have been taking men off here and there.

However, in 1920 we started, with the consent and counsel of the Governor, an intensive safety campaign that has been continued until today. We started with a first-aid meeting. Clyde McDowell himself had one of the teams. Two weeks ago we held in Bluefield, West Virginia, a meet which attracted 23,000 people and 180 teams to that particular place.

In 1863 West Virginia was created a State. At that time, we were mining less than one half million tons of coal—444,000 to be exact. In 1927 we mined 146 million tons. You men will readily understand that with this quick development, or while this intensive development was going on, safety did not keep pace. The result was that this put the accident rate up until 1918. From 1883 to 1919 it was one man killed for every 175,000 tons of coal produced. From 1920 to 1927 we increased that total of production to 254,000 tons per fatality; and this year we have a far better record—360,000 tons per fatality, with a corresponding decrease in all accidents.

Men, I feel that to get safety, especially in the Mining regions, there has to be some real form of interest to attract the folks. We are trying to do that in West

Virginia. As I say, it was started with a first-aid campaign. We got from that to our mining institutes. We have local mining institutes everywhere. Some of those mining institutes have as high as 650 members.

From that to our safety clubs. We have safety clubs in 500 mining operations in the State today and these safety committees of the men meet with the families, with their wives and mothers. It is the most unusual condition existent in coal mining. Pictures were put on, some form of entertainment, and once in a while a real boxing show. I am not strong on boxing. I am afraid somebody will get knocked out flat, and it wouldn't look good, but these things attract the folks. They come out and we are able to convert anywhere from 15 to 20 per cent of those people who are there to our safety idea.

First, I want to assure you that it is the thing to do today. They don't want any side lights. That is the way to get them out. After you get them out you can talk some about safety clubs. Some mines make it compulsory, ranging from 10 to 300 or 400. They are doing a wonderful work. We have in the safety clubs what is known as the safety court. Men who violate rules and regulations violate the mining laws. They are tried before the miners and before the members. The fine is only 50 cents or one dollar, but the man there has not only endangered his own life but the lives of those with whom he is associated. It has been the most remarkable thing in my life, getting men to do the things that are right and stopping them from doing the things that are wrong. They feel badly about it. Their wives talk to them about it—"Why did you do this and that?" And I want to say that this club wasn't organized or instituted by me to begin with, but it was copied from the Island Creek Coal Co. and put in state-wide use by me. The safety court idea was proposed and put into effect by Thomas Fear of the Consolidation Coal Co. and this combination is doing real honest-to-goodness work.

In 1926, with the consent and advice of Governor Gore, who is my present boss, we put into effect the safety day. The only state in the Union that stops work for one day that men may review the year's activity, to show who are the men who compose this underground army of safety! I want to say that if nothing else ever comes from the safety movement in our State except to see those thousands of members in white uniforms walking down the streets of Bluefield putting over the message to the folks in the town, and led by a band of the National Guard and the Boy Scouts of America and the Safety Patrol of Bluefield, we will have done a great deal. All of these men were dressed in white suits with black belts. There is a reason, gentlemen, for that white suit and black belt which I have never stated. The white is for the brightness of the future; which we all seek to attain, and the black ties and belts are for the men who have passed on. That is the reason for that dress.

Men, this is a great movement. I have two pictures of this day which I think answer the question, Does Safety Pay? I shall be glad to show them to you. I should be pleased if you will look at these pictures and see what can be done. Attracting 23,000 men of the mines is greater than bringing 1,000,000 to just an ordinary event.

Men came from all over the country, and a number of them traveled hundreds of miles. Why do you men do that? Because they are all interested in their fellow men, and being a Scotchman and bearing in mind Bobby Burns having said "Man's inhumanity to man"—that is being changed and "man's humanity to man" is making accomplishment.

Thousands of homes in West Virginia are happy, contented, and prosperous because accidents have been stopped. Men in the past thought only in dollars and cents. We are said to have saved \$900,000 to the operators of West Virginia on accidents alone. Not only from that standpoint does the Department of Mines talk. We want to save those men of the mountains so that their homes will

continue to be happy and the breadwinner will be still there and bring in the things that are necessary.

I know that safety pays. I know the fellow who drove the mule with me down in New River 25 years ago. Two years ago, I saw him with his right arm gone. He was working at the pump and by accident his arm was pulled out. The fellow was big and strong, and he could throw me any time. He could wrestle. Now he is getting only one-third of what he used to get. Does anyone doubt that safety pays? That is the answer.

We have had some terrible disasters in West Virginia. I hope to God they have passed. Some of these disasters were due to the inherent hazards of mining, some of them were due to other things which I am not going to talk about. There is no reason for an explosion in any mine, whether it is gas or non-gas. I say that, knowing that we have mines in West Virginia producing six to seven and one-half million cubic feet in 24 hours of gas. If mines are properly ventilated, if they have adequate supervision, if they have proper care in assuring that the different things that you know or I know are enforced, explosions will be a thing of the past, and they should be a thing of the past. They have no place in coal mining. Our greatest trouble is the individual act. That is why we are concentrating on education.

We have, as I said, this first-aid movement and these safety clubs—that is, for the folks back in the mines. We are starting this year in the high schools of West Virginia a mining course. This course will be elective but it will give the boys back in the mines the fundamentals of mining. If they are not able to go to college, they don't have that wide gap that they would have if they did not receive this course. If they go to the mines then they are much better to go ahead and take up the duties as miner's sons.

We are starting in the New River field a mine foreman's training. I might say that our department is sponsoring these things. They are going to be carried out by the Department of Engineering at the University, and by training the forces which some companies have. I hope it will be a state-wide proposition and it is all thought out for one thing—safety and efficiency. We need it. You need it. We hope great results will come from it.

Men, I would like to talk longer. I will tell you that every state should have a State Safety Day. Every man that works in or about the mines or the industry for a year is entitled to that day to show to the world that he belongs to that army of safety, and we in West Virginia feel it is one of the greatest movements we have ever started. The towns become aroused, sections become aroused as to what it is all about. They go back to the mines much better. I tell you that \$900,000 has been saved to the coal companies, but we can't tell you the number of homes to which we have not had to go and tell the wives that their husbands had passed on. It is a serious proposition, more so in mining than anywhere else, especially where every man is dependent upon himself. He must be taught. We can't ask a man to do anything unless he is shown what, how to do it, and when to do it. If he is taught and is able to know the dangerous surroundings and able to protect himself, then we are doing something worth while.

I want to say that West Virginia does not have a branch of the National Safety Council and I am hopeful something will be organized in our State that will interest the mining people and bring in other industries so that life and limb might be saved.

Think this Safety Day over, give your men a chance. Nothing gave me greater satisfaction than what a lady told me on the Saturday night after that meeting. She said, "I have seen the army of men pass. I have seen every kind of a parade, but there was something impressive about this parade which causes men to give up a day. It seemed eternal—where men were taught the feeling for their fellow men. I was just filled up with emotion from the crowd when I saw those men

pass." When you get folks talking along that line, and realize that those men with those big thick fists from the mining district are going out and helping their fellow men in this army of commerce, you know that these men will be much safer from then on. When you have done this you can answer that "safety pays."

CHAIRMAN McDOWELL: I don't think there is any question about this part. That "Safety Pays" needs no further proof. I don't think there is a question as to the sincerity put forth in that subject by our friend, Mr. Lambie. They have done a considerable amount of worthwhile safety work in West Virginia that we in other states can look up to and feel that probably we need an awakening to do something of a like nature. I think it is a wonderful subject. I think it is a subject that you men should discuss. I would like to see it brought out very clearly. Let's have as many people express their opinions as possible.

A. H. TRESTRAIL (Pickands Mather & Co., Caspian, Mich.): I would like to ask the gentleman if this Safety Day is held on your regular Labor Day or whether you have a separate day for that purpose.

MR. LAMBIE: Safety Day activities are held usually on the second or third Saturday in September, a day apart from Labor Day, devoted to the State. This is the first year we did not have any appropriation from the State. We went out and solicited the money. However, the legislature of West Virginia appropriated \$5,000 to carry it. We hope it will continue.

J. T. RYAN (Mine Safety Appliance Co., Pittsburgh, Pa.): I had the pleasure of witnessing this State Safety Day. I want to say it was the most remarkable display of safety spirit that I have ever seen in my life. It is impossible to explain the interest that was displayed there on that day. I want to second Mr. Lambie's suggestion that other states follow that example established in West Virginia. It is really unexplainable—I just simply can't believe the interest that was displayed. Most of you have attended first-aid meets, and they are rather dry affairs, but in West Virginia they do things just a little different. They work in enough entertainment to make it interesting, not only for the teams competing, but for the spectators.

THEODORE MARVIN (The Explosives Engineer, Wilmington, Del.): If someone is interested (for instance Oklahoma wants to establish a safety day) according to your experience, what procedure would you suggest?

MR. LAMBIE: If the state wants to start a State Safety Day, the Governor of West Virginia will be only too pleased to send a man a month prior to the day to help that state. Next year, we expect a larger interest in the State Safety Day. The fuel companies, lead companies, chemical companies down through our section who haven't been in it yet, have stated that they will take part in the next year.

MR. MARVIN: If someone is interested, they can communicate with you and you will assist them, or through you?

MR. LAMBIE: Yes.

C. S. HURTER (E. I. du Pont de Nemours & Co., Wilmington, Del.): The Pittsburgh Limestone Co. instituted a Five Year No-Accident Club. A man who has been five years without an accident gets a badge. He joins automatically this Five Year No-Accident Club. Once or twice a year the company gives him a blow out. If he has an accident or is the cause of an accident to another man, he loses his badge and has to re-earn it. That has been very successful in the safety campaign of the Pittsburgh Limestone Co.

CHAIRMAN McDOWELL: I would like to hear from Mr. Arthur Crowfoot.

ARTHUR CROWFOOT (Phelps Dodge Corp., Morenci, Ariz.): I was very much interested in Mr. Lambie's talk. We found absolutely that safety does pay. I have no figures on dollars and cents in mind but in numerous branches which our companies have, we have gone month after month without a lost-time accident. We have a mining division and concentrating division, that is sheeting. In my

particular case, being superintendent of concentrating at Morenci, we have worked 87,365 man shifts without a lost-time accident. Our concentrator at Nacozari has gone for a good deal longer period than that. The concentrator in Nacozari went two years, with the exception of five days, without a lost-time accident. The greatest result that I see is that it has the men absolutely more contented in his work. Labor turnover is very greatly lessened and the men take a very keen interest in their work. Now, to the men that have gone a year without a lost-time accident, we present a watch fob. Any man in our branch who goes through a year without a lost-time accident receives one of these watch fobs.

Now, we have just revised our safety rule book. They were issued at the beginning of the month. Starting on October 15 we will examine every man in our employ regarding his knowledge of those rules. We expect every man to pass an examination on safety rules within a period we have set. There is no definite time, but we will say within the period of four or five months every man in our employ must pass the examination to show he understands every safety rule we have in force. We regard 80 per cent as a passing mark for all ordinary operators and for foremen we will increase that to 90 per cent. Those men that pass, we will present with a very good quality of belt with a silver buckle with the same design on it as the watch fob.

There is one question I would like to ask Mr. Lambie about the safety clubs. Are they composed entirely of men that are operators, or does the club include their families?

MR. LAMBIE: The membership of the safety clubs are men who are employed in the mines. Usually the president of the safety council is the mine superintendent.

W. H. FORBES (New England Fuel & Transportation Co., Great Town, West Va.): All from one particular mine?

MR. LAMBIE: That depends upon the number of men employed. We have 10 or 15 in some and 400 or 500 in others.

C. L. WILSON (Berwin-White Coal Mining Co., Philadelphia, Pa.): I would like to speak about one point in Mr. Lambie's talk this morning and that is the reaction this Safety Day has created in West Virginia. A large number of operators in West Virginia are not altogether sold on Safety Day. They believe it is a good thing but they have not yet got the spirit. It was my privilege to invite our Philadelphia office to West Virginia. I want to tell you very candidly they were converted to the West Virginia State Safety Day. They came back and told me it was one of the grandest things they ever witnessed and next year there would be no trouble to get across our budget for Safety Day.

T. T. READ (American Institute Mining and Met. Engineers, New York): I am turning over in my mind the splendid speech of our friend Mr. Lambie on the topic "Does Safety Pay?" Why in the world should we ask ourselves that? Perhaps it was intended to be whether certain things we do in the name of safety pays. I know that some people do raise the question as to whether the great amount of effort that is put in on certain safety campaigns really pays. I must confess that I am more and more convinced that the absolutely essential character in our human lives is in our attitude of mind. If you get people thinking and believing one way, they will do things. If you don't get them with you, they don't.

I am reminded that a few years ago, a distinguished gentleman came to New York. He packed Madison Square Garden. He didn't make any impression. It was because his message and his method did not produce any effect. The people came to see him just the way they would see a two-headed calf. They didn't do what he told them to do. We have to meet the same factor in our safety campaign. We have got to get people. They have got to get it demonstrated to them. The woman Mr. Lambie spoke about was converted in her heart. She believed she could do something. I think these State Safety Days is one thing

that will move people's emotions. I think when we all get people's minds and hearts to do something that is really worth while, we will produce results that pay.

WILLIAM GEORGE (Madeira Hill Co., Phillipsburg, Pa.): I just want to refer what Mr. Lambie said about reducing accidents. Four years ago we adopted a system what we call "educating the miner in taking care of his own hazards," and we fixed up a system of codes by which the assistant foreman marked daily the hazards coming under his observation. He instructed the miner how to take care of them. Since adopting that system we have reduced our accidents at the working base over 50 per cent in man day losses.

CHAIRMAN McDOWELL: I would like to go West and find out whether safety pays. I am going to call on Mr. Bochert.

W. C. BOCHERT (St. Joseph Lead Co., Bonne Terre, Mo.): In regard to the question whether or not safety pays, I am very glad to say it does. The St. Joseph Lead Co. about four years ago decided to establish a safety department that had the same rating as any other department. So the first thing for the safety department to do was to make that department pay. I think we have done that in two ways. In the first place, we have cut down very largely the number of accidents we have had in our mines. In the second place, the efficiency of our operations has been very materially increasing every year. Of course, I don't know how much that is due to safety but the safety department feels as though they are entitled to a certain amount of credit, because in our safety work we are trying to sell the idea that safety and efficiency go hand in hand and can be created and established through cooperation. We are getting that very nicely.

In listening to Mr. Lambie and his safety work, especially the safety contest, I would like to say that before I went to the St. Joe about six years ago they attempted to establish first-aid field meets. Several companies went in on that. I understand because of a poor selection of judges, the thing developed into a fizzle. No one has been eager for such a thing since. I think, however, the idea could be resold to the operators in the lead belt and the thing could be reestablished.

However, in our operations in the lead field, we are considerably different from the coal mines. Fortunately, we do not have the things that exist in the coal mines or in many of the metal mines. Our rock happens to be of a kind of material, mat limestone, that builds very easily. At the same time it is in unusual stopes. We have some stopes as high as 250 feet that have been mined out as much as 40 years ago. That rock is still there. The roof is as solid as it was 40 years ago. It is a very peculiar situation. It is fortunate for the safety department and for operators. With some of that ground, for example, a set of drills will last an entire week without sharpening. At the same time that limestone stands up year after year without trouble.

We have some ground that is very slaty. The roof has usual thin laminated layers. That is the ground that gives us the most trouble. About four years ago the companies in the lead belt had a large number of roof miners. The business of the roof miner was to take down the working layers safely and take care of that until quitting time. That accounted for many accidents because the roof miner wasn't on the job. We tried to sell the miner the idea that he is the best man to take care of his ground. At the present time we have very few roof miners and use only the roof miners as the assistant when there might be too much to take down. That system is working out satisfactorily. It was just a little hard to put it across.

In connection with prizes, we started out with the idea of selling our bosses—mining captains—on the idea of safety first. They were not entirely sold on safety. In order to make it interesting for the bosses we established the bonus system, whereby the shift boss gets one cent per shift for every man shift under his supervision. If he has a lost-time accident we charge him 50 cents a day for every man that is off the job. The reason for that is that the more man-shifts a

man works the more bonus he is able to make. That encourages the bosses to get the man back. We want him to encourage him to come back. But so the man won't come back too soon, and before he is ready to come back, we have a stringent method through our doctors organization, that each man must have a doctor's permit before he can come back on the job. So it is entirely up to the doctor to permit the man to come back to work.

Now as far as creating interest in safety, the premium method works good, also contests of various kinds. We conducted those just recently; one of our shift bosses, having an average of 55 men, completed a record of 30,000 shifts without a lost-time accident, and the company is buying each man in that crew a pair of safety shoes. One of the other things that has worked out nicely is the premium, and I might pass on to you men the pocket knife made of stainless steel with the man on one side of the handle and the inscription on the outside. We find that those men will work unusually hard for this little premium. We have found it the best thing to interest the men and keep them interested in safety.

In fact, we are not pushing our contests too hard for this reason: we find the men get too enthusiastic about it sometimes and will not always report their injuries. Very often we have a man that will neglect or will not report an injury and the first thing we know a serious infection develops. We have a system that very few mines of this country have; that is, that a man can go to work pretty much at whatever time he pleases and he can come home when he gets through with his work. We work almost entirely on the bonus system. If he wants to go to a picnic or some other place, he can start work at three in the afternoon. And when he finishes up his work, he can go home.

C. M. WAMPLER (Eagle Picher Lead Co.): I would like to ask the last speaker in regard to this one cent bonus system. Does the foreman get that one cent per man shift, regardless of whether he has any accidents during the month or not? And also whether in case he has a man hurt one day, but returns the next day, is there a 50 per cent reduction made in that case?

MR. BOCHERT: Last year we had several things to overcome in our bonus system. In the first place, we paid the shift boss a cent a shift for all of the shifts that came under his supervision. If a man is injured, the first day of accident does not count. We will give the foreman a day. So it is to his advantage to send that man to the doctors for all little injuries that arise. That is the idea of making the first day free; no penalty on the first day. It has worked out nicely.

Another thing; if a man, for instance, is injured on the last day of the month and the man is out five days the shift boss will lose five days of his bonus, with a penalty of five times 50 cents after the first day. In that case he would lose five days and he would lose two dollars in bonus.

Another thing we do. In case a man has a serious accident on the haulage and is out six months, we merely deduct that shift boss's bonus for that month and start him out with a clean slate again. We started to carry the bonus plan until the time was entirely cleared up, but in the interval the foreman lost—for instance, he lost six months before he got any bonus. He wouldn't take the interest. We consequently gave him a chance to start out with a clean slate at the beginning of each month. It costs the company a little more but it keeps the foreman on his toes constantly.

GEORGE MARTINSON (Picklands Mather & Co., Hibbing, Minn.): After 15 years of safety effort, I want to say there isn't any question in my mind or in the mind of my employers that safety pays. We have tried all of the stunts that men have spoken of and probably some others, too. I think the attitude of the employer—our employer—is shown by the fact that in 15 years there has never been any question about safety expenditures. The personnel of our department

is now six times as large as when the safety plan was originated. That answers as far as our mines are concerned.

CHAIRMAN McDOWELL: Does anyone else have any particular comment to make? I think we would like to hear from Mr. Brennan of Phelps Dodge Co.

W. D. BRENNAN (Phelps Dodge Corp., New York): We have tried to reduce in our own minds in cost per cent of tons of coal produced. In the course of the last four or five years, we have brought our costs away down as far as the compensation allows us to work, from five cents a ton for accident down to three and if continue with the showing that an intensive campaign has resulted in I hope that the cost can still be materially reduced. Safety does pay with us in dollars and cents; it has paid.

MR. MARVIN: So many of you got up and said "Does Safety Pay"? I think if you will notice the program, it says emphatically that safety pays; not "does it pay?" or "why it pays." The ones on the program committee were emphatic in believing that and in stating that safety does pay. I hope you will just look at the program. It is a positive suggestion to you that it does pay. I think the discussion has brought that out.

CHAIRMAN McDOWELL: We have just a few minutes on this particular paper and it might be well for us to confine ourselves probably to particular points of interest that will bring out that safety pays.

I notice that one coal mining company has sent three or four representatives to this meeting. They no doubt had a particular idea or interest in the meeting and especially in sending four representatives. I would like to hear from Mr. Lenhart, of the W. J. Rainey Coal Co.

F. S. LENHART (W. J. Rainey, Inc., Uniontown, Pa.): We have found that safety pays, looking at it from the point of view of the hard coal operator. It pays on the cost sheet. It also pays from the standpoint of humanity, we feel. We don't give any form of award to our officials for safety work, but we do reward them by sending them to the National Safety Congress each year. Those awards are figured, each plant is placed against his own safety record for the preceding year, his cost per ton of coal mined per man, and the plant that can reduce that cost the greatest percentage, is given the award.

Now, our Mount Reddy plant won the award this year. We have with us today the superintendent, the mine foreman, and the assistant foreman from another plant.

Our safety work is handled through our bulletin board in the first place. I might say we use the Elliott Bulletin Board. These boards are kept well lighted, and posters are changed every day. We endeavor to put the safety meetings home at the place. We hold the foreman responsible for all classes of accidents, no matter how they occur. It is up to him to instruct the workmen safely. If he is negligent, he is held responsible. Sometimes he is demoted; in cases, he has been discharged. We have what we call a general safety committee which is comprised of the general superintendent, the assistant general superintendent, the master mechanic, etc. We have a plant safety meeting or Safety Day. We hold safety meetings in each of our plants each month. Into those safety meetings the man who was injured during the previous month is called and asked to explain how the accident occurred and how it could be prevented in the future. In that way we get the man injured and the foreman in the meeting. Sometimes we get a better slant on how accidents occur. We feel we are having success in our work but that we have a good deal to do in the future.

CHAIRMAN McDOWELL: From what Mr. Lenhart said, I think it would be well for us to have Mr. Ainsley, the superintendent who is with Mr. Lenhart, explain how safety pays, how he does it.

DAVID AINSLEY (W. J. Rainey, Inc., Almontown, Pa.): Mr. Lenhart covered the group pretty thoroughly. Each foreman is responsible for his own section.

If he has an accident the mine foreman has to come along with the man, at the end of the month, to the meeting and it is brought out there. The thing is to place the blame on somebody. The man himself has a chance to speak first, explaining how the accident did happen. Therefore, we get the thing before the whole safety committee at that time. I think it is a very good thing. It places the blame where it belongs.

CHAIRMAN McDOWELL: Anyone else? Mr. Hensel?

H. G. HENSEL (Youngstown Sheet & Tube Co., Chicago, Ill.): Yes, safety pays. I think we all know that but we feel we would like to hear what other people are doing, how they are overcoming their problems, and that is the real reason for these meetings.

In the past year or year and a half we have tried at some of our properties a rather new stunt, that we call the "Daily Report of Unsafe Practices Corrected by Foremen." We have found that this report system has had a very good effect upon our accident record. It is the foreman's duty to make out that report every day whether he is correcting any practices or not and that report goes to the department superintendent. It then goes to the safety department, where it is chalked up on a card. These cards are filed with the foreman's name. On that card is not only his record of unsafe practices that he has corrected as reported, but a record of the accidents he has had in his department; and if eventually that foreman has a serious accident and he is called before his department superintendent, or the superintendent of the plant or mine, that record is then laid before the officials and they have a chance to judge whether this foreman has really been doing anything in safety, whether he has been trying to prevent accidents or whether he has been lax in his activities. That has had a wonderful effect upon the men.

The system was suggested by one of our foremen. He gave a talk in one of our safety meetings. He was scheduled with the superintendent to talk a week in advance and one of the main points he brought out was this: "We foremen are held responsible for our accidents but we are never given a chance to say what we are doing for safety, how we are trying to prevent accidents. Why can't we make a report of some kind to our superintendent as to what we are doing?" And then we started this system of giving them the opportunity. Finally, it spread to all of the departments in the Western Division of our company.

We find if a department superintendent at the end of the month receives his report from our department and that certain foremen are either not sending in reports or sending in blank reports he is soon called in to answer for it. For this reason, inspectors in the safety department are continually finding unsafe practices in that foreman's department and he says to this foreman, "If these men from the safety department can find unsafe practices by going through your department once a day, or perhaps once a week, what can you find there on the job your full eight or ten hours? What can the foremen on the other shifts find? You should be able to help on these things that are really causing our accidents."

We find in going through our cost sheets that safety pays, and it is true also that we are saving lives and limbs because fatalities are being cut out, and our serious accidents are being cut out, until we feel it will be impossible for us to stop the safety movement in any of our works and mines where it is now going along as it is. Of course, there is big room for improvement. We are urging all of our foremen and superintendents to give it more and more consideration and to give our men and foremen a chance to take part in it. I think you will find that if you give your men an opportunity either through a suggestion system or through a system of meetings held by the foremen to take part in the safety

movement that they will take more interest in it. They feel that it is a part of their job; that it is meant for them; that is, not something that the company is interested in alone, and they will be only too glad to give their suggestions for the correction of unsafe conditions and practices.

CHAIRMAN McDOWELL: We will close the discussion on this paper. We want to thank Mr. Lambie for his talk on the subject and all those who took an active part in the discussion.

We will now have the second talk scheduled for our program which is by Mr. H. S. Gilbertson, Director of Personnel, Lehigh Coal & Navigation Co., Lansford, Pa.

Training the Mine Foreman

By H. S. GILBERTSON

The Lehigh Coal and Navigation Company, Lansford, Pa.

I have been asked to speak about methods and results in mine foreman training. But it seems to me that before we get down to details, it is eminently desirable that we should decide what it is that we hope to accomplish by this sort of educational effort and what are the underlying conditions which have to be met, and possibly altered, as a condition precedent to success in foreman education. The answer to these questions will go a long way toward determining methods.

What every industrial concern really wants to bring about, I believe, is a condition under which management, supervisory forces and rank and file, will be thinking and acting in unison, where everyone in the plant will be facing the same way. This is effective organization.

Now there are a good many reasons why management, supervisors and men do not always think in unison. One of these which seems to play an unusually important role in the mining industry, or at least that portion of it with which I am familiar, is the traditional theory of organization. The mine foreman in times past was given almost complete responsibility for what went on underground. There were and still are some perfectly good reasons for this policy. But there never were any very good reasons for some of the implications which were drawn from it. Giving a man full responsibility does not necessarily or properly mean that he is not to be supervised, or that he is entitled to keep his superiors in the dark as to what he is doing, or to go his own gait regardless of the consequences outside his own jurisdiction. And yet, the situation in years gone by has been much like that in a good many organizations. The mine foreman was held responsible for "results." And "results" meant not so much low costs, nor good personal policies, not so much conservation of the mine and not so much safety, but rather, big production—tonnage.

The mine foreman of yesterday, and to some extent today, the man whom we hope to improve by training, is the product of this policy of the industry. Under the weight of very large responsibilities and not very much detailed supervision and still less positive guidance, he developed into a very resourceful and self-reliant man with strongly individualistic leanings. This is the element of great strength which the mine foreman possesses, possibly in greater degree than foremen of other industries. His is a bigger job than that of other foremen. Greater hazards, greater possibilities of damage to property and more acute and difficult labor problems are involved in his work.

In some important ways the tradition I have indicated and the mental habits in the foreman which it has created are a stumbling block in the way of improved organization procedure. Individual temperament is not always a safe guide in personnel and safety work. There is a certain amount of standardization desirable

in these things and consequently there must be a certain amount of sacrifice of personal point of view in subordination to a broader company policy.

Furthermore, the traditional plan of organization which I have described has tended to create a habit of secretiveness as to the methods employed, and as to what goes on generally in the mines. The general management of mining properties do not always have the information to which they are entitled, and in the interest of the business and of the foreman whom they should help.

Now, as the result of the great and direct emphasis on production and as a result of the lack of constant communication between foremen and management on matters of detail, it is not surprising that there were produced comparatively few men with the all-around characteristics that present ideals of foremanship call for. There were ever so many good producers, probably not so many good conservationists, probably still fewer cost analysts, and while most of these men were keenly interested in safety, there remained much to be learned as to the methods of arriving at this great objective.

Now it goes without saying, that all this is not so much a criticism of the foreman as it was of past management policies. Managements themselves have been secretive about their larger interests. They have not always let their work supervisors in on the great and interesting problems of the industry which may seem to lie mainly outside of the mine itself, but are very often problems that the foremen themselves have a large part in originating. The labor problem, for instance, in all its ramifications, is a management and personnel problem as well as an economic one, and yet we know that there is often a very incomplete understanding between the man who deals with the larger economic relations and the man who intimately knows the individuals who are affected.

And so foreman training is to my mind—and it is the policy adopted in our company—first of all a matter of understanding the position and characteristics of these strategic men and directing every effort toward overcoming their deficiencies. Fundamental to everything else are those deficiencies which arise from lack of information. A foreman should not be expected to do much toward reducing his costs if you simply keep telling him to get his costs down, or to get better production, if you merely hammer away at the idea of production, or to improve his safety record, if you merely talk safety in general terms.

We have tried to meet this need for a background of knowledge by opening lines of communication both ways, and it has seemed to us that first responsibility lies not with the foreman but with the management. For a number of years our foremen have been receiving analytical statements of costs which have enabled them to put their fingers upon the details which affect results in this direction. More lately we have inaugurated a policy of publicity which relates to practically everything directly and indirectly associated with the proper functioning of mine operation. This publicity relates less to technical mining matters than to questions involving personnel, and questions related to the economics of the industry, but there is scarcely a subject which even remotely bears upon operation which has not been discussed at one time or another. Our particular medium for this publicity is a monthly publication that goes not only to our operating supervisors, but to the English speaking miners and to the leaders in the mining community.

Of a more permanent nature is another publication of ours entitled "Mine Management Policies," directed more specifically to our foremen and their assistants. It is a little book of principles based upon specific conditions in our operations and defines the ideals and objectives of the management with respect to numerous considerations that have to do with operation. It deals with such economic factors as costs, production and profits, and with such personnel problems as selection, construction and discipline of men in the handling of their grievances, and such intangible but very real matters as industrial goodwill. And it may be

added there is a chapter on safety, which undertakes to go to the bottom of the subject, in a manner that I will describe more in detail presently.

We believe that men of the calibre of our mine foremen by reason of being exposed to information and analysis of matters of this kind will respond to the larger problems of the company. In the three or four years of our experimentation along this line, I believe that our confidence has not been misplaced. Specifically, we believe that we have done something to create that atmosphere of open-mindedness which the General Motors Corporation seems to regard as the chief cornerstone of its success.

Another quality which we hope to inculcate in our foremen and particularly the younger men who are coming up to fill these supervisory jobs, is a greater degree of exactitude. It is characteristic of the so-called practical man everywhere in contrast to the engineer that he is likely to be content with rough approximations of fact.

Thus, in the matter of safety. In our company textbook, the chapter on this subject tries to teach the foreman the cost of accidents; first, the obvious cost such as compensation insurance liabilities, loss of production, etc., then we lead him into the intangibles, such as the loss of morals, loss of confidence in the company. We impress upon him the importance of following through to its ultimate cause or causes, and particularly to the human cause if, as is usually the case, there happens to be one. And then, we emphasize the importance of the margin or factor of safety, that extra measure of precaution over and above what is obviously indicated.

In our course in Mine Management last winter we tried to instill some clear thinking on safety matters by breaking up procedure of accident prevention and investigation in three parts. In our first meeting we asked the members of the class to picture themselves as taking a safety observation trip through the mines, beginning at the top of the shaft and following through to the last working face. We asked the class to confine themselves absolutely in this particular conference to the barest statement possible concerning the actual danger points along the line of their trip. It was a difficult matter for some of the class to keep their minds on this particular phase of the subject; they would wander off immediately into discussion of causes and remedies, which was just what we wanted to avoid at that stage. But gradually it became clear what we wanted, and many of the members, I believe, saw the point of trying to do one thing at a time, and to keep the personal equation out of the investigation. In the second conference on safety, we dealt with specific measures for removing the danger points, and in the third conference we got down to the discussion of principles.

The old time training of the foreman militated against his becoming the most effective sort of an executive. The State Mine Laws, for example, which I suppose reflect the traditional thought about proper procedure in mine operation, seem to assume that a good foreman spends practically all of his time running around the mine. As a result of this tradition, many foremen are deficient in the quality of being able to delegate work, or being able to multiply their own eyes and legs so as to cover the mine at all times with supervision. We have put the matter to our foremen somewhat in this way:—"It is all very well for you to be on the job at a particular point where something unusual is happening, but what about the other 999 points in the mine where things are going on and you are not present?" We are, therefore, trying to get our foremen to build up their subordinates, pointing out to them that this is absolutely necessary, if the foreman's job is to be made into something bigger, more effective and more remunerative.

We are striving earnestly also to have our foreman acquire a balanced sense of values. As I pointed out a while back, the emphasis has been in the past mainly upon production and that is where it belongs, but production is only in an indirect sense a matter of pushing cars and other things along. In a mine, at least, it is

primarily a matter of completely setting the stage with proper maintenance conditions, proper equipment and service to the operating man, satisfactory morale, discipline, instruction, etc. When the foreman acquires a balanced sense of values which takes in not only production but costs, safety, etc., the great objective of production will automatically be taken care of far better than if the whole emphasis were put upon production.

And, of course, we lay a great deal of emphasis upon leadership. This, after all, is the secret of much of the success of American industry. The fact is that to a greater degree than in some countries, the whole man is put to work as a willing captive who knows something of the objectives for which he is working. Over one hundred and fifty years ago one of the highest officers in the army of Frederick the Great, the ancestor of our contemporary, William II of Germany, was brought over to America and put in charge of the conditioning of the American troops. He rendered a tremendous service to the American cause, but in speaking of the American soldier and contrasting what he was accustomed to in Germany, he wrote to a friend in his home country, "You say to your soldier, 'Do this,' and he doeth it. But I am obliged to say, 'This is the reason why you ought to do that,' and then he does it."

I suppose in view of the subject assigned to me and after this rather extended analysis, it really is necessary to say something about methods.

Our first attempt at foreman conferences followed a full year of publicity such as I have described. During the long strike of 1925-1926 we instituted discussion conferences at our several collieries, attendance at which was practically compulsory. The basis of these conferences was a uniform series of questions for the several operations dealing with practical mine management, rather than technical mining problems. Each conference was attended by the foreman and his assistants, with the superintendent acting as conference leader. They were held once in each two weeks and were supposed to take two hours. Some one acted as secretary of the meeting and sent in to the director of personnel the composite result of the thought of the group on each question. Later on, the reports from the several collieries were consolidated and sent out in mimeograph form to each man. The subjects treated included several phases of personnel, the handling of materials, several aspects of costs, and production.

The results obtained from this experiment varied at the different collieries and clearly reflected the different degrees of interest, intelligence and leadership among the foremen and their assistants in the several groups. In some instances, the men voluntarily doubled the time supposed to be given to the discussion. The reports turned up a lot of practical information which led to some important changes of procedure particularly in the employment office and in the handling of certain materials. Facts came to the surface which these men had been keeping to themselves; grievances they had been nursing and difficulties which they had been trying to solve locally but which needed outside assistance.

It did not seem desirable to repeat the experiment in just this form. In the second year we shifted from a compulsory to a voluntary basis and directed our attention to prospective mine executives, men holding the assistant mine foreman's papers, but still miners. This time we enlisted as conference leaders some of our best and most experienced foremen and mining men, department heads and others conversant with various phases of mine management and also one or two outsiders. Meetings were held once a week during the winter.

A number of the foremen and assistants, in addition to the conference leaders attended these meetings. The superintendents were quite regular and interested visitors and were constantly on the lookout for new material with which to man their organizations. As a matter of fact a number of the class were promoted to assistant mine foreman jobs as a result of their attendance in this course. Courses of this kind impart a good deal of valuable practical information but

their greatest value lies in provoking thought in the men who attend. In fact, the best discussion is that which always takes place out on the sidewalk after the meeting or at the colliery the next day or possibly weeks or months later. Many of these discussions have been reported to me and they attest the real earnestness of the men who engage in these.

One of the best testimonials to the value of the idea of these foreman conferences comes from one of our sub-storekeepers who has stated that: "One thing that impressed me was the fact that the men attending these sessions now realize that a vast understanding is necessary to capably manage a mine with all its attending problems, and that intense study and application is necessary if they are to merit promotion by properly fitting themselves for a supervisory capacity."

(Mr. Luke Barnett of Pittsburgh, Pa., impersonating a Slavish miner from the coal mining regions of Pennsylvania, offered criticisms of the exhibits of safety posters. After this, he entertained the meeting with humor.)

CHAIRMAN McDOWELL: We will now open our discussion. There are a great many here interested in this work and we are open for discussion. Who will start it?

Mr. Brennan, will you start it?

W. D. BRENNAN (Phelps Dodge Corp., New York): I am going to ask the gentlemen if they have made any special effort to educate the foremen, educate men to the position of foremen, bring them up along certain lines of making foremen of them?

MR. GILBERTSON: We have devoted more effort to that phase of it than to actually training the foremen we have. As we all get along in years we become less receptive to suggestion and we believe that there is a more abundant amount of hope of accomplishment among the more ambitious miners, particularly men who have the assistant foremen's papers and even training men who are actually on the job. Yes, we have given a good deal of attention to that.

MR. BRENNAN: Have you worked along the idea of taking the practical man or the engineer and what results, if any, have you got in bringing up the engineer to foreman or bringing up the practical man?

MR. GILBERTSON: We have given our attention to the practical man. We have mining conditions there that make it absolutely necessary for a man to spend a number of years in those particular mines. There are a variety of local conditions. A man must have much practical experience to become foreman, so our drift has been entirely to the practical man who has grown up in the mines, rather than to the engineer. We have never developed a practical mine foreman out of an engineer yet.

MR. BRENNAN: That's the point. My experience has been along the same lines. I have tried to bring up as foremen engineers in a number of cases, but to date I have not been nearly as successful as I have been able to take the practical miner and bring him up to the position of foreman; but I feel that with the mechanical loading that there is going to be a field where there is going to be possibly an opportunity to develop the engineer into a foreman's position.

CHAIRMAN McDOWELL: There is one thing brought out upon which we all have given considerable thought, and that is the point of bringing the engineer into these conferences. I think we might have further discussion on that. Will anyone volunteer to continue with the discussion?

F. S. LENHART (W. J. Rainey, Inc., Uniontown, Pa.): We are very much interested in foremanship conferences. We have valuable foremanship meetings in each plant each month. All of the men attend from the superintendent down. The men are given notice about a week in advance to what the subject will be. We discuss such subjects as getting out the work, making the job safe for

workers, reducing labor turnover and others along that line. We feel that we are getting quite a good deal of benefit out of these meetings, although it is very hard to put your finger on it just at the present time. We intend to keep them up.

MR. MARVIN: Mr. Nesbitt, who is acting safety engineer of the Tri-State District, conducts what really are foremanship training courses, majoring in safety. I think he could give you more help.

FRED. H. NESBITT (Tri-State Zinc & Lead Ore Products Association, Miami, Okla.): Two years ago we had some wonderful series of foremen's training conferences that were led by Mr. I. N. Anderson, and we have felt that they were a big help to us. Shortly after that we formed a foremen's accident prevention club and held night meetings. After a few meetings it got so they didn't come out, so we started this year holding monthly banquets or luncheons for the foremen. The first one, I think, had 135 in attendance; 98 of them were round foremen. In our district, we have 89 mining companies and something like 216 or 217 mines. These foremen were from all the different mines in the district. We are still continuing those meetings every month. We really think that they have done us a lot of good. With these foremen's meetings and our clinic work, we feel that our accidents this year have been more than cut in two and our fatalities this year have been only one-third of what they were last year.

CHAIRMAN McDOWELL: Is there anyone in the room who has specialized on foremanship conferences? Mr. Henrie?

H. C. HENRIE (Phelps Dodge Corp., Bisbee, Ariz.): Several years ago we went after our accident rate. The number of accidents had been decreased somewhat. We then ran into a situation where it seemed to be quite difficult to get a further reduction. We were able by means of foremanship conferences to get the foremen interested in the problem and make still further reductions.

Now the way those conferences were handled was that the mine superintendent held meetings twice a month with all his foremen, night foremen and shift foremen. Our accident record as to cause of accident was the basis for discussion. For instance, it was found the great majority of our accidents were occurring in operations centering around haulage. We were able to subdivide that further. But finally, we would center attention on some one specific hazard. Then each man present was asked his idea as to the correct method of performing that particular operation. For instance, we would start out, "What is the first thing to do?" We would get that man's version as to the first move that should be made and so on until we carried the operation through. In other words, analyze the operation.

After we had more or less of a standardized method for the operation in question, these standardized methods were typewritten, given to the individual boss and also posted in a conspicuous place or places throughout the mine. The men, after being instructed, were compelled to follow that operation and they were held responsible that the work was done in that manner. In that way you accomplished a two-fold purpose. You found the safe way of doing the job. You probably got a more efficient way than had been customary prior to that, and thirdly you had uniform practice, where before practice would vary in certain details in different parts of the mine and with different qualities.

To illustrate how the simple operation may involve considerable discussion, there are matters of loading a car from the chute. That was quite simple. When we got through there were 22 separate and distinct operations in loading a car. If everyone of those operations was performed in the proper way or in sequence your accident hazard should be reduced to a minimum. At first, it looked difficult in regard to getting this matter over to the day's-pay man. In that case this standard method of loading the car from the chute was posted on each loading chute, the man was instructed and then compelled to work in that manner. That's

just one example of what we have been able to accomplish through these foremanship conferences. They are still held regularly and have been a great factor with us in removing accident hazards and consequently in reducing the accident rate.

T. T. READ (American Inst. Mining and Met. Engineers, New York): May I say I happen to have another thought? Emerson said that in his opinion the great characters of modern industry were increasing voltage rather than amperage. What he meant was that the great development of modern times was not on schedule. Mr. Gilbertson said that by setting things up to some theory, production goes along naturally. I was reminded that back in the war times I had a good deal of contact with efficiency planners. The War College told the other people what to do and they did it. It can't be done that way now. You have to fertilize that planning and control down in your actual operating organization. You have something of the same thing in research.

The fundamental point about foremanship training is that you are going from that wrong step to do the thinking and planning assigned to a specific group and putting it back in the operating organization where it belongs. You are training those practical men so they will get out of their minds certain things because they have theories, they say. They will have theories just the same. They may be wrong. Train them so they can approach things in an engineering spirit and place in their minds a spirit of analysis which they may apply in getting it down to the men. This idea of increasing the voltage and reducing the amperage applies here; in other words, getting the work done with less waste effort.

CHAIRMAN McDOWELL: Unless there is some specific point to be brought out we will close this discussion. I really feel that the foremanship conferences mean a great deal. I have been particularly interested in that phase of training, whether it relates to safety operation or what not. For some time we've all done a certain amount of that work. It is just a matter of how we do it. I am rather of the opinion, regardless of how it is done, if we are doing it, we are doing a particularly good job.

On the Nominating Committee I have appointed Mr. H. I. Young. This was done several weeks ago. Also Mr. J. T. Ryan and Mr. H. C. Henrie. Mr. Young is not present. I will ask Mr. Henrie to make that report tomorrow—at tomorrow's meeting.

The Resolutions Committee. I will appoint on that committee, Mr. Hosler, Chairman; Mr. Henrie, and Mr. Berry.

ADJOURNMENT.

October 3, 1928

C. A. McDOWELL, Chairman
Safety and Personnel Manager, Pittsburgh Coal Company
Pittsburgh, Pa.

The second session was called to order at nine-forty o'clock by the chairman, Mr. C. A. McDowell.

CHAIRMAN McDOWELL: It was my privilege to attend one session of the Rocky Mountain Institute of Rock Springs this year and I was greatly interested in Mr. Miller's paper. There is one thing that is especially interesting to us. It is this: that the Rocky Mountain Institute was set aside one day to take care of National Safety Council work. That means that we have an opportunity, as Mr. Miller expressed it to me, of the Mining Section helping to put across this propaganda on that particular day, and I think it is worthy of our consideration that we keep that in mind. I would particularly bring it to the attention of the next chairman, that we keep that particular question for next year in mind and help them all we possibly can as far as the Mining Section is concerned to put across the program.

Our first talk this morning will be interesting. The speaker is Mr. Cleveland E. Dodge, Vice-President of Phelps Dodge Corp.

Educating the Miner in Safety

By CLEVELAND E. DODGE
Vice-President, Phelps Dodge Copper Company, New York City

One of the problems created by modern civilization and a growing population is the tendency toward an increasing number of accidents. It is a splendid thing for the country that there is in existence such an active organization as the National Safety Council to combat this evil. The problem is just as evident in the different industries as in other walks of life. Owing to the hazardous nature of much work in the mining industry the danger of accidents is especially pronounced. I am sure that there is no other field in which there is required more hard work and careful planning to avoid the occurrence of accidents.

The mining industry combines a large number of varied activities, including all types of regular underground and surface mining, the transportation of ores and materials and different kinds of metallurgical processes.

In underground mining the avoidance of accidents is especially difficult. The greatest number of fatal and serious accidents occur through falls of rock from roof or sides of the workings. Even when miners use every precaution in testing out newly opened up ground, it is apparently impossible to prevent some of these accidents. Constant vigilance, however, can do more than anything else to forestall trouble caused by bad ground and is the aim of every good mining organization.

Perhaps the most difficult feature in mining is due to the fact that conditions are changing constantly, wherever new ore is being developed and extracted, and it is at such points that the majority of the employees must be working. Supervision is difficult, especially in mines where the stopes or working places are situated away from the shafts and main levels. For instance, in some mines a shift boss may perhaps have only 30 men working under him, but it will take him all morning to get around to the points where the men are employed. In mines where the men are more concentrated, supervision and accident prevention as well are made much easier.

Surface mining is in most cases carried on by means of churn drills to break

the ground and steam or electric shovels to lift the broken rock to railroad cars. There is not the same risk as in underground mining from falls of rock, and of course supervision offers no special problem. There is danger usually from slides of broken rock caused by some of the material being constantly removed. In all types of mining one common cause of accidents is in connection with shooting or blasting. Constant care is required to avoid premature explosions or the drilling into unexploded pieces of dynamite.

A great deal more could be said in regard to occurrences of accidents in mines, but the above will serve to point out a few of the conditions which exist to make mining more hazardous than most other types of work.

After ore has been mined it has to be treated by concentrating, leaching, smelting, refining or in other similar process. Most serious accidents are likely to occur in smelting plants, where it is necessary to handle molten materials, but in other respects there is no great difference between metallurgical plants and most manufacturing works.

In a recent book on creative education, Professor Osborn of the American Museum of Natural History compares education in the Stone Age with that of today. In prehistoric times all education came through the handing down from parents to children the arts of hunting, war, agriculture and domestic duties. Especially in the northern climates existence was hard and there was plenty of incentive for children to learn everything that they could. Practical experience went hand in hand with the acquisition of knowledge. Life in our generation presents an entirely different picture. We buy our food and clothes in shops and receive the major part of our education from books. In comparison with today, when children have too much done for them by others, it is possible that the education of the cavemen of northern Europe was superior to ours.

Habits Most Easily Formed in Childhood

This condition has a direct bearing on safety work. The period when habits are most easily formed is during childhood. When we try to teach safety to grown men in our mines and industrial plants the results are often disappointing. The safety education being carried on in some places amongst school children appeals to me especially and I am sure will bear fruit later on in the prevention of accidents.

In the mining districts of Arizona and the southwest specialization in safety prevention was started only about fifteen years ago. The railroads were perhaps the first companies in that part of the country to provide special men for that purpose.

At first a mining company would have one employee to carry on publicity and educational work in regard to accidents. These duties were broadened out to include inspection of working places and conferences with foremen and bosses. Assistants and extra help were later given to the original "Safety First" man. Safety departments organized in this way succeeded in securing successful results, but eventually a point seemed to be reached where any further improvement was altogether too slow.

Several years ago our company found that its accident prevention work had reached this condition and that a new approach would be necessary to attain further improvement. At the same time we noticed that the United States Steel Corporation had been securing increasingly good results in their safety work and this led to a study of their methods and organization. We found that the secret of success of that corporation was in the interest taken by all the officials from Judge Gary down through heads of subsidiary companies and superintendents of plants. It became evident that our weakness was in placing the responsibility for safety on a few special men, rather than considering it as a major part of our operations in which the responsibility would fall on all operating officials.

We organized one committee for our whole company with our general manager in the west as chairman; also a committee for each separate branch or mining camp, with its manager as chairman, and in addition different committees representing departments or smaller divisions of work.

All of these committees have met regularly and maintained a real interest in trying to secure a better accident record. The department committees include a number of days' pay men who are chosen to serve for about three months when others take their places. By this means quite a number of men have been afforded an opportunity to serve as members of one of these committees. Besides regular meetings, inspection trips are arranged for the members on company time, when safety conditions are reported upon and suggestions for changes offered. A number of valuable improvements have grown out of these inspections. The management and supervisory force has steadily become more impressed with the benefit and importance of this work until now it is considered on the same level as the securing of efficiency and low costs or other results of a similar nature.

We have two company trophies, one based on frequency of accidents and the other on severity. Each is awarded annually to the branch holding the best record. There are other trophies also for similar departments of the different branches. Dinners and barbecues are provided for especially good records such as long periods without an accident.

Our different mines and plants have adopted goggles, hard-boiled hats and hard-toed shoes. It is impossible to estimate the number of eyes, heads and feet protected by these devices, but we know definitely that several lives have been saved. One Mexican breaking rock in connection with a new power line at Nacozari had his goggles broken by some flying object. Rather than take a chance, he walked six miles back to camp to procure a new pair before going on with his work. Although this case may be extreme, the spirit back of it is shared by a large majority of the employees. All men at our coal mines in New Mexico are compelled to wear hard-boiled hats and to use goggles when picking coal.

At several of our mines we have organized training schools for new men. Undoubtedly these men are a source of danger to others as well as being detrimental to general efficiency. When it is necessary to employ a number of new green men at the same time, we have on several occasions started them together in a separate part of the mine under the supervision of two or three experienced miners. By this means men unaccustomed to the work can be given special training for as long a period as necessary. These training schools have won the approval of others, as evidenced recently by a "Certificate of Merit" being given to our coal properties at Dawson, New Mexico, by the Joseph A. Holmes Safety Association. The award states that a portion of No. 6 Mine was set aside for the training of new men and during continuous operation for twenty months produced over 45,000 tons of coal with a total of three minor accidents involving only ten lost days.

Since the time when we reorganized our safety work, real improvement has been made, as indicated by the following results:

Combined Figures for Copper Mines, Including Copper Queen, Moctezuma and Morenci Branches of Phelps Dodge Corporation, and Old Dominion Company

Year	Number Lost Time Accidents	Rate per Thousand Shifts
1924.....	2,386	1.047
1925.....	1,394	.629
1926.....	499	.228
1927.....	263	.122
1928 (6 months).....	82	.072

**Coal Mines of Stag Canon Branch, Phelps Dodge
Corporation, Dawson, New Mexico**

Year	Number Lost Time Accidents	Rate per Thousand Shifts
1924.....	443	1.656
1925.....	382	1.490
1926.....	297	.829
1927.....	167	.550
1928 (6 months).....	64	.482

At both copper and coal mines the number of serious accidents has declined as well as the total number of lost time accidents. There are still occurrences of fatal accidents, but we find that these tend to decrease along with a cutting down of the number of total accidents. It is important to educate the employees to avoid all accidents, however slight.

It is interesting that our mines at Nacozari, in Sonora, Mexico, have won for the last two consecutive years our trophy given for the lowest number of lost time accidents. Their record has been as follows:

Year	Number Lost Time Accidents	Rate per Thousand Shifts
1926.....	86	.153
1927.....	37	.062

During the entire month of May, 1927, the 1,800 employees of all departments worked without a lost time accident. These results have been due entirely to the personal interest in safety of American and Mexican officials and bosses.

The avoidance of accidents and training of employees in observing safety rules is similar to any other problem in operating a mine or industrial plant. Success comes by means of individual interest, patience and persistency. The end is worthy of real effort upon the part of all concerned. As respect for safety is acquired by a larger proportion of the industrial workers in the country and by the population as a whole, it seems reasonable to believe that the safety movement with gather momentum with a corresponding decrease in suffering and economic waste.

In closing may I make a special plea to all officials of mining companies to take the responsibility of this work to heart and to exert themselves conscientiously in furthering the cause of safety.

CHAIRMAN McDOWELL: The paper is now open for discussion. Mr. Dodge will be glad to answer any question that anyone may want to ask.

C. S. HURTER (E. I. du Pont de Nemours & Co., Wilmington, Del.): I have not had much experience with Mexican labor but I have been in a number of Spanish and American mines. In view of what they accomplished in Nacozari and other places, where they have Mexican labor, I wish to state they have done a remarkable piece of work.

MR. DODGE: I might say Mr. Ayar, who is manager at Nacozari, and Mr. Lehman, the general superintendent, are here, if anyone would like to ask them any questions.

CHAIRMAN McDOWELL: We would like to have Mr. Ayar start this discussion.

FRANK AYAR (Phelps Dodge Corp., Morenci, Ariz.): I don't believe there is anything in particular I can add to the summary of the safety work which Mr. Dodge has given us. The only thing—that most impressive part of our safety work in Phelps Dodge Corp.—has been the point that Mr. Dodge mentioned; that it started at the top. The biggest secret is starting at the top and showing your men that you are absolutely serious all the way through in your safety campaign.

Now one thing at Nacozari and Morenci that has given us good results in particular, is this safety organization scheme. This gentleman speaks of the work of the Mexicans. I might say that we would stake the Mexican laborer, from a standpoint of safety, against anybody in the world. He is most susceptible to safety training. He welcomes it, if you approach him from the right angle.

We have thrown safety right into the hands of our men in every one of our departments. We have safety committees and lots of committees. We don't have just one committee for a mine. We have a committee in every division of the mine and these committees are not the bosses; that is, our inspection committees are the men and the men make independent inspections twice a month of the property. But these inspections are made at times agreed upon between the superintendent and the safety engineer so that everybody doesn't know just when it is going to be. Under this system, the man is absolutely free to say what he thinks. The safety engineer is the secretary of the inspection and he writes down every recommendation made throughout that division. So, when you get through we have gone right through our mine, or through our concentrate or smelt, everything that a workman has found wrong with it.

There not being any bosses in the inspection, the workmen don't hesitate for a second to say just what they think and we have never in any case failed to comply with the recommendations of our workmen if they have a trace of a chance of improving the safety in that division. Sometimes we have complied with them anyway, because we find that the average man gets a great kick out of seeing some operation that he has recommended put into effect. We have done—like all of the properties—lots of advertising. We feel that you can't do too much of it. We have gone the limit on safety inspection and protection.

Mr. Dodge said we have had—I think it will run well into hundreds of cases—men whose eyes have been saved by goggles, men whose lives have been saved by hard-boiled hats; and I might say that both at Nacozari and at the Morenci Branch of the Phelps Dodge Corporation not a man in the corporation can go down our mines without a hard hat. That includes the president of the Phelps Dodge Corp. and any other corporation, even if you go down there to look around. This is for the psychological effect upon the workmen.

In a letter which I sent out some time ago to our men—every now and then we send out personal letters and circulars—I made the statement that we were absolutely serious in this movement and our policy is not production first, it is not costs first, but it is safety first. A few days afterward, one of our men came around and said, "Mr. Ayar, just between you and me, do you really mean that—that cost is not first, production is not first, but that safety is first?" I said, "You are dead right, I mean it, and I challenge anybody in this organization to show us one case where we have failed to put safety ahead of cost and production." I think that until everybody does that you will never get the limit in safety work.

MR. DODGE: I would like to say in regard to Mr. Ayar putting safety first that I think it is true that in all our mines we found that through playing so much emphasis on safety it improves discipline and it incidentally helps efficiency. Mr. Ayar has his costs at Morenci and I think he will back me up. If you get in your safety and discipline, it helps all your operations. It helps both ways. It is not putting safety in at the expense of other things.

E. H. SUENDER (Madera Hill Co., Frackville, Pa.): In Mr. Dodge's statement of the number of lost time accidents from 1924 to 1928 showing that most remarkable reduction from 443 to 84, if I remember correctly that was in the mining end of the business. May I ask, as a matter of information, the approximate number of men involved in that particular part of the business?

MR. DODGE: About 900 men.

H. S. GILBERTSON (Lehigh Coal & Navigation Co., Lansford, Pa.): I would like to ask Mr. Dodge about the types of accidents which are most prevalent in the mines. I believe accidents from falling roof are the most prevalent forms of accident. If the mines are fortunate to have favorable roof conditions, the accident record would be less. In the copper mines, how big is the factor of falling roof?

MR. DODGE: The fall of roof is the biggest factor by far, especially in the severity of the accidents, and Mr. Ayar can probably answer that. I think the fall of roof is the cause of the majority of accidents anywhere.

MR. AYAR: I think at Nacozari it is true also. The ground is slippery, and sometimes 200 or 300 tons will come down and nobody can see by sounding the ground if anything is wrong at all. The first thing you know one of these big pyramids will drop out and that has been met by using lots of cribbing stock. I think we have got the fall of ground beaten there.

MR. DODGE: It is a little hard to generalize. What is true of one mine is not true of another. The falls of rock cause more difficulties than anything else because you have constant supervision and attention to give it. When you do get a bad fall it is generally a serious accident.

N. W. GREENSFELDER (Hercules Powder Co., Wilmington, Del.): I was interested in company trophies. The spirit of competition is a very potent thing in encouraging men to take a greater interest in safety. I would be interested in having Mr. Dodge tell whether that cooperation has had a tangible effect.

MR. DODGE: I think it has had a big effect. We have these trophies exhibited for a few days around at all the branches and it goes permanently to the branch that won for the previous year; it is put up in a place where anybody can see it. They take pride in the thing. Competition has an influence in anything.

We make use of the usual kind of signs and different features to try to get it up before the men. Yes, I think it has a very big effect in each of our departments.

R. N. HOSLER (Coal Mine Section, P. C. R. & I., Harrisburg, Pa.): If I am correct, Mr. Dodge refers in his paper to the fact that he set aside a portion of their mine for training of new men. I would be particularly interested in knowing the detail, just what they do there and many of the others will.

MR. DODGE: Could Mr. Brennan answer that?

W. D. BRENNAN (Phelps Dodge Corp., New York City): In our training school for miners, we found that the accidents among green men were large. We were getting a number of them. We took one pair of entries and as each man went through the employment department it was ascertained whether he had had any coal mining experience or not, or just what experience he had; and where we found the man had very little or no experience we sent him to this school. This year we had from 18 to 26 men usually under the supervision of one special instructor.

The general supervision of that part of the mine was carried on by the mine foreman or assistant in a general way. A special man spent his entire time educating these men. They went in under the ordinary conditions. They were in the machine operated portion of the mine and partly on the general retreat. As the man became more efficient, after he was shown the props and different kinds of work, he was given an opportunity to learn the driller retreat work which in our mine is rather dangerous as we have extremely bad top. The men in that department became familiar with the conditions under which they were working and learned the idea of the school and very soon took pride in trying to take care of themselves and to work up their production.

We found that as the man became proficient and we were ready to move him to another part of the mine or to another mine, in a great many cases he didn't like to leave. They liked the close supervision and the attention that they

had in this particular place. We used the word "school." It seemed to be a good word. It was operated in conjunction with the Vocational Department of the State of New Mexico. They found out what we were attempting to do and became interested and wanted to take part in it, so we arranged for them to do so, and to fill out reports for them and to work with them and at different instruction orders connected with the department. While they were not mining men they came up and visited and it created quite a little comment and interest throughout the entire State in that particular department.

We feel quite proud of the record we made, considering the conditions under which the men were required to work. At first the school operated in only one mine but we have broadened it out. Now we have several schools in the various other mines and before we started this school it was quite difficult to get the young fellows as they finished their high school courses to become interested and anxious to go underground. Their ambition in a great many cases has been to find some surface work or get out from the mines, not to go into the mines. But we notice now that quite a few of them come around after they have finished their high school courses and say they think they would like to go into the mine and would like to start in the school. We feel we are bringing back into the mines some of the younger generation. It seems we are developing pretty good miners as miners go today.

C. M. WAMPLER (Eagle Picher Lead Co.): I would like to ask whether the Phelps Dodge Corp. is doing anything to protect the men's feet?

MR. DODGE: In coal mining, we require a man to wear a hard boiled hat. Nobody can go there without a hard boiled hat.

We always require every man to wear goggles not only at the face when he is picking and when he is shoveling and all men working on tracks and any place where there is a possibility of flying material getting in their eyes. Those two are in effect now and have been for two years and the hard boiled cap a year.

The safety shoe—we have the rubber. About half the men wear rubber shoes, the other half leather. The best thing we have been able to find in the way of rubber shoes is not very good but the tip of the rubber shoe must be hard. The leather shoe has been quite a little experiment and quite a little trial and to date we haven't got a very good shoe, but the last batch we got in seems to be good so that now every man that shows up at the mine with a new pair of shoes is required to wear a shoe with a hard cap. We are not asking the men to throw away their old shoes but we are working along the line that everybody that goes in with a new pair of shoes has to have a shoe with a hard toe. We figure that in the course of three to six months everybody in the mine will be wearing shoes with hard caps.

Mr. Ayar could say something about copper mining and shoes. The last time he was in the office he had a shoe store.

MR. AYAR: We have been going into the shoe business quite seriously. There are different types of shoes with hard caps. At the present time over 80 per cent of our men at Morenci Branch of the Phelps Dodge Corp. have safety cap shoes. The safety cap shoe comes down over the end of the toe. We have had lots of cases where men's toes have been absolutely saved by the shoes. In fact, Mr. Crowfoot, superintendent of the concentrate, had a case where a casting dropped on a man's toe and the cap held but the pressure from the floor shoved up and it actually hurt his foot from below, but the cap held. Every now and then we have a man with his little toe hurt. We are demanding a shoe which goes all the way around, not only the cap, but all the way around and covers the little toe also.

I would like to say also that following up the shoe business we found that every now and then if something would drop on a man's instep, where we are

dulling rock through, he had no protection at that place. One of our men designed a spat with heavy strips that fastens on like a skate. It sets on the top of the shoe and fastens up around the man's instep, so we get the man's instep as well as all his toes protected.

E. H. SUENDER (Madeira Hill & Co., Frackville, Pa.): Does that interfere with a man's instep?

MR. AYAR: A little, but it is much better than injuring his instep. The men buy the shoes and the company furnishes the spats. They are kept in a tool room, checked in and out on every shift. I don't know what is inside of them. We have never had a case where it broke through the cap.

B. J. DRYER (Woodward Iron Co., Woodward, Ala.): I would like to ask the kind of goggles they use underground. Are they wire goggles or glass goggles?

MR. DODGE: In coal mining, we use wire altogether. In metal, some wire and some glass, mostly glass.

MR. AYAR: Mostly wire underground, although we are coming around more and more to glass.

MR. DRYER: We had trouble in our mines with glass.

MR. FRANK AYAR: In some cases, I might say, that there is a goggle that if you just unscrew the end of it you can put wire or glass in. If a man has trouble with his glass he can put in wire.

MR. DRYER: Dull finished wire?

MR. AYAR: Dull finished wire.

DANIEL HARRINGTON (U. S. Bureau of Mines, Washington, D. C.): If the good record that was announced by Mr. Dodge and inquired into by Mr. Suender, is in connection with the operation of the coal mines, I want to say to you people who are operating coal mines, that if the Phelps Dodge Corp. of Morenci and Nacozari can have a good safety record as far as falls of roof are concerned there isn't a man in the United States, in so far as my knowledge goes, that can't do the same thing; because if there is any place in the United States where they have rotten roof in coal mines it is at Dawson, N. M. I have had a fine chance to find out about it. I made an examination. Those who are interested in the school that was described by Mr. Brennan can get some published information about it from an article that was written by Mr. Grove of the United States Bureau of Mines and published as a report of investigations; and the paper was also presented before the Coal Mining Institute last year at Pittsburgh.

MR. SUENDER: This discussion leads me to believe that the Phelps Dodge Corp. has the safety movement really in their hearts and minds especially when they get to equip their miners with spats and all of their miners with goggles. I think they have done a real job on the miners' end because goggles are concerned all along the line and I would like to ask another question. Did they find in trying to get these men to wear goggles any opposition on the part of the labor unions?

MR. BRENNAN: We don't have any labor unions.

MR. DODGE: You can't jam an order through right away. For instance, the copper mines are very hot in places and you can't force men to wear hard boiled hats with the same degree you can in a cool mine because for years they have been going around without hats or with a light hat. You can't make up your mind and do it, irrespective of conditions. Naturally, we have been pretty slow about it. You have to start at it slowly and get the interest of the men and get their cooperation and then you will find all of a sudden most of the opposition breaks down and you can put through these customs which you couldn't do at first. It takes a good deal of study. That is where the interest of the management is also his interest. If you turn it over to somebody else, you are bound to make mistakes. Probably you won't get results. If you put it up to the management, he is going to study it and take all the different sides into account and make it possible where it wouldn't be otherwise.

F. S. LENHART (W. J. Rainey, Inc., Uniontown, Pa.): We are particularly interested in knowing how this goggle question is put over. Although all miners, loaders or diggers are required to put on screen goggles when they enter the mine, our experience has been that most of the time they wear the goggles on their caps instead of on their eyes. We have been unable to solve this question. If the gentlemen have any particular methods of solving this, we would certainly be glad to hear them.

C. M. WAMPLER (Eagle Picher Lead Co.): We found in the Tri-State District especially they were rather slow to adopt the goggles. At first we didn't think it could be done and it took at least two years to put it over properly. When we first put in goggles not over 20 per cent wore them. One of the main ways we found of putting it over was that we tried to fire some. Finally, we suggested to the foremen that if we had a man we thought we didn't care to keep anyway and if we were on the verge of letting him go, it would be a good chance to catch him not wearing goggles and we put it over in good shape.

Goggles Used Under a Variety of Conditions

A. H. TRESTRAIL (Picklands Mather & Co., Caspian, Mich.): I would like to ask those gentlemen if anyone had an accident due to the fact he couldn't see with the goggles?

MR. BRENNAN: No.

H. C. HENRIE (Phelps Dodge Corp., Bisbee, Ariz.): In answer to Mr. Trestail's question, I can recall several cases where the cause of the injury, the man claimed, was due to his sight being somewhat affected by the use of goggles. However, in all those cases the committee visiting the same working place under those conditions were unable to find any difference. That is to say, the man should be able to see properly. Then we had their eyes examined. In some cases we found instances of rather defective eyesight, which means that you have to have a corrective lens as well as your safety feature. You understand, men are examined when they go to work. They are required to take a physical examination, but in some cases a period of years has elapsed when their eyesight fails. That is one point to watch. We are coming to the point where we have to take into account possible defective eyesight.

CHAIRMAN McDOWELL: Gentlemen, we will have to close this discussion. Perhaps all of us have had it in our minds to ask Mr. Dodge whether he found the school added materially to the cost per ton mined? Second question, if so, does he find that the men who have been trained in the school are safe enough miners so it could drop the cost of accident that way?

MR. BRENNAN: I think possibly with the slight supervision there might have been a slight increase in cost per ton of the coal from that district, but I think that would be more than compensated by the increased production per man due to this supervision where we had this group of green men, so that in the end I wouldn't say there was any material increase in cost.

J. N. CARMODY (Coal Age, New York City): There are two vital points brought out, one being technique, the other leadership and management. I think any of us who have visited the Phelps Dodge properties as I have had the privilege of doing, realize that a very large part of the success is due to the leadership of the men who supervise the job, from Mr. Brennan down through the line. I had the privilege of visiting the mines underground. I even went to a dance attended by almost everybody in the town, and Bill Brennan danced with the finest looking girls. That's the kind of leadership that puts across this safety success. It is no small thing. It is a large thing. The boys and girls, men and women, are just as glad to see him there as is his own foreman. That is the quality of the thing that goes across.

CHAIRMAN McDOWELL: In relation to the shoes you were talking about. Our company has been making experiments in the last four months with a new type of bootee and it is especially new in many respects. So far we have found it to be successful. I have on record in ten or twelve pairs we have put out for experiment, instances where heavier objects than we would expect would fall on the toes and save those particular toes. This shoe is made with a cap that is a little larger than the cap on shoes that have been made in the past. To do that, it was necessary to increase the vamp of the shoe as they call it, which raises it slightly in front. It doesn't look so well but we find in the re-arrangement in the making of this particular bootee that the wearer finds no discomfort and we have on record now four or five pairs that have gone through three month periods and up to the present time are still going along strong. They were given to men that really had something to do and not men who probably didn't have so much to do—men like drivers who were jumping on cars and the like. The miner also wore the bootee.

One thing we stressed in the building of this shoe was a new bottom to this bootee, one in which it would not wear smooth in just a very short period as the present bootee on the market. We did that on account of men doing their work rapidly, jumping around on cars and the like, and we find in one case in particular where a bootee has gone three months. We had the man appear at our safety meeting just recently and show the bootee and explain it to the men—a foreigner, by the way—and it showed conclusively that we were going in the right direction.

After our experiment has been made, I am sure that we shall be glad to pass it along to others.

FRED. H. NESBITT (Tri-State Zinc and Lead Ore Products Association, Miami, Okla.): Are those rubber or leather boots?

CHAIRMAN McDOWELL: Both.

MR. NESBITT: Do you find any objection to that long extension to cap?

CHAIRMAN McDOWELL: It was necessary to revamp the entire shoe to put a longer toe cap on it. We did that on account of taking care of the last two toes. The other boot does not take care of the last two toes.

MR. NESBITT: Could we get the name of that company?

CHAIRMAN McDOWELL: Yes, I would be glad to give it to you. Gentlemen, I am turning the meeting over to our entertainment man, Mr. Ryan, for a few moments.

The Seventh Inning "Stretch" is Enjoyed

JOHN T. RYAN (Mine Safety Appliance Co., Pittsburgh, Pa.): The membership decided last year that they liked the idea of a seventh inning stretch or interruption in the program. We have been discussing various ways of arousing the safety interest. The New Jersey Zinc Company has a rather unusual method and we are going to give you a demonstration of how Ben Tillson, a former president or chairman of our Mining Section, does it. In fact, he is almost a perennial. He was chairman for six years. He will show where he gets most of his inspiration from.

(Mr. B. J. Tillson, New Jersey Zinc Co., Franklin, N. J., and his family band played for fifteen minutes.)

CHAIRMAN McDOWELL: We will go on with our program. The next paper on the program is to be presented by Mr. S. P. Howell, Explosives Engineer of the United States Bureau of Mines, Pittsburgh, Pa.

Safe Handling of Explosives Underground

By S. P. HOWELL

Explosives Engineer, U. S. Bureau of Mines, Pittsburgh, Pa.

My theme is the reduction to a minimum of accidents from explosives underground. The safest explosives and blasting accessories should be chosen for the work. Approved methods of using these explosives and blasting accessories should be adopted, and adequate supervision provided to see that these explosives and accessories are used and the methods adopted are enforced.

It will suffice to say from the statistical standpoint that for a 15 year period, 1911 to 1925, the average number of accidents from explosives underground in coal operation was 199 yearly fatalities. Of these, 135 were in coal mines and 64 in metal mines; or put on a percentage basis, 5.7 per cent of all coal mine fatalities were due directly to explosives underground, 12 per cent of all fatalities in metal mines were due directly to explosives underground; or 6.8 per cent of all the underground accidents of both mines.

So far as transporting and storing explosives underground, in coal mines, are concerned, permissible explosives are, by reason of the fact that their sensitiveness has been established by test, safer than either dynamite or black blasting powder. They are safer than dynamite because as a class they are less sensitive to blast and shock; and they are safer than the black blasting powder by reason of the fact that black blasting powder is so easily ignited and explodes so promptly thereafter.

One of the requirements for permissible explosives is of course not only their great safety against igniting gas and dust—a thing with which we are not concerned particularly just now—but also the fact that they must pass the pendulum-friction test. It is subjecting the explosive to the frictional impact of a wood fibre shoe on a steel anvil. It is a severe test. All permissible explosives must pass this test. They are the only class of explosives that are obliged to pass it before they may be offered for sale in the United States.

Safety in handling explosives can only be promoted and brought about underground by the use of the most dependable blasting supplies and the safest ones. Of these, we have the electric detonators whose legs are electrically short-circuited. We have the sturdy flexible shot-firing cable. We have permissible blasting units. We have carrying bags or carrying boxes which are electrically non-conductive and we have wooden accessories boxes for storage, wooden skewers and wooden tamping bars. I especially want to stress this matter of electrically short-circuiting the legs of detonators.

Electric detonators with the legs electrically short-circuited by shunts or by having the wires twisted together are used in many coal mines of the eastern United States. The universal adoption of this protected electric detonator in all coal mines would eliminate one cause of fatalities and accidents with explosives which is becoming more and more common.

The electric short-circuit is designed to protect the electric detonator from premature firing by electric current from such sources as power lines, lighting circuits, live shot-firing cables, stray currents and live terminal blasting units of the battery type.

The general use of cutting machines, the increasing use of loading machines, conveyors, and electric drills at working faces in coal mines, and the general firing of permissible explosives with electric detonators, means that sources of electric current are frequently in proximity to electric detonators. Constant vigilance is therefore necessary in the handling of electric detonators to protect them against all such sources of current, and the use of electric detonators with

electrically short-circuited legs is one means of reducing this cause of premature explosions.

Manufacturers now "short" all electric detonators having iron legs, and these are in general use in many coal mines where only single shot holes are fired. Except on special order, manufacturers do not "short" any electric detonators having copper wires; such detonators are commonly used in long holes or when firing two or more charges simultaneously. The cheaper iron-legged electric detonators are unsuitable for this service because of their much higher electrical resistance.

It is not uncommon for shot-firers and miners to remove the shunt or untwist the wires of "shorted" electric detonators long before connecting them to the shot-firing cable, or even before charging a hole, or before making a primer. This is done sometimes because they do not know why these devices are "shorted," and sometimes on the plea that it saves time. It is just as important that the "short" be maintained until the wires are connected to the shot-firing cable as it is that "shorted" wires be purchased for use. "Shorted" electric detonators sell at the same price as "unshorted" ones.

Operating officials of coal mines should consider the following suggestions:

1. Purchase electric detonators with electrically short-circuited legs.
2. Explain to shot-firers and miners who fire their own shots, why these devices are short-circuited and when to remove the "short."
3. Procure compliance with these instructions by adequate inspection and tactful discipline.

Another accessory to which consideration should be given is the shot-firing cable. I have found some very poor types of shot-firing cable, annunciator wire, cotton covered, etc. In my judgment the best shot-firing cable and one that is not too good from the standpoint of safety is one that has stranded wire so that it may be flexible, one that is rubber-covered so that it may be sturdy, one of a gauge not less than No. 18, preferably No. 16, and at least 100 feet long. When joints are made they must be well taped and staggered. When explosives are transported by miners they should be in boxes and bags electrically short-circuited and closed. I will later give an illustration of a method used by a certain mine which I think includes some very good features.

When explosives are delivered by the operator, they should in every case be in an insulated car. They should not be on a road that has current on the trolley line, and if it be black powder and must be hauled electrically, a measure of protection can be procured by the use of sturdy insulated couplings.

In the storage of explosives underground in coal mines, the boxes or bags should be put in locked wooden boxes and stored where it is dry; preferably in a rib 60 feet from the face in order to protect it from water, from theft, from flying particles that are blasted. Moreover, this box should be of such size that about one day's supply can be put in it. Nothing else should be stored in this box. It is especially bad practice to store detonators, electric detonators or carbide or metal tools in these boxes.

I have 16 rules for the safe handling of explosives underground. I will refer to some of them, maybe most of them, with comment.

"The permissible explosive (giving its name) shall be used for blasting coal in this mine." This isn't adequate. "Some permissible explosives only shall be used in this mine." It is desirable, even necessary, that the brand name be given so that there are not several different brands in one mine at one time.

"The permissible explosive (giving the brand name) shall be used for blasting rock in this mine." Sometimes it is necessary or desirable to have one for blasting coal and blasting rock in the mine but some coal mines have found it feasible to use one brand for blasting both coal and rock. This is the best practice.

There is a new class of permissibles—the gelatine class—which has a high density, high strength, eminently suitable for blasting rock. It is recommended for your use instead of dynamite.

The electrical detonators with six foot iron (or copper) legs, electrically short-circuited by twisting the ends of the wires (or by shunts) shall be used, and this "short" shall not be removed until the shot-firing cable is attached.

The shot-firing cable shall be rubber-covered, flexible and sturdy, of 16 (not less than 18) gauge stranded wire.

Permissible blasting units shall be used (specifying kind).

Bags or boxes for carrying explosives shall be of the electrical non-conducting type (specifying by name), and only explosives shall be carried in them.

Storage boxes for explosives shall be of dry one-inch lumber not larger than 20 cartridge capacity, provided with a cover and lock, and painted a distinctive color. The box shall be kept covered and locked at all times, except when the explosive is being handled.

Wooden skewers shall be used for punching holes in primers.

Wooden tamping bars shall be straight, at least one and one-fourth inches in diameter and in length about two feet more than the average depth of cut, undercut, overcut or shear.

An estimated supply of explosives for one day may be procured from the outside distributing station, and taken into the mine by a laborer; any unused portion shall be returned to the distributing station at the end of the shift. In case the miner carries his own explosives, the amount any employee has on hand in the mine at one time is automatically restricted.

Explosives shall not be transported on cages carrying men on man-trips, or on electrically hauled trips.

Where shot-firers are employed, electric detonators shall be carried by shot-firer only.

If electric detonators are carried by the miner who does the blasting his partner should carry the explosive.

Smoking and the carrying of matches or pocket lighters are prohibited in this mine. This rule should apply to all coal mines. Smoking is particularly vicious in a gassy mine or near explosives. The ignition of combustible materials, including explosives and electric detonators, is always a potentiality when smoking or matches are permitted underground, regardless of whether the mine is gassy or not. Smoking was one of the suspected causes of at least two gas explosions resulting in the death of 20 men, in gassy coal mines within the last year. The use of open lights in mines rated as non-gassy is a common excuse for permitting smoking underground. The fact is that open lights should not be permitted in coal mines.

Explosives or electric detonators shall not be taken underground in their original containers.

This rule is fully justified by the menace of a probable burning or explosion en masse of one or several boxes or cartons of these explosives. The toxic gases of burning or explosion may asphyxiate the men, explosion may cause fatalities directly, or may initiate a gas or dust explosion. Moreover, one pound of explosive can produce so many tons of coal or rock that no great quantity is used in the average coal mine daily.

All primers shall be made, all holes charged, the electrical short circuit of all electric detonator legs opened, and the shots fired by the shot-firer.

I will try to detail the example of a good practice in handling explosives underground in a closed light bituminous coal mine in the West Virginia territory where the miners take in their explosives in the morning in nice neat wooden boxes. The explosives are placed in this box at the distributing station by an attendant in quantities that the miner estimates to meet his daily supply, in no event exceed-

ing a certain number of sticks. He proceeds into the mine on a traveling way in which there are no trolley lines and that applies to both the main entry and butt entry. He crosses no track. He goes under no trolley lines enroute to his working place because there are overcasts over the roadways or ramps or steps. At the end of the shift or during the shift, the shot-firer comes around to fire the shots. The shot-firer carries electric detonators in a canvas roll containing 50 compartments, one electrical detonator in each compartment. This roll is carried in a leather pouch. The miner gives the shot-firer a check for the electric detonators which are used.

At the end of the shift, the miner returns the box with the explosives that are left, to the attendant at the distributing station, where the attendant checks up on that particular miner's box and if it is found that he has used, or the shot-firer has used, from this box six or eight sticks as determined in the amount the miner took out in the morning and returned at night, that number of sticks must correspond with what the shot-firer has on his record. Moreover, electric detonators of the shot-firer are checked up, because of the 50 which he takes in he must return either the unused electric detonators or the checks for them. I think this particular example of good practice illustrates a considerable number of good safety practices.

Of course, it is realized that this may not apply, and cannot apply, to all coal mines.

I recently investigated a coal mine which might illustrate good practice and bad practice—a non-gassy bituminous coal mine. In the afternoon an outside employee took a box; one of these insulated boxes properly made, had been used for about seven years and was in good condition, as I observed it. It was taken to the magazine. In it was placed 24 25-pound kegs of black blasting powder. It was then taken to the mine entrance. Now, it was customary at that mine, or at least their instructions were, that the two day-drivers should take in these explosives at the end of the day shift or after the day shift was out, that before they went into the mine they should pull the switch, cut the power off the trolley line, and they should haul this box on the truck by mule and distribute the powder.

What actually happened was that at six o'clock, for some unknown reason, they took the powder out of this box and put it in an ordinary car. When they got into the mine on a certain entry, they noticed that the trolley line was down and they beat it. They knew something was going to happen. Anyway, they knew the power was on the line. It was against the rules. In any event, the black blasting powder exploded and quickly burned both of these men, one 40 and the other 60 feet away. They died in 24 hours.

Now, the bad practices were: First, that they used black blasting powder at all. Second, if they did use black blasting powder, there wasn't any reason in the world why they should take it in in 25-pound kegs, giving to each miner a two weeks' supply to be stored underground and deteriorate there. In the third place, the powder should have been in an insulated box. In the fourth place, the power should not have been on the line. The reason the trolley line was down was that the coal had failed to support a plumb post which carried a cross bar to which the trolley line was secured. Now the good practice of course was that if they had to take black blasting powder or had to take it in those quantities that the rule was to have power off the line, and another was that they did not haul it in a motor haul trip but by mule.

Now we come to the metal mines. They differ of course from coal mines; that is, they do not have the gas or dust hazard to the same degree that the coal mines do, although that is to be given some consideration at special places; they use much larger quantities of explosives because their blasting is more difficult and their ground is tougher or harder. The commonly used explosive in metal mines is gelatin-dynamite. It is a very good explosive, has some excellent qualities; that

is, it has high density, concentrates your energy in the hole; it is plastic, you can put it in holes that point upward and it will stick there. It is water-resistant, therefore, you can use it in wet work; produces a small quantity of toxic gases, which is desirable for underground operations where you use explosives in such quantity.

But there is one characteristic which gelatin-dynamites have which I wish to stress. Gelatin-dynamites are insensitive to detonation. It is common in large charges, especially where the explosive may have aged somewhat, to fire them only by means of a No. 8 detonator or electric detonator. This is desirable and because of this characteristic it is commonly accepted that gelatin-dynamites are insensitive explosives.

But I didn't say gelatin-dynamites are insensitive. I said they are insensitive to detonation, which is and may be quite different to other types of insensitiveness.

Now, the other part, the other half of this characteristic, is that gelatin-dynamites are sensitive to frictional impact. Nine years ago I made some tests with a great variety of commonly used industrial explosives with the pendulum friction device, and of all such explosives the gelatin-dynamites were the most sensitive. Of course, the point that I want to make is simply this, that because they are insensitive to detonation, do not be fooled regarding their sensitiveness to frictional impact and thereby handle them with any less regard than you would otherwise. The fact is, they should be handled more carefully than any other commonly used industrial explosive.

I want to make a plea for the use of permissible explosives fired electrically and certain types of blasting in metal mines—blasting posts, mats in chutes or in blasting posts where you do or may encounter splintered wood or easily ignited wood. It seems obvious that if you use a permissible explosive which has a short flame, a cool flame, and if you eliminate the smoldering fuse, that you are going to reduce your fires in metal mines in such places.

Now, a fuse commonly cut and capped on the surface causes it to absorb moisture. It would be well to get it near its final state of use. Often 3,000 foot reels are capped with a crimper, placed in a container can, taken underground perhaps on the day shift. I see no great objection to that distributed to the different levels. I think it is an excellent method.

Before I get away, I want to stress this matter of electrical detonators whose legs are electrically short-circuited in metal mines the same as I did in coal mines. Safety in haulage in metal mines is largely a matter of moving it slowly, whether it is in a shaft, in a drift, in a stope or raise. It is well to take explosives in their original boxes, to handle them without the use of open lights. Permissible electrical cap lamps are suitable for use in metal mines to reduce the hazards of lights near open explosives. It is enough to recommend them for general use in metal mines.

I want to stress the matter of illumination of magazines underground. It can be done by self-contained electric lamps but I think that the keyless, vapor-proof bulb, installed in underground magazines; the wiring according to the Underwriters' Standard, with a switch outside the magazine and fuse outside the magazine, is a very good and safe practice.

Last, but not least, I want simply to refer to this matter of thawing explosives. Mr. Adams made reports for a great many years upon the details and causes of accidents in the last 15 years. "Thawing—no accidents in the United States." I don't believe we appreciate what that means and why it is so. In Europe they do not use the low-freezing explosives—the extra low-freezing explosives—to anywhere near the extent that they do in the United States, and manufacturers have provided you in every class and every grade of industrial explosive, a very low-freezing explosive and every factory can and does make these low-freezing explo-

sives. There is no reason for any operator to use any other kind of explosive in his work.

Say that blasting gelatin, of which but small quantities are used—I should say never underground—say that all explosives which are and should be made and bought, were of the extra low-freezing variety, if that is so we need never discuss how we shall build a thaw-house or how we shall heat our magazines. Heated magazines, or thaw-houses should be and almost are obsolete.

Now in talking about this subject I hope that I have raised some questions for discussion and indicated certain hazards and pointed out a means for correcting them. Surely I have not covered the entire subject. I have not mentioned all the hazards or all the means of combatting them by any means. I hope the discussion will elaborate on these things.

CHAIRMAN McDOWELL: The paper is now open for discussion and we will limit your discussion to 15 minutes. Let's see how much we can get out of this discussion in 15 minutes.

FRED. H. NESBITT (Tri-State Zinc and Lead Ore Products Assn., Miami, Okla.): Mr. Howell came down and spent three weeks with us two years ago at a time when we had been having a great many premature explosions from handling powder detonators and we got out a very nice bulletin on it that I suspect all of you have seen. Our fatalities in 1925 from handling explosives was six; in 1926, seven; and after Mr. Howell's visit, in the campaign we put on to make the boys realize that it could be handled safely we had only two and so far this year we have had only one. We give credit to the use of the shot tubes, as we call them—a paste board cylinder.

We have two types, one has a wooden block with a hole in it for the tamping bar spike. In the event we have blocking holes and cavey ground, lots of times you have to leave the shot back in the hole. We feel that through the use of these shot tubes and the campaign we put on, we were able to cut down our powder accident fatalities. We have never in the three years that we have used these shot tubes had any premature explosions at any place where they are using them. Unfortunately, the fatality we had this year was at a mine where they had been using these shot tubes and had discontinued it about six weeks before, because they had a ground boss and he didn't think they were necessary.

C. S. HURTER (E. I. du Pont de Nemours & Co., Wilmington, Del.): The thing I want to elaborate on is one which I had in my paper at Detroit two years ago. In addition to short-circuiting the leg wires of the explosive, I consider it of great importance to have the leads shorted at the point of application of the firing current until it comes to firing the shot. That was developed by Mr. Martin. He developed a fine firing switch. It is safe to use. One of the greatest difficulties in the past has been the carrying of powder. I have a sample of a smaller sack which was developed by us and the copper mines of Butte for the carrying of powder. In the past, the great danger was of the sticks dropping out along the line. The same was made so that it could be carried on the shoulder by straps. With this the powder is pretty well protected. I shall be glad to show the same to anyone who wants to see it.

A. H. TRESTRAIL (Pickands Mather & Co., Caspian, Mich.): I wonder if anybody has had any accidents attributed to fuses not burning at the same rate, or if any extensive, consistent tests have been made relative to whether or not all fuses are uniform in its burning rate?

C. M. WAMPLER (Eagle Picher Lead Co.): On that subject, I was recently called as a witness on a case where a man had lost his eye-sight and he claimed it was caused by fuses burning too fast. I mention I was a witness in the case, because I believe that anybody that thinks a fuse burns too fast—I mean the tip of the fuse—we use the metal—if he will write to the fuse makers and explain the thing, they will send a pamphlet on how fuses are made. It thoroughly con-

vinced me you can't have a fast fuse. I won't explain at this time how it is made. That thorough investigation convinced me it can't burn too fast. They also said it can't burn too slow, or you can't have a delayed fuse, but I am frank to say they haven't convinced me of that.

MR. BROWN: I have investigated several accidents which were alleged to have been caused by what is known as running fuse and we have made a great many tests with fuses and in conjunction with the manufacturers of the fuse we have been unable to make a fuse which will run as they say. You can increase the speed of a fuse a trifle by taking it and hammering it on a steel rail, softening it up, but you can't get it to run. We had a case in a tunnel over in Jersey. A man claimed the six-foot fuse burned in ten seconds. It is simply impossible to do it. They have tried to produce a fuse which will run and they have been unable to do it. They can't make a fuse that stops burning. Even the manufacturers say they will vary 5 per cent either way from normal; the 40 second, 30, 25 and 20 fuse will vary 5 per cent.

MR. HOWELL: One of the first papers the Bureau of Mines published was on the influence of pressure and temperature on the rate of burning of a fuse. That was a technical investigation. The fuse was subjected to various temperatures, the effect upon the speed noted. I think that by combining these in rather extreme ways—ways that were quite impossible to get practical work—it was possible to increase the speed of burning by as much as 50 per cent.

MR. BROWN: The speed is greatly increased when it is under confinement. We have tested every fuse that has been manufactured in this country and in some cases German fuses and Belgian fuses, for burning in air and burning under confinement. We find that with certain fuses, what we call "D Acceleration and burning speed," their speed jumped up as high 50 per cent. That will vary according to the nature of the fuse. With some of the lighter ones the acceleration is greater than in the double tape or triple tape and the higher fuses. The fuse burns fast in the bore and in the open. At higher elevations there is considerable difference. For instance, a fuse will burn slower at Denver than it will in New York.

MR. HOWELL: There are two things I have discovered in investigating accidents in the use of fuses: 1. That the average time burning of a fuse is faster the shorter the fuse you test—it is slower the longer the piece you test. When you light the fuse the gases are not under pressure. As it starts to burn, it burns slowly, then when it gets near the end, the last quarter or half an inch, it spits out. And the practical application of that is that in the metal mines if you use a twelve or eight foot fuse, that is the length of fuse you want to test to determine the speed of burning. Another thing, in lighting block hole shots or dokey shots, sometimes perhaps in rounds, they take a piece of fuse and use it as a light. In doing that they slit every inch or so and if your fuses in your round are six feet you take a six foot piece of fuse. Frequently, the assumption is made that the man lights this and gets away from the base while it is burning. In other words, he's got time equivalent to the burning of a six foot fuse. Since he lights that—that is the first length of fuse light—he is in the clear as long as he gets away while it is burning.

MR. BROWN: The manufacturers of explosives are now manufacturing what they call a warning fuse cap or fuse and the man uses this cap called torpedo and eliminates that first. When that explodes it is time to get out. He hears it.

C. L. WILSON (Berwind-White Coal Mining Co., Philadelphia, Pa.): I would like to ask Mr. Howell a question. When the miner returns his daily supply, would there be any objection, in a bituminous coal mine, to have that miner return that daily supply to a central daily supply magazine?

MR. HOWELL: In general, I don't like the use of a daily underground supply magazine in coal mines. One of the reasons, and, to my mind, the principal reason, to have supplies returned to the surface is that underground storage is a

severe annoyance. That brings up a detail of use that might be mentioned in this connection. The permissible explosives they use may be a cartridge and a half or a whole or a third. Consequently they are cutting their cartridges. They are having left at the end of a shift a half cartridge or a third or two-thirds. If that remains in the mine over night, it will deteriorate promptly. It ought to be used at least by the next day.

Now it has been suggested in some quarters that the manufacturers ought to make half cartridges. I suspect manufacturers will not react very favorably to that because it means more expense. These half cartridges, when they are cut, are usually covered with a dry paper and wrapped dry. They could be maintained in a permissible condition a long time. Sometimes these half cartridges cause partial misfires in bore holes. A half cartridge may be put in a bore hole and an inch of it may be very wet because that inch has been cut—that is the severed end of it. Now, for some reason or other when they put in half cartridges they always put the crimped end at the back and leave this deteriorated end to make the contact with the primer on the cartridge ahead of it.

In some places they have eliminated these partial misfires and are still able to use the cartridges; that is, placing the half cartridges with the deteriorated end at the very bottom. So you continuously have good explosive until the last half inch. If it didn't go, it doesn't make much difference as far as safety or efficiency was concerned.

MR. WILSON: When there are five or six mines returning their powder to the surface, it seems to me we are creating another situation there. If you distribute these explosives at night or have them distributed by the miners and get them from the central station there is quite a condition. What I am trying to explain is that we have our assistant foreman estimate the daily supply for the miner and he in turn distributes that powder at the central place at night and it is locked in a wooden box and closed in a non-combustible building. That evening he returns that powder to this centrally located magazine underground. In some cases there are three, four or five sticks of powder; in many cases, none. After making inspection of these underground magazines at night when the day shift has completed their work, it has been found in some cases there were only three or four dead ones or three or four sticks of powder.

We were trying to have the miner return the daily supply or unused daily supply at the surface and it created a little hazard that we were sorry for.

If the mines are two or three miles apart and all returning powder to one place, there would be too much of it. We decided to have them return it underground. I am wondering whether that is in contradiction of good safety practice?

MR. HOWELL: I don't think that under certain circumstances there would be any objection to your practice.

N. W. GREENSFELDER (Hercules Powder Co., Wilmington, Del.): One class of accidents Mr. Howell didn't speak about is accidents to children who pick up blasting caps, or miners who take them home and the children play with them afterward. The manufacturers of explosives have been giving study to that subject. A year ago they got up a motion picture, which is available to the mining industry, and it has been found effective. Certain companies have taken it, shown it throughout the schools, and we have definite evidence that it has prevented accidents to children.

CHAIRMAN McDOWELL: It has been very interesting to note that the two papers this morning have created considerable discussion.

At this time we desire to have the report of the Nominating Committee. As expressed to you, Mr. Young, chairman of that committee, is not present, but Mr. Henrie of the same committee will now make that report.

H. C. HENRIE (Phelps Dodge Corp., Bisbee, Ariz.): In the absence of Mr. Young, I shall read a report prepared by him and the committee.

Report of the Nominating Committee

Your committee, appointed for the purpose of nominating officers for the Mining Section of the National Safety Council for the year 1928 and 1929, are happy to recommend for the approval of the membership the following officers:

Chairman—George Martinson, of Pickands, Mather & Company, Hibbing, Minn.

Vice-Chairmen—A. W. Dickinson, of Union Pacific Coal Company, Rock Springs, Wyo.; J. P. Hodgson, of Phelps Dodge Corporation, Bisbee, Ariz.; F. C. Miller, of The Colorado Fuel and Iron Company, Trinidad, Colo.; R. N. Hosler, Pennsylvania Compensation Rating & Inspection Bureau, Harrisburg, Pa.

Secretary—Daniel Harrington, of United States Bureau of Mines, Washington, D. C.

It is the opinion of your committee that the Chairmen of the Standing Committees can best be chosen by the new officials. Therefore, we are not recommending Chairmen for the various Standing Committees at this time.

Signed: J. T. RYAN,
H. C. HENRIE,
H. I. YOUNG, Chairman.

CHAIRMAN McDOWELL: I thank the committee for their work in making these nominations. You have heard the report of the Nominating Committee. What is your pleasure?

(Motion was seconded and carried, that the secretary be empowered to cast a ballot for the entire slate.)

ADJOURNMENT

October 3, 1928

Luncheon Session

C. A. McDOWELL, Chairman
Safety and Personnel Manager, Pittsburgh Coal Company
Pittsburgh, Pa.

(Benjamin J. Tillson's (New Jersey Zinc Co., Franklin, N. J.) Band of 40 pieces played during the luncheon.)

The meeting was called to order at one o'clock by the chairman, Mr. C. A. McDowell.

CHAIRMAN McDOWELL: I think it is especially interesting that we should meet in a case of this kind. It is very inspirational for us to sit and listen and get that throb that works through us occasionally when we hear such music. As we look over that crowd we feel that Mr. Tillson has done a wonderful job and it should be inspiring to us in our own communities for work of that kind.

The speaker for the day needs no introduction. However, I really want to state that I have known this gentleman for sometime and I feel that if there is anyone at all who can give us an inspirational thought it is he. I therefore ask that Mr. J. M. Carmody, Editor of "Coal Age," speak to us for a few moments.

Address

By J. M. CARMODY
Editor of "Coal Age," New York City

About half past eleven I was leaving the Waldorf for my office, when Marvin said to me: "We want you to say a few words at the luncheon, and we want you to come back." I suggested to him there were several other fellows whom I named who could do a better job, but he said they may not be available. Ten minutes ago Jack Ryan said "You're elected."

It seems to me that the key note of the genuine safety movement was struck by Mr. Dodge when he said two things; first, that the safety movement with the Phelps Dodge Corporation started at the top and went from the top down through the organization; and then again he said (and what he said was supplemented by statements of Mr. Brennan and Mr. Henrie and Mr. Ayar) that they didn't force the thing through, that they took time to educate the men to a point where they had a desire to carry out safety instruction.

I have always said that safety rules, important as they are, are not enough; nor is the kind of forceful election that is sometimes taken to influence safety movements and methods; good as it is and important as it is, technique enough. The most important single thing that the safety movement needs, and the thing it is getting more and more year by year, is personality and leadership on the part of the men who are carrying out the program for the various companies.

As I look around here now, I find a splendid group of men—men whose personality stand out in this crowd and whose personality will necessarily stand out in a crowd of working men whom they are asking to do certain things for their own protection. The whole thing is psychological, more psychological than it is anything else.

The first important thing, it seems to me, is to establish confidence on the part of

the men in the man who is doing the job. I said upstairs this morning that that is the thing that struck me when I visited Dawson, N. M., about a year ago. I went there as a visitor with the Rocky Mountain Institute crowd. We saw Bill Brennan in action. He wasn't showing off. He was doing his job. He wasn't able to see everybody every minute and incidentally slipped away from the crowd, and I went down to see about something else. But the point is that everybody in that town not only knew him but they had confidence in him. When they had that party that night, at which everybody danced with everybody else, it was a hard job for any visitor to get a girl away from Brennan, particularly the good looking ones. That is the kind of thing that stands out. It is the thing necessary in every single community.

Now, personality, leadership, confidence—it means that men have to have more than a desire to do a good statistical job. Statistics are important in safety. It is absolutely necessary that they be of some fine sort that you can pick out exactly what the conditions are that are causing trouble and causing the difficulty; but they are not enough.

That was demonstrated to me particularly in Bluefield a week ago last Saturday. There was that great Safety Day. That originated in the brain and heart of Bob Lambie who brought together thousands of people and some 180 teams for competition. What did that mean for the State of West Virginia? It meant that the Safety Movement was brought to the attention of every man, woman and child in the State. It meant that the officials, from Governor Gore down, got an entirely new conception of the responsibility of the State to the Mine Safety Department and to the mine operators and to the mine workers.

It meant that the mine workers who came there in large numbers, driving long distances even after it had rained several days and made some of the roads rather difficult to pass—because I spent a week in an automobile going to Bluefield—it meant for those men that they realized that the things they were being told by their safety men, by the State inspectors, were not things that these men alone wanted them to do, but they were things that the whole State Department and government of the State were tremendously interested in. They were doing something for their own good.

I can't think of any other single thing that is quite so important as the expression of your personality, based on a generous understanding of the other fellow's desire largely not to do what he is asked to do first. After all, the thing that safety men must remember is that not only the working man, but every single one of us, builds up resistance when somebody asks us to do something that we haven't done before. It may be for our very best good, but there is something that goes clear back through probably a thousand generations that asks us to be a little skeptical about this thing that somebody asks us to buy, take or use. We have to break it down and we must not break it down by force. Some people say "Well if they don't do the job, ultimately you have to fire a man." Of course, that is the admission that you are not a good manager, that is an admission that you have given up in your desire to convert this man to a practice that is good for himself and good for the company.

Now sometimes it finds its expression through the development of bands in the communities, as you fellows well know, sometimes it finds its expression in the development of baseball teams. It finds itself more frequently than not in some sort of indirect approach to the man's confidence in yourself, to the man's desire to do the thing that is best for everybody to do. You have to build up in the man a desire to take pride in the organization as a whole that does a first class job.

I could talk a long time to you fellows and I would say many things. You know them better than I do. You are on the firing line all the time. I want to leave the single thought with you that is the most important single thing—the development of confidence.

I want to say one more thing. You have to dramatize safety. It hasn't always been done. It can be done. For instance, as I look around here right now I see among my own acquaintances fellows that have put drama here. Jack Ryan, the very name Jack Ryan, carries spirit and fire from the Atlantic to the Pacific. The name Bob Lambie has reached far beyond the borders of the State of West Virginia. With Bob Lambie, with Jack Ryan, and these other fellows, they have a great heart. Bob Lambie would sacrifice himself for everybody else. He doesn't do it for himself. He is so modest. If he weren't so modest, he would be better known, and he ought to be better known everywhere because the people outside of this country ought to know what kind of a man he is. So it goes with Dan Harrington, with Jack Berry; it goes with Forbes and many others. I can name many who are giving of themselves completely for the safety movement; and it comes back and washes back many, many times when it is properly dramatized to those men down in the mines whose lives they are protecting. It ought to be known outside the borders of this country, to the people of other countries, as well.

CHAIRMAN McDOWELL: It is a matter of great regret to us all that Mr. D. D. Muir, vice-president of the United States Fuel Company, who was to have talked to us at this hour, has not been able to be present. But the address Mr. Muir expected to make here will become a part of the record of this meeting.

Safety—A Common Denominator in Coal and Metal Mines

By DOWNIE D. MUIR, JR.

Vice-President and General Manager, United States Fuel Company,
Salt Lake City, Utah

As long as mines operate there will be accidents, and just so long it becomes the duty of every operator not only to use known precautions and preventatives but to use his ingenuity to devise new ones that will fit the particular case. There is not now nor will there ever be a fixed set of safety rules or regulations fitting all cases that will prove a 100 per cent eliminator. The problem of the operator is to approach that goal as near as possible from both humanitarian and economic viewpoints.

Safety in general is considered to mean freedom from danger or hazard and elimination of causes of such. Industries of today, largely mechanized, present far greater hazard to the worker than formerly, not from the standpoint of unit production but from exposure. Transferred underground, industry becomes more hazardous, many conditions existing there not found on the surface. The mine operator is beset with such additional danger for his employees as lack of light, fall of roof or rock, electrical apparatus of a necessity in near proximity to the work, use of explosives, and in coal mines the ever present fear of gas or coal dust explosion. By just this degree his problem calls for additional precaution and renders mining for an industry of its magnitude the most hazardous of all.

It is nearly impossible and thoroughly impractical to attempt listing all causes contributing to accidents. The majority may be, however, confined to relatively few, as follows:

Metal Mines

Falling rock	31.79%
Particles in eyes	13.66
Miscellaneous	8.84
Falling	6.99
Handling drills and other tools.....	6.10

Lifting or overstrain.....	5.30
Transportation system injuries.....	5.27
Falling timber.....	5.16
Struck by axe or pick.....	3.45
Injuries by nails.....	2.36
Cut or pinched by rock.....	2.36
Falling ground.....	1.90
Hands caught.....	1.82
Riding on locomotive or cars.....	1.28
Handling material.....	1.22
Acid water infection.....	.88
Carbide burns or explosions.....	.81
Blasting and handling explosives.....	.81
Total.....	100 %

The above constitutes a nine year record of a Utah metal mine employing in excess of 300 men.

Coal Mines

Mine explosions or fires.....	0.0 %
Fall of face or pillar coal.....	18.0
Falls of roof.....	21.5
Loading mine cars.....	15.0
Miscellaneous.....	11.0
Foreign body in eye.....	4.0
Mine cars and locomotive transportation.....	12.0
Handling tools, axes, bars, etc.....	3.5
Falling timber.....	3.5
Falling.....	3.5
Handling machinery (other than mining).....	3.0
Mining machines.....	2.0
Electricity.....	1.0
Nails, splinters, etc.....	1.0
Explosives.....	1.0
Total.....	100 %

The above is a three year record of three Utah coal mines employing in excess of 600 men. While conditions in these two types of mines differ widely from other mines in various sections of the United States, they are representative of Utah conditions and may be used as criteria for comparison of types of accidents in metal and coal mines.

By far the greatest hazard in both types of mines from standpoint of frequency is falling rock or coal. From standpoint of severity of injury and loss of time, this same hazard is the greatest offender, followed closely by falls of persons in case of metal mines and loading of cars in coal mines. Any similarity of hazard or severity ends at this point, as might be expected, due to widely different conditions.

The question comes to mind as to which type of mine is the more hazardous. Accident records for coal and metal mines are compiled so differently as to make accurate comparison difficult. The Bureau of Mines, however, after considerable effort, have compiled statistics which afford a comparable basis. For the years 1913 to 1925 inclusive, these figures show 4.38 fatalities in coal and 3.53 fatalities in metal mines per one thousand 300-day workers. The same figures for the year 1925 alone show 4.65 fatalities in coal mines and 2.99 fatalities in metal mines on the same basis.

In 1927 the Bureau of Mines, for the third consecutive year, conducted a safety contest among 250 mines and quarries. Among the bituminous division 45 mines reported. In the rating one Utah mine was fifth, another nineteenth and another forty-first. The average frequency rate for the 45, based on fatal, permanent and other lost time accidents per million man hours of exposure, was 97.32. The severity rate, based on number of days lost from accidents per one thousand man hours exposure, was 15.73. The three Utah mines referred to above belong to the United States Fuel Company, Salt Lake City, Utah. Their record for 1925 to 1927 inclusive, on same basis follows:

Records for Three United States Fuel Co. Mines

		No. 1	No. 2	No. 3
Frequency rate	1925	136.463	141.672	136.622
	1926	84.696	130.031	269.985
	1927	77.688	90.789	122.449
Severity rate	1925	81.559	16.894	28.153
	1926	1.671	17.315	123.440
	1927	.784	3.282	35.685
Average Employees	1927	280	249	96

The average frequency rate for 58 metal mines reporting was 63.90 and the severity rate 8.39. This again indicated the greater safety of metal mines. I firmly believe this to be the result of the naturally less hazardous physical conditions of the latter for there is no doubt that greater and more precautionary measures are exercised in coal mining than in metal mining. A comparison of the hazard between coal and metal mines on the basis of production is more difficult to obtain. The following figures were arrived at from such data as available on Utah operations:

Comparison of Coal and Metal Hazards

Year	Metal Mines	Coal Mines
	Frequency rate per 10,000 tons production	
1919	17.2	
1920	18.1	2.3
1921	18.2	2.6
1922	22.0	2.3
1923	24.2	2.3
1924	30.3	2.4
1925	22.5	1.6
1926	19.3	1.4
1927	15.6	1.1

These figures are contradictory to Bureau of Mines' figures, the exposure period of the worker per ton of coal produced being considerably less than per ton of ore produced in Utah. With high flat seams, Utah coal miner averages about 6.65 tons per eight hours; the metal miner approximately 1.3 tons for the same period. This is ratio of at least 5 tons of coal to 1 ton of ore for equal period of exposure. Even after applying this ratio to the preceding figures, frequency of accident per ton production per unit exposure is greater in metal mines. However, the only fair basis of comparison is on the unit exposure regardless of tons produced, which leads to conclusion that coal mines are the more hazardous. In both types of mines the danger of accident increases with increase in number of employees and greater extent of workings. There is no favoritism shown in the preceding comparisons, it being the endeavor of the writer to allow figures to speak for

themselves and also reduce hazards at both coal and metal mines under his supervision.

Utah coal is 40 to 50 per cent volatile matter, low ash, low moisture and in many instances has a high resin content. Mining of same produces a dust, one of the most highly inflammable and explosive known in the United States. Probably one third of the mines in the state have methane. Some contain oil seepage. Arid climate deprives mines of moisture. Seams vary from 6 to 30 feet in thickness, from flat to 10-12 degrees pitch. All in all a combination which, of a necessity, has placed majority of Utah coal mines if not first, well up in the ranks in conscientious endeavor to prevent accidents.

Metal mines of the state are mostly fissures in limestone or replacement of sedimentaries. The latter usually stand well and offer no unusual or extraordinary hazard not encountered elsewhere. The state mining code is a good one and well adhered to by operators. Comparatively the metal operator's task from a safety standpoint is rather less difficult than the coal operator's.

Utah coal mines in general are equipped with hospital facilities within easy reach. Some have a resident doctor at each camp, a first aid room at the pit mouth, and one a central hospital serving four mines.

No open lights are permitted underground, shot firing is done from the surface by independent line from surface to face. No employees are allowed in mine at time of firing and rock dusting is carried on well up to requirement. Rock dust barriers carrying as high as four tons of dust installed at frequent intervals. One mine is now rock dusting back entries. Mines are equipped with tight, solid-end cars. Haulage entries are graded—56 pound steel on main haulage ways. All precautions deemed essential for gaseous mines are taken whether gaseous or not, such as ventilation, rock dust, inert material on haulage ways, concrete overcasts, stoppings and safety record sign boards at pit mouth.

The larger mines maintain safety engineers who make regular inspections and reports, keep accident records, attend to helmet equipment and train rescue crews. Safety measures at some mines cost as high as 3.5 cents per ton production. The operators of these mines feel this to be one of their best investments.

Metal mines in general do not carry safety measures so far, the necessity not being there. They are equipped with hospitals and medical service, have oxygen helmets and trained crews. The use of helmets or hard hats is becoming more general and is decreasing not only severity of head injuries but number of accidents. Use of wire screen goggles of a comfortable pattern is increasing. Blasting powder in red wrappers, due to great visibility, has decreased to a marked extent drilling into missed holes. Strict enforcement of rule that all accidents, no matter how trivial, be reported and treated decreases infection. Containers for drill steel filled on surface not only gets steel to desired point but saves many fingers and bruised heads.

The personal equation of the employee is common to all employers and is more or less successfully handled in many ways. To secure an honest effort against carelessness, the Joplin idea of flags of various values for periods of non-injury is used. The Arizona idea of buttons has worked well. The use of signs at working points where a large number of men pass is good, but upon familiarity with same effect is lost. Welfare and safety associations which stir up and maintain interest do their share.

On the other hand, the employer is entitled to some consideration. The writer is a firm believer in the card system whereby applicant is given a card to the doctor for examination. If this discloses temporary or permanent defects which would incapacitate applicant for work at hand or jeopardize safety of other workers, he should not be employed. The practice of deducting from the payroll accrued premiums on accident policies of employees leads to abuses, especially where com-

pensation laws return high compensation, and should be avoided. Life insurance is entirely different.

The welfare of a mining camp is of paramount importance in matter of safety, although many operators fail to recognize this fact. Given a safe place to work, a decent place to live, schools for his children and some form of diversion for his leisure hours and you have a satisfied employee, who will be permanent. A large labor turn-over is directly responsible for many needless accidents through unfamiliarity with the mine and working conditions. The benefits of a permanent employee and the best class of labor are enjoyed to a greater degree by the coal operator by virtue of the fact that coal mines are longer lived than metal mines, justifying capital expenditure incidental to better camps and accommodations. There is undoubtedly a similarity in safety measures employed successfully in both types of mines, but if there be a common denominator it is constant vigilance, first, last and for all time to even the smallest hazard on part of employer and employee and the teaching of the latter that danger may be seen, recognized and avoided.

ADJOURNMENT

October 4, 1928

C. A. McDOWELL, Chairman
Safety and Personnel Manager, Pittsburgh Coal Company
Pittsburgh, Pa.

The meeting was called to order at nine-forty o'clock by the chairman, Mr. C. A. McDowell.

CHAIRMAN McDOWELL: The first paper we have on the program this morning will be delivered by Mr. E. H. Suender, General Manager, Maderia Hill Co., Frackville, Pa.

Management Believes in Accident Prevention

By E. H. SUENDER
General Manager, Anthracite Mines, Madeira, Hill & Company,
Frackville, Pa.

Judge Gary, Chairman of the Board of the United States Steel Corporation, says accident prevention is not only good morals and good ethics, but also good business. Industry cannot afford to accept this statement as anything but a fact.

Speaking for the Anthracite Industry, with its 158,000 employees, with an annual exposure to accidents of 340,000,000 man hours, and a yearly payroll of over \$300,000,000, and as a Member of a Committee representing the Industry on Accident Prevention and First Aid, I can unhesitatingly say that that management does believe in accident prevention.

Undoubtedly progressive managements and others have similar beliefs, but to believe in an ideal, and to put that belief to work, toward the consummation of the ideal, is quite a different matter.

Executives and managers of industry, and the personnel of their organizations believe in a great many things, but as weak humans, they permit their consciences to direct their activities, for the major portion of time, along channels that are only seemingly more important, although admittedly not so in the opinion of these very executives or managers, than the question of Accident Prevention.

The great majority of the personnel in industrial management believe in the universal necessity for better and better service; better and better quality of product; in the Golden Rule; in the Ten Commandments; in the Constitution of the United States, and in the Eighteenth Amendment, but in all probability, it's only the few who come anywhere near a perfect score in their endeavor to carry out these teachings, rules, laws and regulations.

Now, the point I am trying to make is, that in my observations, limited as they are, I find that while management and their staffs believe in accident prevention, many of them do not have this most important obligation to society, and factor in their production costs, close enough to their hearts and minds to sell it to their superintendents and foremen, much less than to the rank and file of workmen.

I do not concede that the accident prevention effort to conserve human life is being overdone, as some have argued—a fatal accident that could have been prevented by a proper precaution, is a charge that industry can never satisfy or eradicate. A serious accident, leaving the victim maimed, is a living example, in many cases, of the negligence of management. It can well be said that there are no repair parts for the human machine.

Industrial managers are, in a sense, the trustees of their employees, and as such, must be charged with any negligence on their part to conserve life and limb. For years industries, organizations and municipalities have been striving to reduce accident records. For the past fifteen or more years an organized effort to reduce

accidents has been made by many industries—the records confirm the effort. True, it seems in some instances that increased efforts are sometimes met with an increase of accidents—one can only conclude in such cases, that the record, in the absence of effort, would have been all the worse.

Society has erred and is erring today, in failing to educate the child, first in the simple safe practice of play, and finally through all the grades and colleges, constantly impressing upon him his own safety, as well as the obligation he owes to his fellowmen and industry, to do everything within his power to reduce to a minimum the toll that management and workmen are today, through neglect, imposing upon society, industry and the dependents of the gainfully employed. Service clubs in this country, and through the world are doing a splendid piece of work in an effort to improve service to humanity; further the interests of communities, sponsor the commendable movements for the good of all; they might well place more stress on this most important subject of reducing accidents.

In the matter of importance, accident prevention ranks well with ideals sought in the advancement of understanding, good will and International peace, that the Nations of the world are striving for.

The Annual Accident Toll

It is estimated that there occurs in the United States, about 85,000 fatal accidents annually, with a total of all accidents probably equalling 2,500,000 to 3,000,000, with a wage loss in excess of \$1,000,000,000, or about 3 per cent on the \$40,000,000,000 payroll in United States. Of the total fatalities from accidents in the United States, approximately 23,000 are street and highway accidents, 20,000 home accidents, 20,000 drownings, fires, fire arms, falls, electricity—the balance, or 22,000 is charged to industry. The cost to industry alone is estimated at \$5,000 for each fatality. Automobiles cause 25 deaths per 100,000 population in the United States, and this curve seems to be constantly increasing. Twenty-seven per cent of all accident fatalities in United States are motor vehicle accidents. Fifteen thousand lives are lost annually by burning accidents in the United States. Considering the task performed by industry, i.e. its tremendous productivity, it would seem, in a comparative way, that industrial managements are not only making progress, but have established a pretty good record, and yet, only a start has been made—the possibility of further improvements is tremendous. Over 250,000 eye injuries occur in the United States annually, and approximately 15,000 workmen lose their eyesight. It is estimated that 75 per cent of all accidents are preventable. Here is surely a field for real opportunity for management to create and maintain a safety atmosphere.

Forty per cent of all manufacturing in the United States employ from one to five wage earners; 28 per cent between six and 27 wage earners. These two groups employ 825,000 workers.

Low accident records go hand in hand with progressive organizations, efficiency in operation and increased productivity in the greater percentage of cases. The problem that confronts us is to persuade the tremendous number of small business establishments to take a proper interest in this important work. The merging of existing businesses, of similar kinds into larger corporations, with progressive leadership, therefore helps to lessen accidents. Since industries are being merged in part to effect economies, it is apparent that as competition increases and margins decrease, there is all the more necessity to effect mergers, and there is every indication that the next ten years will be a period of consolidations and mergers of industries that will far surpass any similar period heretofore on record. Of the first 1,000 industries listed in Poors Manual, 200 represent consolidations.

Industrial accidents are probably increasing in number, although lack of data makes it impossible to say whether accidents are increasing on the basis of expo-

sure, certainly they are decreasing on the basis of productivity. Increase of accidents and periods of increased industrial activities go hand in hand. The trend seems to point to greater production per man employed, less accidents per unit of production, but more accidents per man employed.

The principal factors that contribute so much to our long list of accidents may be summarized as follows:

- (1) Physical hazards.
- (2) Ignorance of employees in the detail of their work. This is especially true of new or unskilled workers.
- (3) The strain of worry, due to finances, sickness, strife or other family difficulties.
- (4) Ill health of employees.
- (5) Failure to properly warn or instruct the foreign language employee.
- (6) Gross carelessness of shiftless workers.
- (7) Fatigue among employees.
- (8) Employees taking chances.

It's a slipshod, haphazard industry or management that is making no effort to reduce accidents in any of these directions. Such are rendering service to neither customer, society or investor. That they can operate at a profit at all is to be regretted. It is encouraging to note that an ever increasing list of industries, organizations and associations, under wise leaderships, are appropriating large sums of money, and through management are insisting that correctives be applied to each and every factor that tends to conserve life and limb. It is estimated that compensation laws plus organized effort is saving the lives of at least eight persons per 100,000 population, or somewhere between 9,000 and 10,000 persons per year.

Among the progressive industries and managements, physical hazards either have been or are being removed. The exhibit on the roof garden of the Pennsylvania Hotel tells only part of the story. There we have translated into practice the thoughts, study and experience of an army of engineers, practical operating men and wise leadership in industry.

That many accidents occur because employees are ignorant of the ordinary hazards or details of employment, and because they are not properly warned, or instructed, particularly when they are first employed at new work, in unquestionable, and is proven by analysis, in numerous cases. Management is responsible.

That family strife, finances, sickness or other distracting difficulties has contributed its toll in accidents is uncontrovertible. Management can and should interest themselves in such matters, relieve the workmen of the strain, if possible, in order that he may give his proper attention to the detailed performance of his work.

It is argued by some authorities that ill health rather than carelessness is responsible for most of our accidents. I cannot join in that belief, but there isn't any question that the health of the individual is a real factor. Any good accomplished by industry or society, to raise the standard of health is therefore helpful. Industry, municipalities, state and federal government, and the great insurance companies, have done a splendid piece of work in this direction. The Metropolitan Life Insurance Company alone has accomplished remarkable results in its welfare department toward the prevention of diseases and the prolongation of life. The statistics of this company show a reduction of from 13 to 9 days lost per person, due to illness in the year 1909, as compared with 1927. It is estimated that 350,000,000 man-days are lost annually in the United States, due to illness, and that of the 500,000 persons who die each year in the United States, 50 per cent die from postponable deaths. Remembering that there are 42,000,000 persons gainfully employed, we can visualize the cost item to industry. Here is a vast field for work, and many industries and others have recognized it, and are busy combating it.

Accidents among the Non-English speaking classes are in excess of those in

similar occupations in other groups in the same industry. Certainly management cannot offer as an excuse that Non-English speaking employees cannot be properly warned or instructed, for that reason. There is a way to do it—no one knows better than management how to do it—and where the facts reveal that accidents are increased on that account, management must shoulder the responsibility.

That gross carelessness of shiftless workers is one of the real problems from an accident standpoint, is undoubtedly true. There are those who cannot be educated, instructed or warned. Discipline, and discipline only, will correct such carelessness. I know of no better way than to dispense with the services of such workmen. The worker who finds it difficult to secure employment, because of his careless habits, will probably be educated in time.

No foreman has the right to expect from an employee more than a fair day's work. It is gratifying to know that workmen are not being driven today, as might have been the case many years ago. No man should be forced to do a day's work which brings about fatigue to the point where he is more apt to be injured. It is just as sinful to expect a man to do more than a fair day's work, as it is to permit him to do less than a fair day's work. Horse sense on the part of any boss will correct the problem.

To my mind the hardest problem that confronts the foreman is to eliminate the taking of chances, and the gambling against injury while doing so. Here is where we find unusual accidents, the unlooked for occurrences.

Many people are by human nature venturesome, they take the shortest possible routes in the performance of a task. Note the speeding automobile on hill tops and curves, the flying switch on railroads and in mines, the miner in his desire to get his maximum tonnage, or yardage, for a given effort, the short cut fuse in firing shots, the miner's early return to the face of a mis-fire; the big game hunter in the wilds of Africa; the racing automobilist; the aviator in his plane flying through unknown conditions. The question is "How to combat it." Education, warning, instructions, discipline, acquiring the good will of employees, the foreman keeping everlastingly at it is the answer.

Accident records are best, all other things being equal, where the maximum of good will exists between the foreman and his men—and foremen must remember that the only way to purchase or acquire good will, is to give it away. A task can be done in one of two ways—safe or unsafe. The objective to be striven for by industry, is the performance of a job in a safe way, placing productivity secondly, rather than the converse.

Coming down to our individual problems in mining and preparing Anthracite; we do claim that accident prevention and safety practices were effective in the industry in an organized way probably as long as any other industry in the country. The hazards of the business necessitated this activity for many many years. The mines are regulated by State Mine Laws and are under the supervision of State Mine Inspectors—further improvements might well be made by coordination of State Mining Laws, establishing reasonable rules and regulations that can mutually be agreed upon between State authorities and progressive mining managements. Notwithstanding this State supervision and regulation, the record of fatal accidents per man employed, or per million tons produced, or per exposure of man hours is not altogether a cheery one, although progress is being constantly made in the face of the ever increasing hazard that the business of mining is confronted with. Because of the hazard, the industry with its 158,000 employees, must be prepared to meet every emergency, and is therefore equipped with emergency hospitals, mine rescue apparatus and first aid and mine rescue teams, until today the industry knows that trained men are immediately available in the event of accidents occurring on either the day or night shifts.

A recent survey, concerning the preparedness for emergency, discloses the fact that a large number of men are trained in mine rescue and first aid work. To

Mr. W. J. Richards, formerly President of the P. & R. C. & I. Company, belongs the credit for having started the First Aid movement in the Anthracite field in an organized way, as early as 1901. While all this has nothing to do with accident prevention, it has the effect, however, of impressing upon the rank and file the necessity to increase the maximum care on account of the hazards involved.

Mining, from an accident standpoint, is quite different from that of many manufacturing industries, and just as it is true that the unit cost in mining is constantly increasing with fixed labor and material unit costs, so the accident hazard for a fixed productivity and exposure of man hours is constantly increasing. It therefore follows, that just as the industry must expend large sums of money in improvements to maintain a somewhat uniform cost of the production unit, whereas in many other industries such expenditures bring about a lower cost of the production unit—so is it also necessary, that in order to prevent an increasing list of fatalities, and serious accidents per production unit, or exposure, increased efforts must be made to not only correct physical hazards, but every avenue that indicates a lessening of accidents must be traveled. This is one of the reasons why the business of coal mining has not made the maximum reduction in accidents that is found in some manufacturing establishments.

In the year 1926 the Anthracite Industry had 5.33 fatalities per million tons of production, as compared with 6.47 fatalities in 1925. In 1870 the rate was 13.47 fatalities per 1,000,000 tons produced. Anthracite in five year periods, 1870 to date, shows moderate continuous reductions from 13.47 to 5.80 fatalities per million tons, or from eight fatalities per one thousand 300 day employees, to 3.71 in 1926.

The encouraging factor is the substantial reduction made in the last 20 years. It was during this period that a tremendous construction program was carried on throughout the field, mechanization of hand operated jobs, introduction of electric haulage, undercutting, mechanical loading, complete electrification of collieries, the building of new modern preparation plants and the rebuilding of many more. All of this certainly added to the toll of accidents.

The United States Steel Corporation spends over \$1,000,000 annually for accident prevention work, and estimates the saving at 15 times that figure. In 20 years the United States Steel decreased its number of fatal accidents 61 per cent; many other corporations have similar enviable records—reduction ranging from 25 per cent to 75 per cent in fatalities alone, over a period of from 10 to 20 years.

One of the serious handicaps confronting a manager in an accident prevention program is the need of funds to correct an existing hazard. We will probably all concur in the belief that the progressive management of a profitable industry has a greater opportunity to put a program of accident prevention over than has the progressive management of an unprofitable industry, all other things being equal. It should not be so, but I am talking about the practical situation that the managers of industry are confronted with. Take the business of coal mining the world over, from a market standpoint, it is in trouble, and that means, of course, that except in spots it is being operated at too narrow a margin of profit, or without profit, or at a loss, and under such conditions management is certainly handicapped, in every direction, not excluding accident prevention work.

It can't be said that coal mining management, on the average, is less efficient than the management of other industries. It certainly can't be disproved that the highest type of management found in the coal mining business compares favorably with the highest type of management found in other industries. I mention this point because I believe that it is a factor in accident records, in coal and any other industry where such conditions prevail. I think, in the end, this problem will be solved—its solution is now under way.

We are living in a most competitive age. The severest of competition confronts most industries. Profits per unit of production are being reduced—the proportion of accident expense that investors bear is therefore being constantly increased.

Speed seems to be the order of today. Time saving seems to be a factor with all, but in spite of speed, in production, travel on ocean liner, railroads, automobiles or in the air, accident records as a whole, considering the work done, show constant improvements. Thanks to the organized efforts of progressive industrial managements, and the splendid efforts of the National Safety Council, who have been engaged in educating the public and the more derelict industrial managements, to assume their obligations to those whose capital is employed, and to their fellow-men, as well as to themselves.

Upon management devolves the responsibility to build the Safety Conscience among department heads, superintendents, foremen and bosses, who in turn will create the safety atmosphere in our mines and workshops. In the absence of this safety atmosphere we cannot hope to import the safety habit, so essential in the reduction of accidents, to our army of workers.

Any foreman, any boss, who at the finish of a day's work, cannot say that he personally corrected at least a few unsafe practices, that come to his attention during the day, or that he has done some act during the day in the interest of accident prevention, surely does not have the matter close enough to his heart, and isn't worthy of his hire.

The fact that the accident prevention movement is rolling on like an avalanche, gathering speed and volume in its journey, is sufficient evidence to show its worth to executives and managers of industries, small as well as large. The time has long since passed when anyone can doubt the possibility of controlling accidents, the record of industries engaged in this commendable work is the answer after all. Control of accidents is a challenge to management. It is solvable, and the managers that have solved the many seemingly impossible problems in industry are today engaged in working out this problem, and making splendid headway.

Our difficulty is not with the great majority of workers, but rather with the minority. I have the greatest confidence in the loyalty and integrity of the majority upon whom we can always depend for cooperation in such important work.

Looking at the task in a broad way, I think industry can conclude that they are making progress. It is difficult to note the progress from year to year, especially under the existing conditions, which are revolutionizing our industries.

Visualize this problem—in the last ten years, over 33 per cent increase of horsepower per person employed has been installed in United States. The growing new industries, require the training of millions of men in the performance of new tasks, the high speed of productivity, the high speed of travel everywhere, the movement of 1,000,000 cars of revenue freight per week on American railways, the generating and sale of 80,000,000,000 K.W.H. of energy annually, the production and operation of over 21,000,000 automobiles and trucks, the construction work, installation and maintenance of over 18,000,000 telephones, the raising and marketing of over 5,000,000,000 bushels of grain annually, the daily production of over 2,000,000 barrels of crude oil, the annual production of 35,000,000,000 feet of lumber, the tremendous building construction program, averaging over \$6,000,000,000 annually for the past three years, the annual production of over 600,000,000 tons of coal, and this represents but a part of labor's effort. Are we making progress? The answer is in the affirmative. One need but only compare the records of today with the records of many years back in any industry, anywhere.

May I cite a very interesting record, concerning accidents on the one hand on railroads 85 years ago, at about the beginning of railroad travel, as compared with travel in the air today by aeroplane. "According to the most recent announcement (1927), Imperial Airways in England carried 52,000 passengers over 2,500,000 miles without injury to a single passenger." In the London Times of June 14, 1842, we find this "In 1841 the number of passengers carried on the eight railway lines, numbered 10,508, the distance 3,562,338 miles yearly. In this time only 56 passengers were injured, of whom 22 were killed. Remembering that 85 years ago a speed of

30 miles an hour was considered dangerous, excessive, and greater speeds were unthought of, while today passenger trains are exceeding 60 miles an hour, automobiles are frequently operated at and over that rate, and have exceeded 200 miles an hour in races, aeroplanes, with cruising speeds of 65 miles an hour, in recent years have increased these speeds to 90 and then 180 miles an hour, and in races have exceeded 300 miles an hour.

Of course, management believes in accident prevention, and the records show it. The task is but started—the problem concerns all of us, and each must do his part. May I leave with you the words of Kipling: "It's not the ammunition nor the guns, but the everlasting team work of every bloomin' soul."

CHAIRMAN McDOWELL: I think that is an especially good paper for discussion. There are no doubt many in this room that can bring out particular points of interest for all of us. I am going to ask Mr. Leland of the Montezuma Copper Co. if he will start this discussion.

E. LELAND (Montezuma Copper Co., Nacozari, Son., Mex.): The employment of foreign labor is one point. Of course, with us, all our workmen are Spanish speaking. When we first started our safety campaign, we found that we had lots of foreigners, but they apparently knew enough Spanish to get by. When we came to put over a safety campaign we found they did not know enough Spanish to get by. In other words, we had to tell the story of safety to our men through our bosses in their language or in language they could understand, and in putting over safety we have simply followed out the principles that have been brought out in all of these talks, including safety from the management to the man.

Through our committees, we found all the members would be enthusiastic, but it wasn't taken to the man, so we had to carry the thing specifically to the man by impressing upon the bosses the necessity of having talks with men on the job. We started out calling contractors together on each level and explained to them the necessity of carrying out the safety idea to their men.

We followed that up with the safety talks in the stations, group talks, and finally the last thing has been to have examinations on safety rules. This started about a year ago. At the present time every employee of the company has successfully passed examination on safety rules. Approximately everyone, I should say. The first of October the rules went into effect that men accepting employment with us within a reasonable length of time (which we have set at 60 days), successfully pass examination on safety rules or they will not be retained in the employment of the company.

F. H. AMRAN (New York City): I happen to be in an insurance organization which is interested in the maintenance of accident prevention work, particularly in metal mines throughout the Middle West. I would like to ask if Mr. Leland's organization has a book of rules mentioning the fact that all workmen have to comply with the rules within a certain period and unless they do they are no longer maintained in the service?

MR. LELAND: Yes, we have a book of rules covering it. We call it "Operating Safety Rules." We base this examination on that section of the Rule Book pertaining to the class of work the man is employed in.

MR. AMRAN: Are those rules printed in English?

MR. LELAND: All in Spanish.

DANIEL HARRINGTON (United States Bureau of Mines, Washington, D. C.): Don't you have copies in English?

MR. LELAND: We have copies for the American speaking people.

MR. SUENDER: Are your efforts directed in the English language or in the particular language of that miner whom you want to reach?

MR. LELAND: Principally in the English language. In some rare cases in a foreign language. We have twice as large a population of foreign speaking

people, but a large percentage of them are Americanized sufficiently to understand the average talk of the mines.

CHAIRMAN McDOWELL: The subject of this paper is "The Management Believes in Accident Prevention." I am going to ask Mr. Adams if in the study of statistics brought to his attention whether it is his opinion that the management believes in accident prevention.

W. W. ADAMS (United States Bureau of Mines, Washington, D. C.): Management does believe in accident prevention. I think if it didn't we would not have any progress in safety work. I was interested in what Mr. Suender had to say regarding the interest of management in safety work and a part of his paper has records which indicated that the foreign speaking man had an accident rate no worse than the English in the same occupation. I am inclined to agree with that. I have not been able to find records along that point, however. I would like to ask where they can be obtained?

MR. SUENDER: I don't think I said just that. I said, "Accidents among the non-English speaking classes are in excess of those in similar occupations in other groups in the same industry. Certainly management cannot offer as an excuse that non-English speaking employees cannot be properly warned or instructed, for that reason." That's a general statement made about it. I think I could find the authority for the statement and we find a little of it in our mines.

H. D. MCGINNIES (Du Pont Co., Wilmington, Del.): I am very much interested in the foreign side of it. I am interested in the fact that our company takes an interest in the family side of it. I attend quite a lot of safety meetings throughout the country, and at those meetings I have to address them in their dialects. The sufferer, after all, in any accident is not the man himself as much as the family. I put it over at these meetings that they should talk safety at home and they should make the men promise on leaving home that they would do all possible to return to them just in as good shape as they left. I had one foreign fellow come up to me after a meeting and he said, "You know you make trouble for me last night?" "Why, what's the matter?" "I go home, the woman she give me hell. I have children. She say, 'Andy, anything happens to you, nobody wants to marry me with eight children.' She give me hell. She say, 'I go out work washing. Boss tell you something to do, you do. I don't know. Too much job for me raise this eight children.'"

That was the effect it had on this foreign born fellow and his family. I think management should take an interest in the family side of it.

GEORGE MARTINSON (Pickands, Mather & Co., Hibbing, Minn.): If the membership of the Mining Section of the National Safety Council is an indication of the interest of management in accident prevention, I think it should be answered in the negative. We have 246 members of the Mining Section in the entire country and there are many other mining organizations over the country. People are certainly interested here but there is a vast field which hasn't been touched.

CHAIRMAN McDOWELL: There's a whole lot of truth in that statement. Naturally, we would like to see as many as possible attend those meetings.

Is Mr. Cameron in the room? Maybe you can give us a few moments.

A. P. CAMERON (Westmoreland Coal Co., Irwin, Pa.): "Does the management believe in accident prevention?" That's the question, isn't it? I think that is really a silly question, on first thought. I think that the management that does not believe in accident prevention is not a coal management concern. That is our first duty, all the time, morning, noon and night. We try to stress that before any part of our organization. At our meetings, at our foremen's meetings, monthly, weekly and at the mines—that is the individual mines, monthly meetings—we talk it. We have the general meeting of our foremen, and accidents and how to prevent accidents is always our subject for discussion.

We have possibly a little different system of putting questions at our general

meetings. The boss of each mine is sent to some other mine and makes a careful analysis of all the defects he can find in the other fellow's mine. He's got to be careful because the other fellow will be back of him next month. The point is that we get the viewpoint of the other fellow. It raises a good deal of discussion in our meetings as to what one fellow thinks about accident prevention as against another.

Then we get a broad view of our mines in general. Of ten or fifteen mines we discuss one mine each month.

R. N. HOSLER (Coal Mine Section, P. C. R. & I., Harrisburg, Pa.): I don't think we could find a mining company in the United States whose management does not believe in accident prevention, but one of the shortcomings of human nature is that we don't always practice that which we believe, and I think Mr. Suender hit the nail on the head. I wish that more managers of mines might be here and with that stroke drive the nail clear to its seat. He said the one important single thing is that management must convey their belief in accident prevention down to their organization and unless they do that it will be of no avail. They simply have to put their beliefs into practice.

Mr. Adams and I spent a couple of hours yesterday afternoon together and we were looking at some figures; I'll give you just a little picture. We are so apt, I think, at times to not consider the seriousness of accidents. I think we had a record in these particular figures something like more than 50,000 non-compensation accidents under the Workmen's Compensation Act in Pennsylvania, for the bituminous mines only. From these figures as a basis, we deduced that the bituminous industry in Pennsylvania has an army of 500 men who were injured not sufficiently to be compensated under the Workmen's Compensation Act. Now picture to yourself what any one of your managers or you men could do with 500 men for a year and you will get some idea of the magnitude of this waste; and this one thought must be accompanied with the statement that every one of these accidents is a potential death.

A. H. TRESTRAIL (Pickands, Mather & Co., Caspian, Mich.): I would like to ask the gentleman that read the paper where the dividing line is between the management and the rest of the organization; or who, to the employee, is the manager?

MR. SUENDER: To my mind, the management makes contact with the employee, as a foreman, the assistant foreman or the boss. You can't blame him for not putting in the accident prevention program if somebody doesn't put it over for him. Just as I said, it is up to the management to build the accident prevention program in the minds of the foremen, the superintendents and department heads so they can create the atmosphere in the minds of the workmen. When the atmosphere is created the work is done.

I was interested in Mr. McGinnies' statement. I believe that one of the places where we do fall down is the failure on the part of the foreman to make a personal contact with the employee to the point where he takes an interest in that employee's family.

I had expected somebody was going to ask me that question or "How can that be done?" Well, it can be done at least on the part of the foreman to the point where he knows his man by name, where he knows something about his family, where he can inquire about the health of the family or the child that is in the hospital or the sick wife, and if the management can't do anything more than that they have done a lot there. We have worked out an experiment in one of our mines where there are some 1,200 employees; where we have a welfare worker, so called; where we have a nurse; where we take care of the child, see that the parents are properly instructed how to feed it; where the child before it is born and the child's mother are being looked after, the child being picked up through the kindergarten school; and finally into the girl and boy scout movements where we are endeavoring to interest men and boys in club work; where we sponsor

baseball, football, basketball; where we can say there is not a child in the community who should have its tonsils removed that hasn't had them removed; and where we can say the children have been taken care of so that diphtheria doesn't get into the mining village, and properly looking after it. I believe with Mr. McGinnies that is a big factor and that less attention is paid by all of us to it.

C. L. WILSON (Berwin-White Coal Mining Co., Philadelphia, Pa.): How much colored labor do you have?

MR. SUENDER: The percentage of colored labor in the anthracite is negligible, although there is a stray one here and there. Prior to the big slump in the bituminous field there were no colored people in the anthracite field. I don't suppose there is 1/10 of 1 per cent if there is that.

CHAIRMAN McDOWELL: I am going to deviate from my prearranged plan. You brought up the subject of the colored workman. I don't mind saying that when we mention the colored workman there is sometimes a smile as to the proficiency and efficiency of his work. About 28 per cent of our employees are colored. In my study for the last year, taking his work with the work of the white man, and this study is from month to month, it has proven to me conclusively from all angles that we do not have as many colored men injured in our mines as we do whites, regardless of all figures or any figuring we might do. It gives you a slant on the colored population especially in the Pittsburgh district.

As for welfare work, recently I employed a colored welfare worker for our colored people. He is doing a wonderful job. We went out and got a first-class man—a man that has had three years in Pitt, a man who has had five years in the largest colored Community House in Pittsburgh. The only thing I can say is that he is doing a wonderful piece of work. I think this is an especially worthwhile subject for discussion. I would like to have a few more questions asked about it, and I am particularly interested in the thought brought out by Mr. McGinnies. I do not think the management spends time enough with the family. We have men in this room who stressed that particular point very conclusively in their work. I am going to ask Mr. Berry for a few minutes to tell us something about the work he is doing.

J. V. BERRY (Bethlehem Mines Corp., Johnstown, Pa.): The work we have been doing in the last few years is through the general safety meetings. Last year we had 27 at different mining communities. After all, we have them open to the school children in the community. School is dismissed for that part of the program. In the evening we keep the school children out. It is open to all the men and women, the hall not being large enough to house them all. Last year we had 37,000 who attended twenty-seven meetings. The meetings averaged from 500 to the afternoon to as high as 700 in the evening. We find that this is a great way of putting over a safety movement in the home, through the men at the mines, through the children at the school, and through the women.

The other day we were asked whether we would have them this winter. The men were very much in favor of it.

We don't confine the meetings to safety. However, one of the main features is to have a good talk on safety. The men themselves put over the amusement. We have a sort of vaudeville and also a motion picture. The vaudeville entertainment is all home talent, taken from the men at the mines and the children at school. The teachers make up the entire entertainment.

We hold them on Washington's Birthday and on different days, while we put that on as a safety feature.

Another thing that we have been doing is to have teachers cooperate with us in having the children make up safety posters. It is surprising to see the things they will pick up around the mining camps and notice a hazard about the mine.

Another feature, through cooperation of the teachers, is the writing of an essay on some section of the Mining Laws and Rules which we have posted in and

about the mine. In doing that, of course, we didn't tell them anything about it, but they go around the mine, look at the bulletin boards and see what to write about. It is surprising to see how many did that in writing their essay of their different groups: We think that it is a good thing, and we have been doing that for the past three years. We expect to continue this winter.

That, however, is only one point of our safety work. We have, in addition to that, a committee called "Safety Committee No. 1," which investigates all lost time accidents. In addition to this committee, which is composed of a miner, a day man, a safety engineer, or the division mine inspector, which makes up part of that committee, there must be a report made—a detailed report of every phase of each accident—so that responsibility can be laid where it belongs. They have found that our foremen, superintendents, are all very much in favor of it and they cooperate very well with our committee. We feel that it has been the means of helping to reduce accidents.

CHAIRMAN McDOWELL: We have been favored by Miss A. R. Coombs. I would like to have Miss Coombs say a few words to us.

MISS A. R. COOMBS: There isn't anything I can say except to reiterate the interest of our organization in your safety work and to pledge ourselves to your work. I am sure you are more interested in hearing from the operators or operating men who are really doing the work, than anything that I might say.

SIDNEY HALL (New Jersey Zinc Co., Franklin, N. J.): The personal touch with the man is important. We have been in safety work for a good many years and we have gotten some results. We have tried various ways in safety meetings, so we find the personal touch of the foreman and the management with the men is doing more and has been doing more than anything else we have done. We put it up to the men themselves. The company does not believe in compulsion. We use hard-boiled hats, goggles, safety shoes, first-aid training and we make the first-aid men the permanent safety committee. That is, we really put it up to the men themselves. We find that that does more than anything else to help us in our safety work.

MR. WILSON: In connection with this personal touch, I would like to add the colored situation. We take a picture of the colored family, have a slide made of it, place it in the hands of moving picture operator every night we have a show at the movies. If he is a safe worker, we state so. If he is not a safe worker, we also tell the community this man has been found doing a certain thing. A little inscription left at the bottom says just what happened. In many cases we found the wives took a great interest in coming out to see their pictures. That creates a lot of interest around that mining community.

MR. SUENDER: I think that is effective work. I believe advertising pays. That kind of advertising can't be put over everywhere, but if it could I think we would make more progress.

MR. AMRAN: I referred just a little while ago to the mines of the National Lead Co. The record as to what has been accomplished and the reasons and causes were fully described in the *National Safety News* in the April number. I presume a number of the gentlemen present in this meeting saw that article. I think, without going into detail, accomplishment in their mine was due mainly to the fact that the management (by saying management, I mean from the president of the company down to the foreman) everyone is interested in the subject of safety and I think our safety committee meetings down there, which are held semi-monthly for each one of the various shifts, has accomplished possibly great results in this no-accident work.

Of course, we also have a very elaborate educational system. For instance, from our office we send a man twice a year, to stay at the mines about a week or ten days, and he does not only make his suggestions to the miners, but also he lectures in the various public schools in this region because the management very

wisely thinks that eventually all children will have to go in the mines themselves.

CHAIRMAN McDOWELL: I find it necessary to close this discussion.

We shall pass on to the next paper. Mr. Dan Harrington, our secretary.

Fires in Metal Mines—Causes, Prevention, and Methods of Handling

By DANIEL HARRINGTON

Chief Engineer, Safety Division, U. S. Bureau of Mines, Washington, D. C.

Before going into the subject, I think it would be advisable to give you at least some sort of idea why I, supposed to be a coal mining engineer, should try to talk about metal mine fires and probably make some drastic statements to you metal mining men. The reason is that for about eight years while I was in the Bureau of Mines field service, much of my time—in fact, most of it—was devoted to a study of metal mine ventilation.

In that study of metal mine ventilation I had a chance to go into metal mines in 24 or 25 states. In several cases I was present at or after the most destructive metal mine fires in loss of life in the history of the United States. I am going to list a few of them.

The first one was the Pennsylvania mine fire in Butte, Montana, in 1916, with 21 lives lost.

That was followed in the same year with the Yellow Jacket at Gold Hill, Nevada, where there were five lives lost.

In the next year, 1917, there was the North Butte fire in Butte, 163 lives lost, and in this I had a rather odd experience for several months before that fire. Dr. Lanza of the United States Public Health Service and I had been making a detailed study of that particular property and we knew it from A to Z. In fact, I think I was probably more familiar with that particular property than with almost any other mine I have ever been in in the United States, except some in which I had charge of operation.

I was present at the recovery work at the Argonaut fire in California in 1922, in which 47 lives were lost, and this year I went up to Northern Canada to the Hollinger fire in the Porcupine gold mining district where there were 39 lives lost. That is just a list of the mine fires in which, in each instance, several lives were lost.

In addition to that I have had a chance to be present at, and make reports on, metal mine fires in which there were no lives lost, in Arizona, Idaho, Wyoming, Colorado, Minnesota, and Michigan. So much for qualifying.

A few years ago, the Bureau of Mines issued a publication, in which I participated as co-author, giving some figures as to metal mine fires and giving some facts concerning the figures and fires. It developed that out of 114 fires of which we had fairly definite information before 1922 about 7 per cent of those fires or eight of them was caused by electricity. There were 191 fatalities from these eight fires out of a total of 533 for the 114 fires. A recent report by a Bureau of Mines engineer as to fires which have taken place in recent years—the previously mentioned tabulation and report being on fires before 1922—shows that of a list of 55 fires from 1917 to 1922, 12 were from open lights or flames, 6 from smoking, 22 from electricity, 2 from an open acetylene torch, 4 from friction and 9 from unknown causes.

Going back to the electrical hazard which I am going to stress throughout this paper, the figures before given for a long series of years before 1922 as to metal mine fires show that about 7 or 8 per cent were due to electricity. Figures for

the latter period from 1917 to 1928 show that 40 per cent were from electricity. That is something which I wish to call to your definite attention, you metal mining men. If I were going to speak on coal mining, I could bring the same cause to your attention as to coal mining because the same thing is applicable, although a large number of coal mining people deny it. The facts however are there.

Now as to causes: In the early years of metal mining up to about 1914 or 1915, the prime cause of metal mine fires was the candle. The miner would be given three or four candles to take underground to light his working place during a shift. As the candle would burn down to about an inch or an inch and a half in length, he would take another candle from his pocket, light the second candle, and throw aside the first one, very seldom taking any precaution toward extinguishing the flame. There were hundreds, literally hundreds of metal mine fires, caused by these discarded candles. Later on, the candle was superseded by the open acetylene light or carbide light. As we know, the carbide light was an enormous improvement over the candle, but the carbide light itself is by no means a safe light for either coal or metal mines.

As to instances in which the open light has been at fault, the North Butte fire with its 163 lives lost was caused by ignition of electrical cable which had not as yet been used for electricity. It was being taken into the mine and was wrecked in the shaft and the wrecked frayed insulation of it was set afire by an open acetylene lamp in the hands of an assistant foreman when he was trying to remove the wrecked cable from the shaft. The resulting fire and poisonous fumes spread down into the mine because it was a downcast shaft. When the fire got a good start, it converted the shaft from downcast to upcast and did it in short order, notwithstanding the fact the fan was working. They had a very efficient ventilation system also. Of about some 400 workers, 163 of them were trapped and killed. Only two of them, however—I want to stress this point also—only two of them—came in contact at all with flame. The rest of them were killed by fumes.

At the Hollinger fire in Canada, there have been a number of misconceptions in mining circles concerning the affair. It was caused, in my opinion, by an open light. Possibly the open light may have been a match from a smoker; more probably, it was due to a very reprehensible habit which persists in metal mines that in order to obtain information as to what may be the condition in a winze or a stope which is below or any open working below, the metal miner frequently lights a piece of paper and throws it into the opening, whatever it may be. To my mind, that is what occurred at Hollinger. It was either the throwing of a lighted piece of paper into the stope below or the throwing of a smoker's match; possibly it was the ignition of paper from explosives wrappings which were being dumped in the chute coming in contact with a carbide light of a worker.

There is another possibility as to Hollinger which should not be entirely ignored, and that is that the trolley locomotive system did not bond the rails and there is no question there were some very drastic electrical arcs at the rail sections when the trolley locomotives were being used and they were being used past the point at which this particular fire occurred.

Another point is the fact that there was a minimum amount of material burned. The total amount of material that burned in the Hollinger fire, to my mind, could be easily contained in this room. It probably could be contained in one-fifth of this room. Nevertheless, it resulted in the death of 39 men.

Here I am going to digress and call attention to an almost universal failing of metal mining men. We of the Bureau of Mines have made studies of metal mine ventilation in practically every district in the United States. In going into the mines, we call attention to what in our minds are fire hazards, and I have had metal mining men after metal mining men tell me I had wheels in my head because I called attention to the hazard of underground timbered shacks, of timber

bark, or timber piles, or piles of old timber which were being thrown aside, of manure, or of dumping explosives wrappings in abandoned raises or of dozens of similar hazards. They say, "We have been doing that for 10, 20, or 30 years and we have never had a fire." Gentlemen, that is what happened at Hollinger. It was a wet mine as mines go and any one who would tell those people there was a possibility of a fire would be laughed at. The facts are that there is hardly a metal mine in the United States that does not have a fire hazard. Why? What burns in a metal mine fire? Generally timber. How many of your mines do not have timber? The other things that burn in metal mine fires are oil and electrical insulation, explosives, etc.

Another thing which people do not realize is the hazard of the insulation on electrical wires which burns and which can transmit fire hundreds of feet, sometimes thousands of feet, yet it is practically neglected as a cause of possible fire or transmission of fire.

Then there is the matter of hay, manure, trash of various descriptions. Some mines have a fire hazard from carbonaceous shales or slate, which is particularly true in some of the regions up in Lake Superior. I think some gentlemen here can bear me out on that.

There is also the question of explosives—storage of explosives, the handling of explosives boxes, the handling of wrappers from explosives, of the sawdust in which the explosive is packed; this is a very fruitful cause of fire.

As a matter of fact, there was a fire in a metal mine not long ago in an explosive magazine which bade fair to be destructive. Fortunately the explosives burned and did not explode. There again I understand was an ignition from an open light or from a smoker.

Now as to smoking, generally speaking when a person goes in a mine and calls attention to the hazard of smoking, he is again pronounced a crank. "That's all bunk. There isn't any hazard. That has been done for five years or twenty years or thirty or forty years," and probably it is true. Nevertheless, there is not one year that goes by in the United States that there are not a half dozen to a dozen or more fires in metal mines caused by smoking. Gentlemen, the answer is up to you. If you are going to allow smoking in your mines, you are going to have fires. If you can not handle the hazard, you are going to handle fires. Generally speaking, when you put it up to the metal mining men that there should not be any smoking in the mine, they say it can't be done. That in my opinion is pure bunk. If you have the will to stop it, it can be stopped.

I have given you some things which can burn in a metal mine. I can not call attention to all of the things. Very few here do not have some of those things. It does not matter whether it is a wet or a dry mine, whether silver, copper, gold or whatever kind of material is mined, there are few, if any, mines, coal or metal, which do not have a fire hazard.

Another fallacy very prevalent among metal mining men about fires is that the only metal mine fires are in sulphide ore mines; because in silver, gold, and other mines, the metal generally is carried in quartz, which is non-combustible, it is figured that a fire is impossible. Of course, the quartz is non-combustible, but that is not true of much of the material you bring into the mine such as timber, explosives, hay, oil, insulated electric wires, etc., etc.

Going back to the causes again; open lights in the past have taken their toll. They are going to take their toll as long as used in mines. I indicated at the beginning that at the present time the hazard is becoming more and more due to electricity. What form of hazard is there in connection with electricity? A confidential memorandum was made out sometime ago and sent to the members of the Safety Division of the Bureau of Mines concerning fires, recent fires, which had occurred and giving their causes. This was not published because of the fact

that we secured some of the data confidentially and if it were published giving names, places and dates, we would get into trouble with our friends who gave us this information. I am not going to give out the names of the places, or the dates, but I am going to indicate what was given to us as the causes as follows:—

1. Some one, either on one of the levels or coming up in the cage threw a lighted cigarette butt away and this started the fire.

2. Timber in underground shaft gave way breaking the electric wires that were in the shaft and as shaft was very dry it is probable the timber was ignited by the wires.

3. A miner or some other person threw a lighted piece of paper down a chute, in going off shift, to see how much ore was in the chute. Fire resulted.

4. This fire started close to the fan motor on the south side of a shaft station and was caused by a carbide lamp on the hat of a miner coming in contact with canvas tubing, taking air from fan to raise where miners were at work.

5. Fire caused by overheated electric light globe (incandescent) coming in contact with some rope.

6. This fire was started close to a timber shaft presumably by a match thrown by a smoker.

7. Fire was caused by a spark from a short circuit in the hinge on a knife type trolley switch.

8. Caused by carelessness of a pumpman, burning newspapers on a concrete floor in a pump room, deliberately setting fire to material in a mine.

9. The bark on a timber cap piece probably caught fire by coming in contact with a carbide lamp on miner's cap.

10. Candle used for illumination was left burning by miner and caused fire.

11. Here is another one. The contact of a trolley wire with the cap of a set of timber in a wet drift, which was being crushed, caused this fire. Here is another point I want to call to your attention. You can talk until you are black in the face to most any metal mining man stating that he has fire hazards where he has damp ground or wet ground and he will tell you without any ifs, ands, and buts that you are crazy. Nevertheless we have definite records of very disastrous fires occurring in mines which are decidedly wet. Not long ago in a shaft being sunk in the aid of driving a tunnel for water purposes for a big city, there was encountered carbonaceous shale which throws off methane. The shaft was so wet the workers had to use rubber boots, "slickers," rubber caps and hats. The methane was ignited by an open light and came in contact with timber, and notwithstanding the fact water was pouring in the shaft, the timber was ignited and burned briskly. This fire is of recent origin—two days ago, in fact.

12. Fire was started by the contact of electricity with 12 inch by 12 inch timber.

13. Flame of a carbide lamp came in contact with a leg of a set of timber.

14. Probably due to defective electrical installation, installation in this case being wires.

15. Small transformer and a starting compensator ran hot setting fire to a wooden frame, which was burning when the fire was discovered.

16. Men were using an acetylene torch in a pocket of the shaft station and went away. Later on fire was found.

17. Here is a significant one. "It did not seem possible that a fire could occur in this shaft. The timbers burned, and the mine is wet." Two possible theories have been advanced. One is that a candle which was in use by a miner—a rather unusual thing in these days—was left in a dry place in the shaft station. The other theory is that the fire was caused by a short circuit in the electric power cable. I want again to call attention to the frequency of electric power ignitions.

18. The fire was caused by an overheated resistance on one of the electric tuggers used for slushing ore.

19. Fire was found in a raise 80 feet below the 300-foot level at a point where spent carbide was thrown.

20. Another case of throwing lighted powder wrappings into the raises to see how much dirt was left.

21. Fire was caused by sparks from a railroad locomotive setting fire to the wooden headframe on the surface. Hot embers from the headframe fell into the shaft and burned out the shaft. There is another thing about which our metal mining people are decidedly careless: having inflammable structures on the surface and little or no protection for the workers underground. There is no reason why these should not have been safeguarded by having concrete or steel frame and suitable door to be closed in case of fire. The cost is not prohibitive yet this precaution is not present in one-tenth of 1 per cent of the mines of the United States.

22. The open flame of the lamp of a man who hid some tools in a certain place where there was some dry lagging probably came in contact with timber.

23. It was determined that it started by a carelessly thrown cigarette, although there was a "no smoking rule" in the mine at the time. I want to call your attention to the fact that very frequently we find that there is a "no smoking rule" supposedly in effect in places in and around mines, and the man who most frequently violates it is the mine foreman or the shift boss.

24. Here is an odd one. It was stated that fire was caused by the rope on a slope running against the bearing on a roller heating the oil that was in the roller bearing. The burning oil set fire to the nearby ties. It was a destructive fire.

25. Another case. Fire started from a lighted carbide lamp which a powder man placed on a shelf under a large fuse box, setting fire to paper between the boards.

26. Several cases of fires, causes unknown.

27. Electric cable which was in conduit burned from the 21st to the 22nd level. Trolley wire had fallen, and not being sufficiently grounded to operate the circuit breaker at the shaft, it heated and caused the feeder wire to burn. There have been a number of instances where trolley wires have been down, set fire to cable, or set fire to the insulation on cables, and then the insulation carried fire to timber and caused fires.

28. Probably a match or burning tobacco from a pipe started this fire.

29. Current left on controller of a sinking hoist. Motor-hoist became overheated and timber foundation began to burn. Why have electrical machinery on timber foundations? It is almost universal for temporary installations underground but should not be.

30. Another case of electricity, but it does not give the details.

31. There is another class of ignition which comes in blasting, that is the use of fuse in connection with timber. There have been a considerable number of fires in metal mines where timber has been blasted, either blasting of cribs in top slicing work or in cut and fill work or in blasting of posts where the timber mat is following. There have been very severe and costly mine fires from this, although they have not resulted in very great loss of life.

32. One mining company was blasting some posts out to bring down the overlying material in a caving system and the timbers caught fire undoubtedly from the fuse and before they could finally get the thing under control they had to flood the entire mine, with an enormous loss to the company. The cause is apparent, though the answer is not quite so easy although we had been recommending the use of permissible explosives for blasting of timber; and where it can possibly be done, the blasting of timber electrically rather than through the use of fuse is advisable.

33. There have been fires in a few mines from the use of dynamite in large charges. In high sulphide ore, 40, 42 or 45 per cent sulphur, in some mines, there have been fires and explosions very much like we get in coal mines, from the ignition of these sulphides, where blasted in the ordinary manner with dynamite.

Here is a case where in my opinion coal mining methods will have to be used

if they are going to avoid occurrences of this description. That is water down the face thoroughly, keep the territory back of the face wet, as we try to do in many places in coal mines, and it may even come that our metal mining friends may have to go to our coal mining method of introducing rock-dust to prevent explosions in their sulphide drifts. I referred a few minutes ago to spontaneous fires. That has been a source of much trouble in some of the mines in the Lake Superior region and in some Western mines. The spontaneous fires in the Lake Superior District generally come from carbonaceous slates or shales and I understand there is some trouble there right now in some places from this cause. The spontaneous firing of oily waste thrown into the gob, especially in the backfill stopes, has resulted in a number of fires. It is poor practice. In the past there was much of a practice to throw manure into an old stope; this has caused a number of fires which have in some instances at least cost the company far more money than the removal of the manure would have cost. As a matter of fact, our metal mining companies are far more in danger from rubbish fires apparently than are our coal mining companies. Why that should be I do not know, but there seem to be more fires from that cause in metal mines than there are in coal mines.

A number of metal mines have sealed fires and very frequently these sealed fires break out anew, and it is almost incomprehensible how far a well defined metal fire can penetrate through what are supposedly solid walls. In one instance, the mining company is very much of the opinion that a fire which had an exceptionally good start—as a matter of fact burned for 20 years—finally penetrated through 75 feet of solid rock. The reason they give is that the rock was gradually heated to such extent that the temperature on the outside was brought up to the ignition point of timber in contact with the rock.

Now as to the fumes which come off mine fires; they certainly are of interest. The metal mining industry, unfortunately for it, is afflicted with a greater variety and more virulent type of fumes than is the coal mining industry, especially at the time of a mine fire. In coal mines, if we have a fire our dangerous fumes are ordinarily carbon monoxide which will "get you" quickly. If the fire is in concentrated form and burns out of the air all the oxygen, it leaves an atmosphere with a deficiency of oxygen and composed chiefly of carbon dioxide and nitrogen. If you leave those two out of consideration, there are practically no other fumes met in coal mining at fires or afterward.

In metal mine fires, on the other hand, there is, in some isolated instances H_2S or SO_2 . Metal mines at times of fire have carbon monoxide and carbon dioxide in proportions that are ordinarily greater—far greater—than at coal mine fires. In addition the metal mine fires very frequently have, strangely enough, given off methane, the very same gas with which you coal mining people have so much trouble. There are instances on record of sealed fires in metal mines causing surrounding ground to break the stoppings and men entering the mine to mend those stoppings, using the open type of lights, have ignited methane; in some instances these men were killed or had to be sent to the hospital. This was very mysterious for a while until we were finally able to get some samples of the gas and it analyzed regular old CH_4 . In addition to the CO_2 , CO , and sometimes methane, frequently the metal mine fire fighter is afflicted with SO_2 . Believe me, it is a nasty gas to handle. In some instances they are afflicted with H_2S . The SO_2 is like a rattle snake. It gives you warning. You can't go into it. You can't breathe it. You can't keep your eyes open. But the H_2S while it gives warning from its odor if it is in a mild, very mild concentration, when it gets into its heaviest concentration, gives very little odor and you are soon down, and when you are down you are out. In addition, metal mine fires very frequently have arsenic fumes; some of the copper ores are a combination of copper, iron and sulphur and arsenic. In the Butte district of Montana one of the main ores up there has such

a combination and when they have fires they have arsenic fumes, as well as CO, CO₂, SO₂, and sometimes H₂S and CH₄.

Then there are in some instances fumes of which I do not know the exact composition. We have never been able to get the data on them but we know that they must be dilute sulphuric acid or sulphurous acid because they have the effect of those fumes. These gases are formed in an unknown way but when they come they are absolutely deadly and have caused death.

Now, as to precautionary measures; I have tried to indicate in general what I think should be done toward prevention. There are a number of other things, which, in my opinion, should be done. Every metal mine should have a mechanical ventilation system; preferably the fans should be located on the surface. Fans should be so fixed that air current can be reversed if necessary. The reversal should be used only when necessary and under proper precautions. To make that reversal possible it is necessary to have a definite system of doors underground. The doors should be so placed that when the direction of air is reversed they will not open. That seems to be almost an impossible thing to get through the minds of people. They think you can place a door with a fan which is exhausting and the door will automatically remain closed when that fan is made a force unit. All they have to do is to use their heads and they can see that it is an impossibility; yet the matter of proper placing and construction of underground doors is handled correctly very seldom in metal mines.

Another thing which should be in metal mines—and I am not sure it does not apply to all coal mines also—is that there should be in place in every main air course either in itself or adjacent to it, a system of doors such that, by the closing of those doors, an entire course can be isolated from the rest of the mine or any part of it. At the Argonaut fire, they had a system of doors in place between their main intake and their main return, except that they had no door on the lowest level. All of the air went down through the main shaft or main incline to the lowest level and was then allowed to go through the mine and up to the surface. The men who were trapped—47 of them—came into the lowest level when the smoke came on them and they telephoned for the cage to go to the surface. They could not get it. The smoke finally drove them back where they were found two or three weeks later dead. If there had been a door in place on the lowest level those men could have shut it and it is entirely probable they would have been saved. That has been repeated in a number of metal mines. If there is a well planned and installed system of doors along the various shafts there need not be the usual heavy loss of life in metal mine fires.

As to ventilation, I accompanied the Bureau of Mines car to Ontario at the time of the Porcupine fire and about the only thing we did which amounted to anything was to show these people how to handle their ventilation in order to remove the smoke from the mine. Other than that we could have stayed at home. Metal mining people seem to feel that ventilation is abstruse. They can not touch it and do not touch it. Very seldom do they do a good job, even when they try to handle it.

Ordinarily, the metal mine people have little or no conception of what to do with ventilation, even if they have it. If they install mechanical ventilation in a metal mine and do not install it correctly and do not use it correctly, in a time of disaster it is a menace instead of an aid. That is a thing that should be brought home definitely. I have been in one metal mine where they had a system of ventilation of which they were proud. They had an intake or downcast shaft which was timbered, had any number of electric wires and electrical equipment along the various stations. The fan was pulling the air out of another shaft and the time interval from the time the air went down one shaft to the other was about ten minutes. That meant that if there was a fire in the top of the intake or downcast shaft that within ten minutes every man in the mine was trapped. The men

who were running that mine were exceptionally able men. They knew more about metal mining in a minute than I would in my life, yet they were continuing a wholesale death trap, which however they afterward corrected. My time has expired, yet I have failed to touch upon a considerable number of decidedly important points connected with fires in metal mines.

THEODORE MARVIN (The Explosives Engineer, Wilmington, Del.): I would like to condemn the practice which many metal mining companies have of leaving their paper wrappings and powder boxes underground. I think that anyone wishing to start the campaign for fewer mine fires can do a great deal I believe by eliminating that practice from their mining methods.

GEORGE MARTINSON (Pickands, Mather & Co., Hibbing, Minn.): I enjoyed Mr. Harrington's talk very much. I want to say that he told us about all the fires he attended. We had him in the Lake Superior Region. He knows more about it than any other man who visited our country. The statement that 40 per cent of the fires have been caused by electricity is interesting. I didn't realize it had grown to such proportions. I can see his figures are based on facts of the Bureau of Mines.

I don't know just how true his statement is that carbide is not a safe light. There have been suggestions made at various times at metal mines they ought to go into electricity. It may be Dan has particularly good reasons for that statement. I think he has.

Another interesting thing was the statement that permissible explosives might be used for blasting down rooms. Mr. Harrington said they are being used. We can't trace any fires to that particular cause, but to the fuse and other explosives setting fire to the rooms you have blasted, there might be possibilities there. I don't know whether it would be practical to get any special explosives for the job, but it might be. I am not familiar enough with it to know. It requires particular skill on the part of the company just the same as you are using dynamite.

FRANK AYAR (Phelps Dodge Corp., Morenci, Ariz.): I must say that I don't believe there is any talk we have enjoyed as much as Mr. Harrington's, because we have done quite a lot of safety work in the metal mines. Although we think we have done a lot of safety work, we are absolutely asleep when it comes to fire protection and prevention. I just want to give an example to show how much asleep we were at the Morenci plant of Phelps Dodge Corp. About twenty-six months ago we got the best electrical engineer we could find in that part of the country to make a survey of our electric hazards. This man made this survey absolutely independent of the mechanical organization and reported directly to the management, and we were dumbfounded when the survey was completed to find we had something like 2,500 or 2,600 electrical hazards in our company, which we thought was getting along pretty well from the standpoint of safety.

Well, we had copies of this report sent to every department and the report is a great thing. It is about thirty or forty pages, describing in detail each of these hazards; and now at each weekly meeting of our department heads and superintendents, we require that each department head tell us just how many of his particular hazards he has eliminated during the past week and what his total percentage eliminated to date is. I might say we have two departments that have eliminated every one of their hazards. Mr. Harrington spoke of the hazard of electrical conductors in mines. Just as a matter of information, we have in process of being driven from the several levels a separate raise all the way from the surface of our fourteenth level for no purpose except to carry these wires and get every power wire out of the shaft.

We have been quite fortunate in not having a fire caused by these wires. But I think the big thing in safety is not to wait until you have had an accident, nor to wait until you have had a fire, but to make believe that you have had one and take the same action you would take if you had a terrible disaster.

We have talked this morning about the subject, "Is Management Interested in Safety?" and if they are there is nothing they should tackle more thoroughly than fire hazards. Mr. Harrington mentioned the wet timber as being a hazard even though it is wet. It is our experience that the wet timber is a vastly greater hazard than any dry timber; and all through our haulage ways, everywhere we go under a cap with a trolley wire we have got a hazard. We have quite a problem. We haven't worked it out yet to know what to do to eliminate that hazard, but at the present time we are working along the lines of fireproof paint and if that doesn't work well, to actually put on some sort of an insulating coating on the timber. The paint would be much cheaper and if anybody knows of a fireproof paint which will not wash off with water we would be very much interested in getting information about what that paint is.

Another thing, in these fire analyses, you will find that almost every company interested in fire has got a great big poster up in their property or in their mines telling just what to do in case of fire. But my opinion is that not one in a hundred of those organizations will do what that poster says. I think that everybody ought to get together and make believe they have a fire in their company and summon every key man to a certain point and have those men tell exactly what they are going to do if they have a fire in a certain place. That takes everybody, from the manager of the company down through to the master mechanics and superintendents and everybody else. If you don't do that you are going to have terrible confusion when the fire comes. Then don't think you can emphasize too strongly the cleanliness of your mine—from chips, papers, etc.—because it is a terrible hazard.

One other point, in connection with electrical firing. That is one problem we have not been able to solve. We do quite a little firing with delayed action fuses. To date we can't find a single manufacturer who will guarantee that his delayed action fuse will not burn the powder. We have tested every fuse we can find and we find these even though they have double protectors over it fulminate, while the fire burns out through both of these cases. If somebody has a protector that they will guarantee, we would be interested in knowing what it is. I would like to know.

SIDNEY HALL (New Jersey Zinc Co., Franklin, N. J.): I think there is an answer to that side burning and side spitting and delay of the detonator cap through the development of liquid oxygen explosives. Liquid oxygen explosives are very easily ignited. In order to use them in some drift ground underground, it was necessary where they wanted to use a delayed electrical detonator to devise a special means for preventing that side ignition and I am sure that at least one company and maybe others have developed those satisfactorily. In fact, I was at the plant of one company when they were working with this, and as a test, the delayed detonator, or delayed action detonator, was embedded in gunpowder and it repeatedly passed that test.

MR. HARRINGTON: Before leaving this subject, I want to put before our coal mining friends a similar thought about this electrical hazard. They have escaped unscathed today. They might get their share of the medicine as well as the metal mining people. We have summed up in the safety division of the Bureau of Mines the causes of all of the explosions of which we have record for the fiscal year ending June 30, 1928, confined to the United States. This is for coal mines alone. We have a list of 29 with 341 fatalities. Of these, fourteen are definitely known to have been caused by electrical ignition, the total number of fatalities are as follows: Fourteen electrical explosions, 282 fatalities. Get that—282 out of the total of 341. Ten explosions from open lights with forty-eight fatalities; three from explosives with nine fatalities; and two unknown. I don't claim this is a complete list of all the explosions in the last year, but it is a complete list of all of them of which we have a record.

A. H. TRESTRAIL (Pickands, Mather & Co., Caspian, Mich.): I know of one case where the steel head frame was being taken down and they were burning out the rivets. We hadn't sufficiently covered the shaft and metal dropping down to timbers started a fire in the shaft. This happened previous to the noon hour. The men working on the shaft went to lunch and a workman discovered smoke coming out of the shaft. He turned the water down the shaft which drove the smoke through it first. As it happened the smoke was not intense enough to suffocate anyone and one man lost his life, whether it was heart failure or what we don't know. But in taking down head frames it would seem that covering the shaft would be a very important thing to watch out for.

CHAIRMAN McDOWELL: We are going to close the discussion. As members of the Mining Section, I am sure we are greatly honored to have in your presence this morning one who is vitally interested in work of this kind. This gentleman has been formerly Secretary of Agriculture of the United States. At this time we would appreciate having a few remarks from the Honorable Howard M. Gore, Governor of the State of West Virginia.

HON. HOWARD M. GORE: It is inspiring to me to come here and say a few words to you about the great humanitarian work of you men of the mines. Its far-reaching activities really give it the greatest force in the public good. For example, those of you who make your researches at your laboratories and your studies under practical conditions, frequently fail to get it in such shape so that it reaches the imagination and inspiration of the masses of the public.

In all public matters, like mine work or safety work, the work that carries with it probably as much poetry and as much of the human side of life and human interest in life as any other work, it is difficult to catch the public interest and imagination. Therefore, give it the proper standing in our schools, our laboratories in the industry itself, among the masses of the people, among your own political leaders.

Take for example in our own State. For a great many years the coal industry was a rather somber industry. That is, I mean to say, that it was a place for men to become soiled at their work, and then they hurried home from it. It was a place to make a living, and then to sort of get away from it. Our citizens in and around the border of the coal regions looked upon it as a somber place. But in our State under the direction of our mining division and our Chief Lambie, we undertook to put on a State Safety Day. You know, for example, here is one of the interesting things. One of the things this State Safety Day has done is to interest the public in the explosive power of coal dust.

We thought it was a great event, but this simple demonstration before the public eye aroused the interest of the public school child and of the workmen of the profession and all of those engaged in every line of endeavor.

Today in our State the public imagination has been stimulated to the point that the public and those engaged in other professions are also deeply interested in that rule of humanity where we save and conserve human life and human suffering, where the laws of economics and humanity meet perfectly.

I sometimes wonder if you in the profession get the idea that in addition to knowing these things, in addition to impressing upon the human family and mankind the necessity for being safe and for promoting safety, you don't get their imagination. It has been the habit of many people to take a chance and you have got to catch their interest, and by catching their interest we get, as we might say, the entire family of the public mind centered behind this work of safety and this work of improvement.

I don't know, men, really why I came here. When my chief suggested I come up and say a word to you, I hesitated. You know I am a farmer by profession. I hesitated, and then I thought this, that on this occasion I might be present and say to you that I doubt whether you quite value the great service that you are

rendering to humanity, and I am wondering if, as you gather from the four corners of the country here to study these problems, each of you to take back what you get from your neighbors' laboratory, your neighbors' study, whether you realize that we have made a uniformity of activity in the interest of the human family that each year expresses itself in a greater sum total of human happiness. God bless you and continue your good work.

CHAIRMAN McDOWELL: I think we should close this meeting and the Section for the last three days. First, I would like to know if the Resolutions Committee has anything to report?

Report of the Resolutions Committee

R. N. HOSLER (Coal Mine Section, P. C. R. & I., Harrisburg, Pa.): We have a resolution.

RESOLVED, That the sincere appreciation of the Mining Section of the National Council be conveyed to Mr. Benjamin F. Tillson, a member from Franklin, N. J., for the entertainment furnished this Section by his family orchestra and the boys' and girls' band.

Signed by Messrs. Hosler, Henrie and Berry for the Resolutions Committee.

I would like to say that I don't know if it is the custom to offer a resolution for service rendered by members of the Section, inasmuch as they are appreciated, but we feel that it was such an unusual pleasure in Mr. Tillson bringing his family over here and playing to us yesterday, together with the boys' and girls' band for our luncheon, that it should be recognized in the form of a resolution to be conveyed to him.

(Motion seconded and carried.)

CHAIRMAN McDOWELL: In closing, and in turning over the meeting to the next chairman, I want to take a minute or two of your time.

Report of the Chairman of the Mining Section

I have been especially interested in safety, personnel and community activities for a number of years, but more particularly have I been interested in this work since attending the annual meetings of the National Safety Council. I have endeavored to do all I possibly could to further the cause of the Council, especially the Mining Section, and I assure you that it has been a privilege to be Chairman during the past year of such a worthwhile institution. As Chairman it has appeared rather difficult at times to carry on the work of the Section on account of various circumstances, but I assure you that I have constantly endeavored to carry out the principles of the Section and to have the membership know that the standards set up in the past by our worthy executives were upheld to the highest degree possible during the past year.

We are all striving for the same objective and we should feel worthy of our responsibilities when selected as Chairman or for any other office in the Mining Section of the National Safety Council. We should strive willingly and be in perfect accord with the National Movement to bring about a most successful conclusion of that particular or collective effort.

There is no doubt in my mind that this work is going forward and forward until we have reached a definite goal and can feel that the work has not been in vain.

We become discouraged from time to time when our particular efforts are not as successful as we may have desired them to be. But this not discouragement to the minds of those who have been in the work for any length of time, but should rebound as a stimulating tonic towards closer concentration and greater

effort in those particular problems. Success will come to those who follow such principles.

I can look back over the year's work and see where, as Chairman, I could have performed the duties of my office probably more satisfactorily to the membership, and for not doing those particular things I feel that I owe the membership an apology.

The Chicago Office keeps one particularly busy and on the job at all times. The National Office has indeed a wonderful system. They sent out for this Section an eight piece mailing campaign that was indeed worthwhile. Some of it went out under the signature of your Chairman. I feel that it was of considerable interest to those who received it and that it will help materially to strengthen this safety movement. I received many congratulatory replies to these forms of membership appeal.

We have had exceptionally good meetings this year and I believe we have been interested every minute of the time. I thank the membership for the honor of being its Chairman for this year and assure you that it was a pleasure to work for you. The officers of the section, the chairmen of the committees and their associates were willing at all times to help in every way possible to make these meetings a success. I thank them all kindly for their help, and assure the membership that I will be willing at all times to help in my humble way to further the cause.

I desire at this time to have the new chairman for next year, Mr. Martinson, come forward and assume the duties of chairman.

Appointment of Committee Chairmen

GEORGE MARTINSON (Pickands, Mather & Co., Hibbing, Minn.): I want to tell you that I deeply appreciate the honor that is mine in being chairman of the Mining Section and in doing that I also want to tell you that I appreciate the responsibility that rests with me and the other officers of the Section. The standards that have been set by the previous administration are going to be hard to equal and much harder to beat. I have nothing more to say at this time, and I want to announce the committees that I have appointed to help in the work of the coming year:

Poster Committee: Chairman, Fred Nesbitt (Tri-State Lead & Zinc Producers Association, Picher, Okla.).

Membership Committee: C. A. McDowell (Pittsburgh Coal Co., Pittsburgh, Pa.).

Publicity: J. M. Carmody, (Coal Age, New York).

Slide Committee: H. G. Hensel (Youngstown Sheet & Tube Co., Chicago, Ill.).

Engineering Committee: Chairman, Dr. T. T. Read (A. I. M. & M. E., New York).

Statistics Committee: Rush N. Hosler (Coal Mine Section, P. C. R. & I., Harrisburg, Pa.).

News Letter Editor: Daniel Harrington (U. S. Bureau of Mines.)

Program Committee: Marvin and Jack Ryan.

Entertainment Committee: Jack Ryan.

Executive Committee: Mr. Yates (Home State Mining Co.), B. J. Tillson (New Jersey Zinc Co., Franklin, N. J.).

We want Jack Ryan to know that at the request of the chairman, we ask him to continue in his capacity as chairman of the Entertainment Committee. He has done splendid work this year. I know his efforts will be better next year.

MR. HARRINGTON: I note from the new chairman's appointments that I am supposed to continue as editor of the *News Letter*. Gentlemen, I would like to call your attention to the fact that unless you people supply information to be put in that monthly *News Letter* the only thing you are going to get is stuff from me.

You are going to take my ~~fibes~~ and that's all you will get. Unless you want that cant, you want to shoot stuff which is yours, rather than receive stuff which comes from me only?

MR. ADAMS: I was in Chicago recently and called at the office of the National Safety Council. While there I saw Mr. Keefer and Mr. Burns, who as you know prepared this yearly summary of accident statistics, which is based on reports from various sections of the Safety Council. It does not show a very good representation from the Mining Section. We in the Bureau of Mines have for several years been in what we call the National Safety Competition that is based upon very detailed information which comes to us from 250 mines and quarries. It offers just the type of information that Mr. Keefer and Mr. Burns are anxious to get for the mining industry, but many of the members of the Mining Section are not represented in those yearly compilations. I have promised the Council I would be glad to supply them with all of the data we can as early in the year as they need to have it in order to prepare their yearly summary covering all of the sections or all of the sections of the Council. I want to invite all of the people in the Mining Section here to cooperate. It does not involve very much labor on the part of the companies that are participating. I shall be glad to furnish the details by correspondence to anyone who participate.

CHAIRMAN MARTINSON: That is an important matter to the Mining Section and the mining industry. I wish it were possible for the various companies to cooperate with the Bureau of Mines in this work.

MR. HARRINGTON: It seems to me that a few moments in description of what needs to be done there should be given here. It really means practically nothing in the way of additional work to you people. All that is required practically is that you supply to the Bureau of Mines a carbon copy of the accident report which you are already obligated to hand in most states to your inspector. That is practically it. The man-hour exposure is the only additional work. It entails practically no additional work. It really adds one carbon copy of your accident report.

MR. ADAMS: How many companies represented here are now taking part in that contest? That could be answered by the raising of the hands here. I don't know by looking at them.

CHAIRMAN MARTINSON: Isn't it true, Mr. Adams, some people are furnishing you reports who are not entered in the contest? Quite a number?

MR. ADAMS: As many are furnishing reports that are not in the contest, as are in the contest, and they have various reasons for not wanting to be formally enrolled, yet we would be mighty glad to have the formal enrollment.

MR. HARRINGTON: You don't need to be afraid, if you have a particularly bad record, that it is going to be spread throughout the United States. No names of companies are given out, the names of the companies or the individual companies entering into this are not given out to the public. You can't tell whether the records are east, south, north or west.

CHAIRMAN MARTINSON: Can we get a raising of hands now? All who are in the contest raise their hands?

(Four raise their hands.)

All who are not in the contest and not furnishing reports raise their hands.

(Four raise their hands.)

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Packers and Tanners Section

New Section Officers

Chairman—EDWARD E. DREWS, Safety Engineer, Libby, McNeill and Libby, Chicago.

Secretary—HUBERT L. CLOVER, Safety Supervisor, International Shoe Co., St. Louis, Mo.

Poster and Slide Committee Chairman—FRED SCHWARZE, Pfister and Vogel Leather Company, Milwaukee, Wis.

Membership Committee Chairman—WILLIAM C. COREY, Delaware Leather Co., Wilmington, Del.

Program Committee Chairman—S. R. JENSEN, Armour and Company, Chicago.

Publicity and Statistics Committee Chairman—DEAN MONEYSMAKER, Disability Department, International Shoe Company, St. Louis, Mo.

Executive Committee: The Officers and

N. L. BRAINARD, Swift and Company, Chicago.

J. M. EATON, Libby, McNeill and Libby, Chicago.

Retiring Officers

Chairman, WILLIAM CAMPBELL, Graton and Knight Company, Worcester, Mass.; *Vice-Chairman*, O. C. STERN, Plankinton Packing Company, Milwaukee, Wis.; *Secretary*, EDWARD E. DREWS, Libby, McNeill and Libby, Chicago, Ill.; *Poster and Slide Committee Chairman*, FRED SCHWARZE, Pfister and Vogel Leather Company, Milwaukee, Wis.; *Membership Committee Chairman*, WILLIAM C. COREY, Delaware Leather Company, Wilmington, Del.; *Program Committee Chairman*, F. A. HONNELL, Wilson and Company, Chicago, Ill.; *Engineering Committee Chairman*, S. R. JENSEN, Armour and Company, Chicago, Ill.; *Statistics Committee Chairman*, DEAN MONEYSMAKER, International Shoe Company, St. Louis, Mo. *Executive Committee: THE OFFICERS AND* N. L. BRAINARD, Swift and Company, Chicago, Ill.; J. M. EATON, Libby, McNeill and Libby, Chicago, Ill.; W. F. MCCLELLAN, Armour and Company, Chicago, Ill.

October 2, 1928

WILLIAM CAMPBELL, Chairman

Safety Engineer, Graton & Knight Company, Worcester, Mass.

The first session of the Packers and Tanners Section at the Seventeenth Annual Safety Congress was called to order at nine-thirty o'clock by the chairman, William Campbell, Graton & Knight Company, Worcester, Mass.

CHAIRMAN CAMPBELL: Members of the Packers and Tanners Section, the first on the program this morning is a round table discussion on methods of preventing

the outstanding accidents of the packing and tanning industries. Mr. McLean, we'd like to have a few remarks by you on that.

Methods of Preventing the Outstanding Accidents of the Packing and Tanning Industries

By D. D. McLEAN

Supervising Engineer, The Travelers Insurance Company, Hartford, Conn.

In the United States today there are over two thousand plants engaged in packing or manufacturing meat products and there are several hundred thousand persons employed by them. In addition to the edible substances that are shipped all over the world innumerable by-products are made from what was formerly considered waste material and the disposal of which was a source of considerable expense to the packers. For this economical condition of affairs credit is due largely to the efforts of chemists who have made possible the utilization of practically every part of the slaughtered animal including the offal.

According to the last industrial census of the United States Department of Commerce, the leather industry, of which the tanning industry is the origin, is the third greatest manufacturing industry in this country and there are over a quarter of a million persons engaged in it.

Nothing, therefore, needs to be said as to the tremendous importance of these two industries in their relation to the happiness and prosperity of our Country nor as to the high place they occupy in the industrial firmament.

In considering the methods of preventing the outstanding accidents of these two industries it is necessary to refer to them (the industries) separately and, as the subject is of exceedingly wide scope it is obvious that it cannot here be dealt with exhaustively nor is it necessary or desirable that we should attempt it.

The method by means of which we propose to approach the subject is to follow as closely as possible the regular course of the processes involved and to notice the more important accident hazards as they arise in the progress of the work.

Methods of Killing Animals

Let us look at the Packing Industry first. In a packing house, the animals are separated into three general divisions, one of which include sheep, lambs, and calves; another hogs, and the third cows and steers (which are collectively known as beeves). The methods of slaughtering and cutting up the different animals vary somewhat, and for that reason each group is usually handled in a separate building or department.

- Removing the Hides

The department in which animals are slaughtered is called "the killing floor" and after the animals have been killed the work of removing the skins and hides calls for considerable skill. The floors are usually slippery where this work is done and there is danger that the man may slip and fall if he loses his grip on the skins which he is pulling off. The workman should never hold a knife in his hand while removing a hide in this way but should put it in his pouch or lay it down in some safe place. The hides should not be allowed to accumulate but should be taken away as fast as practicable and the floors should be kept reasonably clean.

In this department the slipping hazard must necessarily be faced. This is the origin of many painful injuries. This hazard can be mitigated by surfacing the floor of the department with an abrasive material at the time of its original construction or by roughening its surface. Further, the wearing of boots by the

butchers and other operators in this department, soled with non-skid material, will do much to reduce the slipping dangers and the results occurring therefrom. This hazard cannot, apparently, be altogether removed and its elimination is an outstanding problem.

Slaughtering Hogs

In the hog and sheep slaughter departments the principal danger in the shackling or hooking pens occurs when the conveyor wheels with chains attached are returned along the overhead rails from the floor above or from some other point, by gravity. In some plants single-grooved-wheel trolleys are used and these often attain considerable speed during the return journey and sometimes they jump the track. In such cases severe injuries are likely to occur if there are persons near by, especially if one of the conveyor wheels, while carrying a heavy animal, should fall upon a man. Guard rails or other effective devices should be provided to prevent accidents of this sort, particularly at curves and at the end of the rail. A better plan consists in the installation of a two-grooved-wheel trolley. It is almost impossible for such a trolley to jump the track, even though it attains a swinging, jerky motion. The chains and shackles should be inspected frequently and carefully, and any that are found defective should be discarded at once.

In the subsequent operations in connection with the slaughtering of hogs, the carcasses are moved along by means of overhead trolley to scalding vats, which are simply long wooden troughs containing water heated to about 140 degrees Fahrenheit. The workmen in this room have long wooden paddles or poles with which they push the carcasses about in the water. The humidity in this room is excessive in the summer months, owing to the vapor that constantly rises from the hot water, and considerable water is unavoidably spilled or splattered upon the floor. Suitable ventilating apparatus should be installed to improve the atmospheric conditions in the room and the floors should be so constructed that the water will drain off quickly and thoroughly. In modern plants heated air is forced into the room in cold weather to prevent fog. It is particularly important for the health of the employees, especially during cold weather, that their working clothes be changed for warm, dry garments before leaving the plant.

The progress of the carcass now brings it in contact with various workmen in succession, each one of whom has some special operation to perform in the work of cutting up the animals. The injuries resulting from this work consist mainly of accidental cuts from the knives which the men have to use. It is the general opinion that dull knives are more dangerous than sharp ones. If a knife is sharp, the work can be done with little effort but if it is done with a dull knife considerable pressure must be exerted; and in case the knife should slip this extra pressure would be likely to make more serious any accidental cut that might follow.

The trolleys in large plants are usually operated by an endless chain which gives each workman sufficient time to perform the particular task that is assigned to him. In determining the speed at which the trolley shall be operated, consideration should be given to the fact that the men cannot work as skillfully nor as rapidly toward the end of the day as they can when starting fresh in the morning. The difference in productive capacity may be slight but it is likely to be sufficient to cause an increased number of accidents if the rate of production is based upon the output obtained under the most favorable conditions. Moreover, some men are naturally slower of movement than others and would be at a serious disadvantage with respect to their safety if they had to work constantly at top speed in order to keep pace with the more rapid workers. For the safety of all the men, therefore, the speed of the trolley should be such that the slowest man in the group can perform his part of the work without undue haste and in this way local congestion and confusion will be avoided.

The men engaged in splitting, cutting, trimming, and scraping the hogs usually

stand on platforms elevated from three to four feet above the floor. Strong substantial railings should, therefore, be installed upon them to prevent the men from falling off and the platform should be well covered. Modern equipment for scraping hogs consists of a machine having a set of revolving beaters made of leather strips and steel knuckles.

The hogs are passed through this machine and the greater part of the hair is scraped off. Singeing the fine hair from the hogs is done by means of a gas torch and while using a torch the man should be careful to avoid burning himself and other workmen near him.

Killing Cattle

Although the killing of cattle is done in a somewhat different way from that used in killing sheep, calves, and hogs, and though it is, performed in another part of the plant, the hazards are very similar to those confronted by the workers in the smaller animal departments and the accidents, therefore, in the beef killing departments are similar to those on the other killing floors. The accidents occurring here, however, are likely to be more serious because the animals handled are larger and, therefore, the knives, cleavers, and other implements must be of a larger and heavier pattern.

A serious hazard in the beef killing department is in the danger that arises when the muscles of the dead animal contract unexpectedly. An instructive case of an accident of this kind is that of a skilled workman who had been employed for more than ten years as a butcher and who had an artery cut by his own knife. He was engaged in the usual course of his work when, without any warning, the muscles of the animal he was working on contracted suddenly and sent his knife flying. Unfortunately the knife struck his arm and injured it so badly that amputation was necessary in order to save the man's life. This danger of muscle contraction is ever present in the handling of freshly killed animals and cases of it are frequent in meat packing plants.

New workmen particularly should be carefully instructed with regard to this danger and all employees should be reminded of it from time to time and be warned to keep their knives in safe positions.

Mechanical and Hand Implements

The mechanical hoists located above the killing floor must be inspected, oiled, and repaired from time to time.

Suitable platforms should be provided to facilitate this work and they should be well constructed and rigidly fastened; moreover, substantial guard rails should be installed along the entire length of such runways or platforms.

Accidents may occur in the cutting and trimming department and are mainly due to the use of knives, saws, steels, and machinery. The steels should be equipped with satisfactory stop guards. A guard of this kind may be cast as part of the handle but very good guards can be made by fitting these steels with leather discs cut from discarded belting. With protection of either of these kinds the workman may sharpen his knives without fear of having them slip and cut him.

The meat saws (called *hand* saws) are also a prolific source of accidents because the workmen often become careless and saw their own fingers. Many of these accidents may be prevented by attaching finger stops or hand stops or rests to the saw blade. One of these should be rigidly secured to each side of the blade and may consist of a light metal plate with a curved bottom extending out from the blade a distance of about half an inch. This guard should be about 4 inches long. When guards of this kind are properly used it is not necessary for the workman to get his fingers under the saw blade.

Other saws used in the cutting and trimming department are the band saw and the circular cross-cut saw, both of which should be guarded. The band saw should have both driving wheels completely boxed and the cross-cut saw should have a movable guard arranged in such a way that a workman cannot bring his hands in contact with the saw blade while properly performing this work. Under no circumstances should workmen be allowed to clean saws or other dangerous devices while the machines are in motion.

The belly roller is one of the few machines used in the cutting and trimming department. The entrance point of the first roller should be so guarded that it will be impossible for the operator to get his hands caught. This is highly important because the table is usually greasy and slippery. The side chains and sprockets that drive the roller should be guarded as well as the main driving chain and sprockets.

Undoubtedly the greatest hazard in the cutting and trimming department is due to the condition of the floors. In some plants scraps of fat and meat are *constantly* falling on the floor, thus creating conditions that are likely to result in falls with the possibility of cuts from the knives, saws, and other tools that are commonly used. There is no need to allow scraps to remain under foot in this way and in the best plants of today it is a very rare thing to find a single piece of such material on the floors. It is wasteful as well as dangerous to be slack in this respect and the flooring should be kept clean at all times even if it becomes necessary to engage extra workmen for this express purpose. One source of wetness is from pickle dripping out of trucks.

Cooked Meat Department

In those plant where cooked and minced meat products are manufactured dangers to the hands are encountered in the operation of chopping, mincing and grinding machines; the knives and cutters of which should as far as practical be enclosed in substantial covers and the operators should be furnished with wooden paddles in all cases where it is necessary in feeding the machines to push the meat with the knives.

Pressure Cooking Vessels and Rendering Tanks

In packing establishments where cooked meats are manufactured, cooking kettles of various designs and usually constructed of copper and operated under steam pressure are used. Definite knowledge of the safe condition of these vessels should be aimed at. Their structural data should be known and the pressures under which they are working should be kept as close to the usual factor of five as is possible. They should be examined and tested by a hydrostatic pressure at regular intervals—annually—and records of these inspections and tests should be kept.

In establishments where fertilizer is manufactured from the otherwise waste material, large rendering tanks operated under steam pressure, there is a hazard of explosion. These vessels are usually made of boiler plate steel, are constructed of truncated cylinders, riveted and stayed together, and are subjected to bursting and collapsing strain. Their construction should be based on the most careful calculations and the best workmanship and should operate at a factor of safety of not less than five, and they should be provided with safety relief valve and pressure gauge. Because of the acids and corrosive vapors in and given off by the material cooked therein, they are subject to very rapid plate corrosion and deterioration. They should, therefore, be carefully inspected at regular intervals of not more than six months by a competent engineer or boiler inspector and upon detection of serious plate wastage they should either have their working pressure reduced or substantial repairs made to them. Records of inspections and results

discovered therefrom should be kept by the safety department of the plant and their conditions always carefully watched and studied.

These suggestions apply to all other vessels operated under steam, air or gas pressure in the processes incident to the industry, and definite knowledge and check of structural data and conditions should be kept. In and about plants of this kind there are usually air pressure tanks and in connection with the refrigerating apparatus there is oftentimes an ammonia receiver operated under very high pressure.

We mention these things because it has been our experience that even in the best regulated plants the executives and the Safety Department know very little, if anything, about them in respect to their safe conditions but they carry precisely the same explosion element as a steam boiler. Many states now have laws requiring the regular inspection of steam boilers, but very few have laws requiring the regular inspection of unfired pressure vessels.

Shipping Department

The shipping department is one of the largest of the meat packing plant. All of the products are packed in boxes, barrels, cartons, and other packages. Accidents are frequently due to carelessness on the part of the workmen. The danger from projecting nails is a prominent one and everything possible should be done to eliminate it. Nails should never be left projecting from boards, barrels, or boxes. Care should be taken to stack boxes and barrels in a safe way because careless methods of piling are likely to result in serious accidents. Truckmen should avoid overloading their hand trucks or stacking the boxes up too high on them.

A large proportion of the accidents in meat packing plants are caused, as we have said, by the knives, meat saws, cleavers, and other implements that are constantly used. Many of these accidents are due to carelessness or haste. In this industry sharp knives and heavy cleavers of a wide variety of shapes and classes are used literally by armies of men—long thin knives, short heavy knives, knives that curve up and knives that curve down, crescent-shaped knives with handles at both ends, knives of every possible size, weight, and form, all sharpened to razor keenness; and it has been well and truly said that "the knife question is undoubtedly the greatest safety problem in the packing industry."

Much can be done in the provision of safeguards on the knives themselves and in the use of gloves and cuffs and aprons as protective devices on the person of the workers. Unguarded knives should not be permitted; the use of guarded knives should be strictly enforced upon the workers so that accidents to the fingers, hands, wrists, and forearm may be as far as possible eliminated.

Occupational Hazards—the Tanning Industry—Anthrax

The handling of animal and cattle hides, pelts and fleeces in the tanning industry exposes the workers to a number of inherent dangers to life and health and, prominent among these is the disease known as anthrax. This disease is caused by a certain microscopic organism known as the anthrax bacillus which enters the animal or the human being in some way or other and then grows and multiplies in great numbers, thriving and developing at the expense of the tissues of the body, and at the same time producing substances that poison the entire system of the victim.

Infection may be acquired either externally or internally. Most commonly, the anthrax bacillus gains admission through some abrasion of the skin, such as a scratch, cut, or newly-opened pimple. The parts of the body that are most often affected are those that are uncovered, as the neck, face, arms and hands.

Less commonly infection is got by inhaling, or swallowing the germs. This is

much more dangerous than external infection and it usually results fatally in a very short time.

There are many measures that can be adopted for reducing this danger and there has grown up considerable literature on the subject. The following is a list of typical recommendations for the mitigation of this hazard.

Typical Recommendations for Prevention of Anthrax

1. Foreign skins should be segregated or physically separated from domestic skins in storage sheds by partitions constructed to facilitate the separation. Apartments emptied of hides should be ventilated or disinfected with a solution of phenol or carbolic acid immediately upon being emptied.
2. Waste, scrap, hair, and other debris should be washed from the floors daily. This practice can be exercised at the noon hour or between shifts.
3. Departments of the plant where dust from the skins may be a factor in distributing anthrax germs should be ventilated to dust collectors or reservoirs. This debris should be burned at regular intervals.
4. Tanneries working on raw foreign skins should thoroughly soak them no less than forty-eight hours in a one to one thousand bichloride of mercury solution (one pound of mercuric chloride to one thousand pounds of water), to which has been added enough formic acid to make a 2 per cent solution of acid.
5. In case of anthrax being contracted by employees from hides in any department of the plant, the department that is suspected of containing the contagion should be fumigated by the gas generated from the mixture of formaldehyde and potassium permanganate. At the time of this fumigation no employees should be allowed in or about the department.
6. Machines for buffing, kneading, willowing, burnishing or heckling skins should be provided with a dust exhaust system.
7. If there is accumulation of dust in any department of the plant where skins are buffed, dehaired, skived, etc., the ceilings and the walls should be disinfected by the use of carbolic acid, formaldehyde, or a solution of mercuric chloride.

Personal Sanitation

8. The eating of lunches in the plant in proximity to skins that are being processed should be prohibited.
9. Separate rooms or partitions should separate the lunch rooms from other departments of the plant.
10. It should be a rule that previous to eating lunches the employees should be required to wash hands thoroughly, and if there is a suspicion of anthrax contagion, or if the employees have been handling foreign skins a wash containing 2 per cent of mercuric chloride solution should be used, and the hands rinsed after with water.
11. Employees having pimples, skin abrasions or cuts should report to the office immediately for first aid administration, or to physician in charge of the medical services of the plant.
12. Aprons, boots, and long-sleeved gloves should be furnished the employees handling the skins previous to their being subjected to dehairing solutions.
13. Employees engaged in carrying hides on their shoulders should have their necks fully protected from coming in contact with skins. Hides should be transported on trucks if practicable.
14. Overalls, aprons, and other miscellaneous clothing worn by employees handling hides should be disinfected at regular intervals.

Handling Chrome and Acid, etc.

In preparing the hides for the dehairing process and in the process of tanning, various acids and dilutions are used in the soaking and tan vats. Among these may be mentioned lime, disulphide of arsenic, tannin or tannic acid, chromium, soda ash and caustic soda, hydrochloric and sulphuric acid, etc.; danger to hands, eyes and other parts of the body arises from this source and acid burns are a common kind of injury in many tanneries. Chrome sores are also of frequent occurrence.

The workers exposed to or handling these acids and dilutions should be provided with rubber gloves, aprons and suitable footwear and they should be made to wear them at all times when engaged in these duties. Also, as a preventive, the workmen should be provided with ointment for treating their hands before starting work so that if acid by any chance gets into their gloves, ill effects are less likely to occur.

In addition to these personal precautions, acid carboys should always be mounted on suitable inclinators before any pouring is done from them. Great care should be exercised at all times while handling carboys of acid, especially while unloading to see that stoppers are firmly set and that no danger of the acid spurting exists.

Skin Eruptions and Diseases

Unless the precautions suggested are carefully carried out the occurrence of eruptions and diseases of the skin will certainly result and the hands, fingers and arms of the workers will become foci of ulcers, eczema and other painful infections leading to incapacitation, and loss of time.

Poisonous Fumes; Fire; Explosion

In those tanneries in which patent leathers of various descriptions are manufactured the degreasing and other processes involve the use of large quantities of petroleum naphtha, wood alcohol, amyl-acetate and nitro-cellulose. These solvents not only give off poisonous fumes which are capable of producing very ulterior effects on the health of the men, which may bring on incapacitation, but they are highly flammable and explosive. It is imperative in such establishments that ventilation be of the most adequate kind and that all possible sources of ignition be effectively guarded against. All electric wiring should be run in tight metal conduit; all switches should be of the safety enclosed type and should preferably be located outside of the rooms in which these volatile liquids are used; all electric light bulbs should be of the keyless socket type, enclosed in vapor proof gloves. No open lights of any kind should be permitted and the workers should be forbidden smoking or the carrying of matches.

Vats and Tanks

The soaking and tanning of hides is done in vats and tanks which have their tops level with the floor. Danger of slipping and falling into these receptacles is inherent to the industry. The manner in which this hazard can be reduced naturally suggests that the tanks be covered or that they be railed along their edges. If covers are used they should be of 2 inch plankings well fitted into recesses along the edges of the vats. If railings are used they should be substantial, double barred, with the top bar 42 inches high above the floor level, and they should be securely fastened in place.

Floors

Because of the natural wet process of tanning and the quantities of oils and grease used in the stuffing operation etc., the floors of a tannery are always subject

to wet and slippery conditions. Here, as in the packing industry, the hazard of slipping must be faced and accidents due to falling are common. Several remedies are available. First, of course, every effort should be made to prevent unnecessary slopping of water and tanning liquids and the spilling of oil and grease. Careful workmen should be able to help these conditions very materially. Second, wooden floors can be treated with a sprinkling of ground feldspar or powdered resin. Third, oily or greasy conditions can be remedied by the application of caustic solution or air slaked lime. Fourth, employees should be provided with footwear of non-skid type and made to wear them.

Machine Hazards

There are many machines used in the handling and working of hides and leather; a good proportion of these have points of operation with cutting, pinching or squeezing action. The hands and fingers of the operators are subject to amputation or mutilation unless these machines are properly guarded and it should never be lost sight of that, if a machine of this class goes unguarded, it is only a question of time, when some unfortunate workman will lose a hand or an arm or parts thereof. Each machine should therefore be carefully studied and an automatic guard device provided to prevent the hands of the operator from being inserted into the pinch or shear point.

Embossing Presses

It is quite impossible, in this paper, to consider all of the machine hazards in the tanning industry. The embossing press, however, is possibly the most dangerous machine used in this business and has been the cause of many amputated hands and fingers. This machine should always be fitted with an automatic guard, both on the "operating" and "off take" sides, designed in such a manner as to close the feed and off-take apertures prior to the engagement of the dies or plates. Wherever the nature of the work will admit of it, a fixed guard, which reduces these apertures to an opening of not more than three-eighths of an inch, is the better arrangement. This latter arrangement is also better than a two hand operating device, which requires the use of both hands of the operator, to set the machine in motion, thus taking his hands away from the point of operation.

The Human Hazard

The workers in these two industries are made up of many nationalities. Those of foreign birth predominate. It has been estimated that 60 to 70 per cent of them are from the European countries. They are necessarily of strong and robust physique, capable of withstanding the heavy duties which fall upon them. The average wage in the packing industry at the present time is about \$28 per week while that in the tanning industry is about \$26 per week. The general level of intelligence makes skilled, understanding, sympathetic and disciplinary supervision imperative, if the best results are to be attained in accident prevention. It is in this field that the causes and remedies for industrial accidents, more than in any other, are to be found.

It has been known for a number of years that physical hazards are becoming less and less a real factor in safety; and recent authoritative research, through the analysis of 75,000 accident cases, the study of actuarial records and engineering reports, it has been found that 98 per cent of all industrial accidents are preventable. Further, this research has demonstrated that 10 per cent only have their origin in plant physical and mechanical causes and that 88 per cent of all industrial accidents are preventable through the enforcement of proper supervision.

The results of this research have been made the subject of a most interesting paper "The Origin of Accidents" by Mr. H. W. Heinrich, Assistant Superintendent of The Travelers, Engineering and Inspection Division, copies of which are here for distribution and more of which can be had upon request.

Success in Accident Prevention

Success in accident prevention, as in any other field of human endeavor, requires that we shall establish and follow a definite plan for its attainment; it cannot be secured by inconstant or haphazard methods. Such a plan involves and necessitates—First, the sympathetic and active personal interest and participation of the executive forces—Second, the definite imposition of responsibility for the prevention of accidents upon the supervisory staff and strict accountability for each and every case of injury—Third, the education and discipline of employees—and Fourth, the energetic elimination of physical accident causes.

"The salvaging of human life" as Professor H. A. Overstreet points out in his excellent book, *Influencing Human Behavior*, "consists not simply in having high ideals; it consists as much in knowing *how*. We need, in short, to know how to interest our fellows; how to arouse their expectations; how to build up habits of favorable response; how to lead and adjust and control."

These remarks cannot apply more aptly to any man than to the safety supervisor of an industrial plant, for he, above all else, must be a skilled artist in human nature and in the enterprise of life.

MR. CROMWELL: There are a few things I want to bring out. In the first place, we represent one of the biggest tanning industries in the United States. In April of this year we had one anthrax case. That occurred about two or three months ago, and in looking up this case we find that the whole family is subject to all kinds of infections, so that probably answers the question right there. We had one of the man's brothers working in the beam house, and on looking up his past record I found that he had an infection about every few weeks, so that shows that the man was predisposed to infection.

Another thing, the Interstate Commerce Commission and the United States Board of Health require you to fumigate all hides coming from outside the United States, so that you can't get away from the fumigation process. They also require you to fumigate the car that the hides come in, and fumigate your hide house after you remove the hides from it, and everything connected with it, and you must burn all ropes, tags, and other materials that come on hides immediately they are taken off the hide, so that there is no chance of the anthrax getting through in case it should come to your plant.

Probably our worthy brother isn't familiar enough with the tanning industry, but I believe you should have divided it, probably, into Upper, Sole, probably Belting, and Harness Leather, because the accidents for each one of those types of leather are entirely different from the others. They'd probably have the same beam house quotations, but after that they would be different practically all the way through the various departments; and of course the accidents common to Upper are not common to Sole, and the accidents common to Sole are probably not common to Harness Leather, or Belting; so you see, in taking the industry as a whole, there are many things to be taken into consideration.

Speaking of health in the various plants, I am here to tell you right now we have some plants in which we haven't taken in but one or two employees in 28 years, so it shows it is a pretty healthy place to work.

Now, in reference to acids, I want to tell you men that I don't think we have a plant where acids are not entirely mechanically handled, and the man does not come in contact with them in any way. They are handled directly from

the car to the big tank outside, and under air pressure are distributed to the various departments and piped to the various receptacles where they are used. All the man has to do is turn his valve from the main container, draw his supply, shut off the tank, and shoot it into the container. So he doesn't come in contact with it in any way. Of course that equipment has to be replaced probably every four, five, or six months, depending upon how much acid is used.

In reference to limes and lime burns, we had one lime burn about two weeks ago. It is the first one we have had in some time, but that was due to a fellow being plain foolish. He walked into a vat of lime soaps in a beam house, and it went over the top of his boots. He was an ignorant chap and didn't change his boots; in fact, he wore the same pair for three or four days. At the end of the fourth or fifth day, he came to the office and said his feet began to hurt him. If he had reported it right away he wouldn't have lost any time. In case any of you men have lime burns, Johnson & Johnson puts out the best remedy. It can't be beaten. As to chrome sores, it is a very good remedy for those, so we don't have any chrome sores any more.

One thing I think he should have mentioned, is masks for men handling lime and various powder extracts. There is no getting away from that. If you don't, you are going to have lime burns on the nose, and injuries to the nose and lungs from different types of powders. It will make a man have hay fever, or something like that, even though it won't be serious.

Now, as to smoking around the plants, there isn't a plant where we permit smoking any place. If they want to smoke, they must get at least a hundred feet away from the building, and they generally go to the fire room and sit around the outside to smoke for a few minutes.

Now, as to vat accidents,—he mentioned the vat accidents. It depends upon the type of tannery whether you have covers or not. It depends upon whether you use the rocker system, or the open, or closed system. In the last few weeks we have inaugurated a new system whereby every time a vat is opened or emptied of leather, as soon as the men finish pulling the last piece of leather out of the vat, they immediately put up a guard far enough away so that if a man backs up to the vat he will be warned before he slips over, or falls into it.

CHAIRMAN CAMPBELL: Was that in the tan yard or beam house?

MR. CROMWELL: In the tan yard.

CHAIRMAN CAMPBELL: What about your vats in the beam house?

MR. CROMWELL: Generally they are full of hides and you can't do anything about those. I am speaking of yard vats. On the beam house vats you only have, as a rule, four or five men working around them, so that you rarely have a man fall in.

I mentioned about three years ago, to the Congress, where we had a green man working in there, and a carload of hides was going by, and he jumped and took in seven with him.

As to slipping about the various departments, I don't believe you can get away from it. This gentleman mentioned abrasive materials. I don't think you can use them. I think it is out of the question. We have tried every kind of a floor that you can think of, and the only floor that will last is a good wood floor. It should be washed down at very frequent intervals. Now there is another thing you can use, which I think will reduce accidents, and that is the ordinary paving brick laid in cement. We are doing that in some of our scrub houses, where very hot water is going through, and it seems to split up the fibres of the wood and you get a lot of splinters. We are using paving brick laid in cement, and I think that is about the best there is, but then, where they are wearing rubber boots, you will still have the slipping.

Now he mentioned the three-inch clearance on the Sheridan Press—I think it was the Sheridan Press from the description of it. You can only use that on Upper Leather. You can't use it on Sole Leather. In the first place, you have the hip bulges, and you couldn't possibly get a piece of that through there. It wouldn't clear. If you did try to run it through the guard would scratch it up and you'd have a second or a third grade piece of leather. You must have at least 2½-inch clearance on all your guards.

CHAIRMAN CAMPBELL: Mr. Cromwell, if you should put Sole Leather or Bat Leather through, you'd have to raise up your guard so high it wouldn't do you any good. You can only use a ¾-inch guard where you are using a fine Upper Leather or Kid Leather, where you lay it flat on the table.

MR. CROMWELL: Yes. Now you mentioned the time of day that accidents happen. I went over a period of four years, over all our accidents, and I find that the greatest number of accidents happened at eleven or eleven-fifteen in the morning, and that the greatest in the afternoon was around three o'clock.

Now there is one type of accident in our industry that he has not brought out, which is the worst, and which we can't do anything for. That is injury to fingers and thumbs through rotor accidents. We have them every week, and in Pennsylvania particularly, the Pennsylvania State Department of Labor and Industry has camped all over us for the last three or four years about it. There is nothing you can do for it. There are no two pieces of leather that are wetted—and we always have to wet leather down before we roll them—there are no two pieces that will take the same amount of water. Now you may apply the unit to one side of leather and it will soak it up, and apply it to another side, and it will only soak half of it up. Now the first piece of leather going under the roller pawl may roll fine, and the second piece may jerk the man's hand under.

CHAIRMAN CAMPBELL: Mr. Cromwell, would you call that the tanning industry, where you use the roller plan?

MR. CROMWELL: Oh yes, sure. We roll all side leather and sole leather.

CHAIRMAN CAMPBELL: We designate that as curing it.

MR. CROMWELL: "Curing" is generally applied, as I always understood the term, more to harness leather than it does to sole leather.

CHAIRMAN CAMPBELL: That is the reason we haven't so many in this Section, because we call it the Packers and Tanners. All sole leather has to be rolled, and that is called the Finishing department.

MR. CROMWELL: Well, it is the same thing. It belongs to the tanning industry. You have to finish your leather before you can sell it, so naturally it has been classified as one of the departments of the tanning industry.

D. D. McLEAN (The Travelers Insurance Co., Hartford, Conn.): Mr. Chairman, I just want to say that it would have been utterly impossible for me to cover every phase of these two industries in my talk or paper. My function, of course, is simply to generate thoughts in the minds of you gentlemen here, in order that you might do more of the talking than I did; and I do think that up to now it certainly has been successful in producing the effect. Discussion has been aroused; and I just wanted to say this, that I think Mr. Cromwell certainly has got hold of the intelligent way in which this thing was intended to be propounded. I generated thoughts in his mind. Don't you get the idea? I am not here to tell it all to you, because, it would be utterly impossible. I could fill volumes, possibly, if I followed out research enough.

CHAIRMAN CAMPBELL: I think Mr. McLean did quite a lot of good. He got Mr. Cromwell to say something that we haven't heard for quite a long time. But now in regard to this lime. You say you had only one lime accident inside of a year, Mr. Cromwell. You had only one lime accident inside a year?

MR. CROMWELL: No. We have had more than that. We have had, I suppose, maybe five this year. They weren't serious.

CHAIRMAN CAMPBELL: You are pretty lucky. We have one every week.

MR. CROMWELL: If I may take another minute of your time, I might say, on this lime question, if you will watch your men's clothing in the beam house—I know it's an awful job—but if you get after your beam house foreman and talk to him like a real friend, I believe you will get away from the lime question. The way I got under their skin, so to speak—two weeks ago an employee of ours who had met with an accident died and left a wife and five children. Of course it was rather difficult for the family to get along; and every time anything like that happens, if you will get your foremen together and don't be afraid to mention names, but just point these facts out to them, it makes them stop and think and realize the condition that their families would be in if anything happened to them. I think you can get more cooperation from them by going after them from that angle than any other.

If you will have your foremen look after the clothes, and thoroughly impress upon the men not to work in the beam house with any holes in their clothes, any holes in their rubber aprons, or any holes in their rubber gloves or rubber mittens, I think you will get away from your lime burns entirely. As I say, we have had only this one serious one this year. We get lime burns in between the fingers, where there is possibly some perspiration and some lime dust has gathered in there. A man does not lose any time from that. He may have a sore hand for a half a day or so, but he gets some of that Johnson & Johnson preparation and that is the end of it.

Now there is another thing that the worthy brother brought up, in speaking of clothing, about disinfecting. I don't believe that is possible. That is all I'll say on that.

CHAIRMAN CAMPBELL: Any more questions to be asked of Mr. McLean?

FRED SCHWARZE (Pfister & Vogel Leather Co., Milwaukee, Wis.): Mr. McLean has aroused a thought in my mind, likewise. In so far as the time of the day is concerned, our survey has indicated that there are accidents in the morning, afternoon, and at night. Any time. Any place. They just happen. If they didn't, they wouldn't be accidents. They would be forestalled. I think the sentiment that is expressed here today is by those who represent the greater majority, in so far as the volume of business done in the packing and tanning industry is concerned, and probably the minority in the number of plants or establishments that are in effect in the country today. I believe that the type of plant that is represented here is the best type of plant, where the owners have taken an interest in the human side of the question and have provided a good many measures which are lacking in the smaller plants, and to which the insurance element, so to speak, has access. Probably in the larger industries, the liability insurance is carried by the larger establishment on the so-called self-insurance basis. However, there is a parallel between the exposure in the small and large establishment.

In so far as anthrax is concerned, in the operation of six plants over a period of eighteen years, we have not had one single case of anthrax—anthrax infection, I mean. Whether we have had the anthrax bacilli come into the establishments is an unknown fact. I could probably say that the anthrax germ has come in, but through some good streak of fortune there has been no hard luck following on its trail.

In so far as the bichloride treatment is concerned, we only consider that a tentative treatment. In fact, we know that the anthrax spore, so to speak, is immune to the bichloride solution and that only boiling in an excess of 160 degrees Fahrenheit will terminate the potential hazard of an anthrax spore.

As regards the furnishing of rubber gloves, boots, footwear, etc., that is good housekeeping, and means of prevention that will afford itself in the long run.

As to the industrial disease liability of rheumatism in connection with the packing and tanning industries, I would hate to have to ask Mr. McLean, or even

better medical authorities, to qualify that statement. I have sat in on legal and medical discussions, and in the presenting of testimony in cases, where that question has always remained unanswered. The fact is that some people, under the most favorable conditions of living, some people that never get within a mile of a tannery, have rheumatism. The extraction of teeth, tonsils, and everything else, does not cure them, but in some cases an ulster does. The opinions are based more or less on an hypothesis, although I will admit this, that the tanning and other wet industries are blamed in the minds of the laymen and a good many professional men, unjustly, for contributing to the disability account of rheumatism.

As regards the lime burns to hands, we make a so-called "hand inspection," also an inspection of rubber gloves and rubber boots, furnish the squirting barrel without cost, only as to the deposit to be made, to maintain control.

I gained from both Mr. Cromwell's and the chairman's comments that the beam house vats in their establishments generally are not covered. Am I correct?

CHAIRMAN CAMPBELL: Yes, in the beam house.

MR. SCHWARZE: Our practice is just the opposite. In fact, our beam house layouts are rather crowded, and we use our vat tops for trucking and handling. I don't know of an open vat that is maintained open after the stock has been abstracted or replaced. We close them up, and maintain guards around them while the stock is being lifted or placed into these vats.

In the matter of slipping hazards, we have found that emery abrasive and a proper mixture of cement gives a fairly good protection against slipping. In wet places, we have also always had a brick and cement construction. Both have materially minimized the hazard. I will not say that they will eliminate slipping hazards, but they appreciably minimize it.

As regards the $\frac{3}{8}$ -inch setting of the guard on an embosser press—did I understand $\frac{3}{8}$ -inch setting?

MR. CROMWELL: $\frac{3}{8}$ -inch aperture.

MR. SCHWARZE: I would say an aperture of that dimension is impractical, although an aperture of greater dimension, possibly as high as an inch and a half, and to avoid risk the form of entrance is very effective. We have been operating an average of a dozen of that type of press for a period of twenty years. In the first three or four years we had a lot of serious accidents. In the last five years, we have had only one minor accident from operating with different types of guards. We have developed a guard for a sole leather press that has a swinging feature to it, and permits a minimum of 2 inches and a maximum of 3 inches clearance.

MR. MCLEAN: Mr. Chairman, in my paper, referring to the safeguarding of the plant operation on an embossing press, or on any other machine where there is a pinching, squeezing, or cutting action, I referred to three different types of guards that can be used. Now first of all, you can use a $\frac{3}{8}$ -inch aperture or opening. I mention that because in the industrial standards adopted by the various states you can use an aperture of $\frac{3}{8}$ of an inch, which will permit the operation of that machine. Or you can use an automatic safety device that has for its purpose the ejecting of the hands of the operator away from the point of operation as the die begins to descend; or you can use a two-hand device to set the machine in motion, necessitating the taking away of the hands of the operator from the point of operation.

Now I understand that you can't use a $\frac{3}{8}$ -inch aperture in every circumstance in the packing or the tanning industry, or in any other industry, as far as that is concerned; but where you can use a $\frac{3}{8}$ -inch aperture, you will be given credit on your rating schedule for a fully guarded machine. The point of operation of the machine, in states where schedule rating is in operation, is a machine that carries a charge with it on the premium, or the premium rate. In some instances it is a flat charge as high as \$15, for instance, for an unguarded circular saw, under the

schedule in Pennsylvania—\$15 for every saw that is not actually guarded. The premium is increased from that flat rate. The same with other machines, by decreasing in terms of charge or cost. A punch press, for instance, gets a flat charge of \$12, unguarded. Now if you can fix that press up so you can use a $\frac{3}{8}$ -inch aperture, fine! Now it wouldn't be any use of me explaining a larger aperture which would be admitted, or which would get you any credit for a fully-guarded machine. I come down to what is the standard requirement. Now, if you can't use that, why then, of course, you must resort to either the automatic guard or the two-handled device. That is the reason I used the arbitrary figure of $\frac{3}{8}$ of an inch.

MR. CROMWELL: You were speaking of a $\frac{3}{8}$ -inch guard. What you can do is this. You can move your guard far enough away from your machine and have an aperture of $2\frac{1}{2}$ inches. He can also run his hand under that, but it will be about that far (indicating) away from the machine, which prevents putting his hands around the side of the enclosure. We have done that in lots of cases where the man can't possibly get into the machine.

MR. MCLEAN: That is a very good device.

MR. CROMWELL: We use it in practically every plant we have, especially on rings, where our experience was very sad when we first started to use them. There are men about the plant today with scars all over them from that.

MR. MCLEAN: Bearing out the point I mentioned in my paper, that unless the machine is guarded it is simply a question of time. Now in referring to safeguards, I naturally adhere to standard requirements that are to be found in the various schedule rating formulae. But that isn't to say that if you can devise a guard from a job study of the machine itself that is equally effective though not of standard pattern, you are not to use it. By all means, let us use our own genius in devising these guards, and if we can modify or amplify in any direction, in order to save a man's hand, or to save a man's life, why let's do it. I mention that because of what you explained you have done in this particular instance.

MR. CROMWELL: There is one thing about anthrax; a solution put out by the Philadelphia Chemical Company, which you can get your local hospital to stock. It is good for about eight months, and you can get a supply large enough to take care of any of your needs, and it will only cost you about six dollars. The local hospital will stock it and store it in the refrigerator until the time limit has expired, and then replace it and charge you for the original amount.

MR. SCHWARZE: We've carried it for fifteen years.

MR. CROMWELL: It's very good stuff.

MR. SCHWARZE: I'd like to ask, Mr. Chairman—he referred to the arbitrary standard of $\frac{3}{8}$ of an inch. Is the regulating body very arbitrary about maintaining the $\frac{3}{8}$ standard?

MR. MCLEAN: It all depends in what state you are operating, but I do believe—in fact, I know—that if the employer can show to the governing body on the question of standards that he has a guard equivalent to the one that comes under the standard, why by all means they allow him credit. As a matter of fact, according to my duties as an insurance inspecting engineer, among the things that I undertake to do (and all our men undertake to do) is to see that creditable guards are given the deductions they are entitled to. The engineer can often help you in producing the evidence, the right kind of evidence, in the right form, before the board of the governing body in order to convince them that you are entitled to credit.

CHAIRMAN CAMPBELL: Mr. McLean, I have been working forty-four years in the tanning industry and have never seen a case of anthrax yet. Like Mr. Schwarze, I don't know what it is.

MR. MCLEAN: Well, that is mighty fine. You know anthrax is like many other highly dangerous conditions in industry. It is known to be fatal unless it is adequately taken care of, and consequently the employer or manufacturer, as well as

his supervising staff, and, in many cases, also the worker in the industry, is so conscious of the danger that he heeds every possible precaution, both required by legislative enactment and by common sense. Where we know a thing to be dangerous, we certainly take every precaution to prevent such accidents.

As a digression, let us look at the coal mining industry in Pennsylvania. In the bituminous fields, the roof is known to be good. In the anthracite field, in Eastern Pennsylvania, the roof is known to be bad, and yet, in the bituminous fields where the roof is known to be good, you have more accidents from falls than you do in the anthracite region, where it is known to be bad, because naturally they are on their toes all the time to stop the accidents.

MR. CROMWELL: What kind of hides do you work, Mr. Campbell, domestic or foreign?

CHAIRMAN CAMPBELL: A good deal of foreign, but we are getting the cheapest we can, the same as the Central Leather.

MR. CROMWELL: That would answer your anthrax question.

CHAIRMAN CAMPBELL: We don't use much foreign hides, and we haven't much anthrax. You get anthrax more in goat skins and sheep skins than in heavy hides.

Mr. McLean, you have been talking about safeguarding machinery. Here's a machine (handing Mr. McLean a photograph) that was safeguarded automatically, done by the maker before it was put in, and here are the results (handing Mr. McLean two additional photographs). I'll show you the full pictures. Pass them along. That is a de-hairing machine. You will see what happened if you look at these pictures.

MR. CROMWELL: He was lucky to get away with an arm at all.

MR. SCHWARZE: Mr. Chairman, following up what Mr. Cromwell said on anthrax. About four years ago we had the hoof-and-mouth epidemic in the South. We were receiving hides on bordering area territory, and, to put it that way, we possibly did receive some indirectly out of the infected area before the quarantine was set up, but in justice to the men exposed to the handling of these hides, we checked up every man who was absent, no matter what the reason was, unless he had been definitely excused, and we did not find a single case of infection.

CHAIRMAN CAMPBELL: I have a little note here that I have just picked up now. We are talking about safety here and the preventing of accidents, but I think "Safety goes where it is invited, and it stays where it is well-treated." That means that your foreman is the keynote of all the departments. The safety inspector or the safety engineer may be all right as an executive, but it is the foreman that should look after these men, and be given all the credit for the no lost-time accidents.

Any further questions to be asked? Well, we have twenty minutes more. If you'd rather stay here than go outside, why we can have a little more discussion, Mr. McLean.

MR. MCLEAN: I think it is up to the gentlemen representing the industries.

CHAIRMAN CAMPBELL: Mr. Schwarze, do you haul your hides out of the beam house by hand or machinery?

MR. SCHWARZE: By hand, and in some cases we reel out with a toggle—we have an endless set-up of hides toggled together and run the first ones out by hand over a reel, and then they are conveyed to a distant vat or point of working.

CHAIRMAN CAMPBELL: Well, we run them over by electricity. We don't need to have them guarded, because the big electric wheel is on the vat all the time.

MR. SCHWARZE: I suppose if you spill the contents, you have a basket right there?

CHAIRMAN CAMPBELL: Yes, but it is cement vats we have—all wide open, and no guards, because they are full all the time and you can't get around them.

MR. CROMWELL: You don't need them.

CHAIRMAN CAMPBELL: Not where they are full all the time, lying flat, and then this machine is on the place where we are going to take it, the fleshing machine. No. 7 Vat is emptied on the seventh day, Monday, generally; the hides then going to the de-hairing machine, and from that to the fleshing machine. We have overhead cranes to handle what has gone through the fleshing machine. As it comes from the knife, it goes down into the pit, and the pit has three big buckets, and that fleshing goes in that and is lifted up by electric motor and shoved right along into the fleshing house.

MR. SCHWARZE: We contemplate a similar arrangement in our new buildings, but our old buildings do not permit that type of handling.

MR. CROMWELL: You don't have any residue there at all. When you stop at night, everything is clean, except possibly a few pieces hooked around some part of your equipment.

MR. SCHWARZE: Mr. Chairman, how are we going to combat the outstanding conditions leading to accidents in our industry? Mr. McLean's paper carried us along a certain line of discussion. I think there is ample time and opportunity to take up some of these vital issues. In trying to determine which part of the industry, in the lower tanneries, not in the sole leather industry, sole or upper leather industry, which part of the industry furnished the greater hazards, I feel that, generally speaking, it is in the lower tannery, particularly in the beam house, where the hazard is practically on an even basis, exposure of cylinder type of machines and roller type of machines, with the pinching hazards equal in any kind of tanning. I believe that a discussion of this kind may bring out some information of benefit to us all, here, so I recommend that at this time we discuss the hazards in the beam house.

CHAIRMAN CAMPBELL: Mr. Schwarze, regarding the beam house, where we have men who have worked there as long as thirty or thirty-five years, it occurs that when a machine gets old, there is something going to happen. Well, generally, it is rheumatism, see?

MR. SCHWARZE: On the Machine?

CHAIRMAN CAMPBELL: The old man is the machine, and it is getting played-out after thirty-five years of working in the wet and dampness. It was a good machine to do it that long. Even your de-hairing machine will get rusty and you have to throw it out before thirty-five years. But the man will stay there for thirty-five years before you throw him out. So he begins to get decrepit. Now what does it? I have heard some people say here that the tannery is a safe place to work, and there is no rheumatism. Mr. McClellan said that. We have an old man who has been working there twenty-five or thirty years, and of course if they get rheumatism that means compensation, you see. If a man goes out with rheumatism, it means, sometimes, he will be out for six months, and when it isn't rheumatism, they call it lumbago.

MR. CROMWELL: I think, if I might make a suggestion, the only accidents we have in our beam house are knife cuts from trimming fleshings off the edge of the hides. Once in a while, even though sawdust is used and everything else, the knife will slip, and just cut the tip of his finger, or the side of his thumb.

MR. McLEAN: I don't want to seem to be taking more time in this discussion than I have any right to, but the question that you raised with regard to the man becoming decrepit and suffering a physical deformity from having been engaged for thirty-five years in a particular kind of work that he was doing in a tannery—that kind of thing is only amenable to adequate medical supervision in a plant. Now industrial medicine is a growing science. It takes a special and particular study on the part of the medical man and the physician to know what the growing incompetencies of working men are likely to be, due to the kind of work that they have to do; so that as Safety grows older and becomes more and more intelligent, and as the gospel of safety becomes more widespread, preventive medi-

cine, as an ally to the physical accident prevention campaign of the industries of our country will become more and more efficient, and will spread its influence and save men from such deformities as you mentioned, and from the diseases that they are subject to as a result of their life work.

That good thing has been done already—a good deal has been done already. Anthrax is one of the occupational diseases that has got to be faced in the tanning industry, and has been, practically most of it, conquered by the efforts of the industrial physicians, by industrial men; and only through that medium, Mr. Chairman, will the things that you speak of be eliminated, and all the toilers in industry be saved.

Now I might take that a little further. The greatest thing that each and every one of us has to deal with in connection with accident prevention in your establishments is not so much the machinery or the physical conditions under which laborers must perform their work, but it is the human element that you have to deal with. I said in my paper that you must not only have ideals that are high, but you must have the knowledge "how." You must know how to interest your fellows. You must know how to build up habits of favorable response.

I don't believe that in your industries you are lacking in knowledge how, mechanically or physically, to prevent the accidents. You know practically everything that you ought to know, in a physical way, to prevent injuries to your workmen; but you still have accidents. Why is this? Isn't it because the human element naturally enters into the situation?

You say to a foreman, "Here is a man who got hurt in your department. What have you done to prevent that?" He replies: "Well, I told him not to do the job in that way. I told him the right way in which to do it." And Mr. Foreman naturally thinks that he has gone as far as he can go. But he hasn't. As a foreman, it is as much his job to stop accidents, and the incidental costs that arise therefrom, as it is to keep up the production in his department.

Now, not all foremen are fully conscious of their obligation in accident prevention. The foreman is the key man of the situation. He has got, not only to show the men in his department how to work, how to work safely, but he must impress his personality upon those men who are working for him in such a way that they wouldn't dare to do the thing in the improper or in the unsafe way. And in so far as a foreman has an accident in his department, he fails.

Now I do not mean that he is culpable, or negligent, or anything like that, but he has this responsibility, whether or not he is conscious of it, whether or not he has fully accepted it. That responsibility is there, and if a man in his department is hurt, he has failed as a foreman. There is something lacking in him, and were I a foreman in a department in industry I would feel that I had failed if any one of my men was hurt, or if I were having a recurrence of accidents.

Doesn't every one of us here do something every day in a certain way because we know our superiors require us to do that thing in that certain way? Of course we do. Every day of my life I am doing things as best I know how, in the way that I am required to by my superiors. Why? Because they have impressed their personalities, spiritually, upon me. They have sold themselves to me. They have made me realize that this is the right way to do it, and they want me to do the thing in that way. And consequently, being good foremen, as they are, I do the thing in the right way.

Now that is the thing we have got to get over to the foremen, that unless they stop accidents, unless they get to those men who are working for them and show them the right way to do the thing, and keep them up to requirements in that respect, and not just throw the thing aside after once telling them—you can't expect to tell a man a thing once and expect him to know all about it. You must keep on telling him; and, gentlemen, in this paper, "The Origin of Accidents," by Mr. Heinrich, you get a new thought on accident prevention, a

new point of departure. You have got to be seeking out new ways of reaching down to the fellow in the ranks whom we want to save, and it is only by impressing ourselves first, as safety workers, and getting the message over to the foreman, the key man, backed up, of course, by the personal interest and personal participation of the man who pays the bills at the top—only in this way are we ever going to make accident prevention the high and the noble thing that it can be made.

It is not ignoble now, unquestionably, but it has higher things ahead of it, as soon as we get these thoughts thoroughly impressed upon our own minds and upon the minds of those who have charge of toilers in industry. I want to give these copies of "The Origin of Accidents," by H. W. Heinrich, assistant superintendent, Engineering and Inspection Division, The Travelers Insurance Co. Take them and read them as opportunity offers.

MR. SCHWARZE: Mr. Chairman, I'd like to come back on Mr. Cromwell's statement regarding the beam house. Do I understand you correctly, that you have your machines all satisfactorily guarded in the beam house, and that you have no other accidents besides cutting accidents?

MR. CROMWELL: We had only one other accident, as I recall, last year, where we were working extraordinary hides, and since then we have guarded the machines so that accident can't happen in any plant we have; and that was two men working on both sides of the machine. They threw the hide into the machine, and as they did so, the shank or the post hit the operating lever, and one of the operators broke his arm. That is the only accident I can recall in the beam house, at the present time, outside of cutting.

MR. SCHWARZE: How do you guard your pinching hazard on the top?

MR. CROMWELL: We haven't had any trouble on that at all.

MR. SCHWARZE: There is a danger of a man being caught as the feed roller turns inward.

MR. CROMWELL: No, there's not much chance of that. We have two bars in front of the machine, one located about that high (indicating), another that high (again indicating), so in case any man slips, or anything like that, he can put out his hand and catch himself.

MR. SCHWARZE: Doesn't that interfere with throwing in the hide?

MR. CROMWELL: No, this is located—I can't tell you the clearance on the top roll now, but it is enough so that the man couldn't get caught between the two of them, yet enough to protect the man from being hit, because he can probably put his arm against it and grab it.

There is another thing to watch in the beam house, which some foremen believe, and which some do not. We have bridges for all our men to stand on. By a "bridge" I mean a platform raised about six or eight inches off the floor, and these platforms are supposed to be covered with two-inch planking, and as a man works there he will naturally wear two holes in those planks—not holes, but depressions.

Now, some foremen insist upon replacing those planks immediately upon the wearing of the depression in the plank. Another foreman wouldn't allow you to replace any, because he says the depression gives a man a toe-hold, and more of a chance of regaining his former position if he does slip; whereas, if it were smooth, he probably would fall to the floor. There is a divided opinion on that. Every place I have been and seen these worn spots, I have made them replace them, because I think it is the right thing to do, but outside of that I do not know of any other hazard there.

MR. SCHWARZE: In connection with the bridges that you mentioned, we found it good practice to make them of cement.

ADJOURNMENT

October 3, 1928

WILLIAM CAMPBELL, Chairman**Safety Engineer, Graton & Knight Company, Worcester, Mass.**

The second session was called to order at nine forty-five o'clock by the chairman, W. Campbell (Graton & Knight Co., Worcester, Mass.).

CHAIRMAN CAMPBELL: The first on our program this morning, gentlemen, is "Routine in the Handling of an Injury Case," by A. B. Drummond, Industrial Relations Department, Wilson & Company, Chicago.

The Routine of Handling Injuries

By A. B. DRUMMOND**Industrial Relations Department, Wilson & Company, Chicago, Ill.**

As a matter of convenience and follow through, I am going to treat the subject assigned to me under three general headings—Safety, Medical, and Compensation.

Safety, in my estimation, is the Alpha and Omega in the routine of handling injuries. Constructive safety begins with the injury, as usually it discloses that something is wrong with men, methods or materials. By focusing attention on the causes, it gives us the experience necessary to carry on accident prevention with greater efficiency.

The natural and, at the same time, the imperative thing to do when an injury occurs, is to get the injured party into the hands of the medical department—for examination as to the extent of injury and determination as to proper treatment required; so that the necessary surgical care can be rendered and the healing process started without undue delay.

During the time of examination and treatment it is essential that the surgeon draw out from the injured person a full and complete first hand story of the accident and its causes. If a proper confidence in the medical department has been built up, this description could be secured easily and freely, and will form an accurate basis for further investigation as is deemed necessary. Careful attention should be paid to the physical conditions and characteristics of the patient with a view to making notations on any and all points that might have a bearing on future handling.

All this information should be written immediately on the surgeon's report (made in duplicate) one copy to be retained in the medical department for their file; the original being sent to the department handling compensation. It has been found desirable to have a printed form, to be filled in duplicate, notifying the department and a foreman's report covering the accident from his viewpoint. The duplicate copy, pinned to the original copy of surgeon's report which is sent to the compensation department, would seem to be a check against failure to return foreman's report promptly.

The foreman's report should stress two important points—"How did the accident occur?" and "What can be done to prevent a recurrence?"—together with other information that is deemed necessary and advisable.

The compensation department should check carefully on the surgeon's report and the foreman's report, noting all discrepancies, and make such further inquiries as are necessary to make the stories match and present a clear and complete picture of the facts.

Roughly speaking, injuries might be classed under three general headings: 1st, Those injuries which require only the original treatment and dressing (or subsequent dressings) and do not involve stoppage of work; 2nd, Those cases which

are returnable to work but can return to the medical department for treatment; 3rd, Those cases which require confinement to the home or hospital. The first two classes should be assigned a definite time to return for treatments and a record kept to check against failure to return as suggested. The third class should be followed through by the medical department for treatment as required. A progress report should be made out after each treatment, visit or dressing so that the compensation department is properly advised as to the situation in each individual case.

In cases where the recovery from the injury is delayed beyond the point where a full recovery can be normally expected, such additional tests and examinations should be made to positively determine that there are no contributing causes—other than the injury itself for failure to respond to the usual treatments indicated.

Somewhat the same procedure should be followed in those cases where it is suspected that malingering is delaying the recovery unnecessarily.

The compensation department—with these various reports before them, together with such personal investigations as may be required—should be able to handle those cases, which are of a partial permanent nature, or involve specific losses, or those compensable cases which are returnable to work after a period of treatment, with the proper knowledge of each situation. Usually, this should be a matter of simple computation.

The laws governing the payment of compensation to injured employees vary to a considerable extent in the different states. Some states make it necessary that hernias, for instance, be of such a nature as to cause stoppage of work completely and be due entirely to the work in which the injured person was engaged. Other states insist on the payment of compensation for this class of injury when the nature of the work may or may not have exaggerated or aggravated a previous existing condition.

Other causes under some state laws throw the entire burden upon the employees, while other states are more liberal in their interpretations. Each set of circumstances must be considered as a separate matter, as to what is or is not compensable, depending upon the laws of the state in which you are operating or in which state your employees may be when injured.

Working in conjunction with the medical and compensation departments, the safety department should check carefully on the records of injuries and causes and take such immediate action as may be possible to correct the accident producing causes.

It is recommended that a plant safety committee, composed of both supervisors and workers be organized, and to this body should be brought the composite record of injuries and causes. As a means of enlisting the active cooperation of the plant personnel and spreading the gospel of accident prevention this system has proven its worth.

Regular inspection trips should be planned for the committee and the results of each trip should be sent to the superintendent of the plant in order that a complete follow-up may be had. If your operations cover more than one plant, the accident records and accident prevention records should be compiled jointly, so that each location will have the advantage of the experience gathered.

Much more could be said as to the value of records and statistics in carrying on safety work and the information to be gained by careful checking through the accident reports which are constantly passing over our desks. But as the subject assigned to me was the "Routine of Handling Injuries" and it is my understanding that speakers to follow me will cover these points, I feel it would be unfair to those men who have spent time in preparing their talks to steal their thunder.

CHAIRMAN CAMPBELL: I think Mr. Drummond has brought out the handling of injuries very clearly, because we do just the same thing in Graton & Knight Com-

N. L. BRAINARD (Swift & Co., Chicago, Ill.): I have one question I'd like to ask at this time. We sometimes find cases, and I think others will have the same experience, where the doctor will, after the injured man has been examined, pass it as a no lost-time accident. In the doctor's opinion, the man should go back on the job; but occasionally a man will think otherwise, and he does not go back on the job. What is your procedure in such cases, Mr. Drummond, just for a matter of information.

MR. DRUMMOND: There isn't any set procedure, Mr. Brainard. I call to mind a case recently where a man claimed that he had a pain and was not able to return to work. The case was taken up before the Industrial Commission, and all the medical advice that we could possibly get, either from the standpoint of his own doctor or that of the Commission's doctor, or our own doctor, would show no apparent reason or cause for pain; but we couldn't disprove the fact that the man did have pain. He showed very clearly, by his actions and reactions that something was wrong, but nobody could say that there was a certain definite reason for this man suffering pain in his heel. Of course we all realize there are a number of bones in the heel. It may be that something was disjointed, which was not revealed by X-ray or any other test. But we paid on the case, because he claimed absolutely that he had pain, yet no doctor could show why he had pain.

There will be constant disagreement with your doctors. Some men will say that they are not able to go to work, and the doctors will say they are.

MR. BRAINARD: That is the type of case I had more in mind, particularly the type of compensations not involved for maybe three or four days, but they are a source of a good deal of—

MR. DRUMMOND: After an amputation, the doctor may decide the man is able to go to work. The man may claim the end of his finger is a little bit tender and he is unable to go back. It is a fact that has to be tested in each individual case.

MR. BRAINARD: I have in mind cases where a man has possibly been to the doctor's office to receive treatment, and is then told he can go back to the job and finish out the day, but he doesn't come back until the next day. I think such cases present a problem in the routine of handling; as far as the doctor's office record is concerned, that man has gone back to work.

MR. DRUMMOND: Well, of course there is also the other side of it, that we may return a man back to work with what would ordinarily be a simple scratch or cut, which may develop into a serious infection later, or a claim of pain due to an infection which would have to be proved or disproved. It has to be based on the facts in each case.

MR. BRAINARD: The method we follow is to check up those cases the next day.

MR. DRUMMOND: I believe I said, Mr. Brainard, that in those cases where the recovery is not during the time we could normally expect it, in cases of that sort such further tests and examinations as are necessary may be made to determine just what were the causes aside from the injury itself. That may even go as far as tests, or whatnot, to find out definitely just what the reason for the delay of recovery is.

MR. BRAINARD: It is largely a matter of detail or routine, but it has caused a good deal of controversy between the plant foremen and the doctor's office; for the reason that the plant foremen criticize the medical department for marking men "no lost time," and then the man does lose time. They do not seem to understand that the doctors are not infallible.

MR. DRUMMOND: Well, you have the first examination charts and your periodic examination charts, which, if the man has been in your employ some time, ought to be very helpful in figuring a man's reaction on each special case. Some fellows, of course, are free bleeders. Other fellows can almost have their hides taken off without bleeding. It is the same thing on nerve reaction. Some fellows can stand the gaff pretty well, while other fellows faint at a mere scratch. Some of them

are fellows you wouldn't expect to do that, husky chaps, and if they get a little scratch, they just topple over. On the other hand, you will find some little fellows, about four feet three, who stand up under an awful pain. I'm just drawing a picture from one extreme to the other. I don't know whether that answered you, Mr. Brainard. It is a different situation each time. I think that is a matter, largely, of the skill of the men in your medical department, backed up by periodic reports on examination which are made purely for rehabilitation purposes; and you can pretty definitely determine the situation if you have a picture of the man's background, physically and socially. You know about how he lives, and what his complaints have been prior to this time, and how he reacts to them. Some fellows, of course, will indicate straight through that they are going to be fellows difficult to handle under any situation, and yet they may have a class of skill that makes them desirable to employ, in spite of that.

FRED SCHWARZE (Pfister & Vogel Leather Co., Milwaukee, Wis.): How do you control your injured employee—an employee temporarily disabled? How do you control him from getting back to the foreman and going in on production work?

MR. DRUMMOND: You mean a man going back?

MR. SCHWARZE: Without being qualified to the foreman as being able to go back to work.

MR. DRUMMOND: The medical department decides when he should return.

MR. SCHWARZE: Yes, they make a written qualification, but in the meantime he loses control of that man.

MR. DRUMMOND: That absolutely passes to the hands of the medical department, and they, in cooperation with the production department, usually handle the matter of when the man should go back to work. In the case Mr. Brainard brings out, that doesn't quite fit in with that schedule.

I have seen cases where somebody has built up an enviable record for no lost-time accidents. I recall, about a year ago, being in a shop where they had built up a record of 429 days without a single lost-time accident; and I was really amazed that that thing was possible in the kind of work that these particular people were doing. When I was going through the shop I noticed a fellow with one arm bandaged heavily, sweeping the floor with a broom. Now that man, as a matter of fact, had three fingers amputated on one hand, but in order to keep the record going the foreman put the man back on the job. He was able to work with the broom in one hand, and it was not lost time. But by the time that was worked through the Compensation Department it was determined that it was lost time, although the record would mount to that point before it was discovered. When you build up a record of 429 days without a lost-time accident, you are going to be mighty jealous of it!

MR. SCHWARZE: Are you inclined to give the employee the benefit of the doubt when he maintains subjective symptoms—he claims a pain existing, and there is no proof of it?

MR. DRUMMOND: There is no set rule on that. It depends entirely on the man himself, his background, and things of that sort. In this particular case that we brought up before the Board, there was no medical authority to prove that that man had any reason for having pain, but they couldn't prove that he didn't have pain.

O. F. W. CROMWELL (United States Leather Co., Ridgway, Pa.): Mr. Drummond, don't you think it is a good plan, where you have a dispute, to pay another physician a couple of dollars more, or three dollars, to check up on both sides? I do that right along.

MR. DRUMMOND: I think I said that in cases of recovery beyond the point of normal recovery, such further examinations are made as are necessary in order to determine just what the causes are. I made that as a broad statement. In any cases of dispute, it is always well to back yourselves up with the best opinion that

you can get. While of course we feel that our medical department is as good as any medical department, in all our plants, yet we feel that we should have two, or three, or four, as the case may be, independent examinations and reports to back up their report. We are fortified a whole lot better. We don't stop at our medical department in cases of that sort. One opinion isn't worth very much; that is, in a case that involves some money. Mr. Schwarze was telling me about some cases he had to bring up in the supreme court, amounting to something like \$12,000, in which case it is money well spent, and of course we'd be prepared to do the same sort of thing.

CHAIRMAN CAMPBELL: Mr. Drummond, we had an accident in our place, where a man had a rib broken, so he said. The doctor took him to our own hospital and put the X-ray on him, but there was no rib broken. He belonged to five different societies. He had five other doctors to go to see, and all five would say that his rib was broken. We had to pay him the compensation, and he was out seven weeks.

MR. DRUMMOND: I recall a minor case similar to that. We recently paid on a case in dispute, backed up by the testimony of the man's own doctor, who had also certified him to three or four different organizations who paid weekly indemnities. About two or three weeks later we understood there was a case in the police court, where this fellow and the doctor had a fist fight over the disposition of the spoils.

DR. J. R. FRENCH (Golden State Hospital, Los Angeles, Calif.): Perhaps I can add something to Mr. Drummond's statement as to the class of case the gentleman mentioned, about the difference of opinion between the doctors and the patient. Sometimes the patient has an idea that he has pain. Now that idea is simulated for one of two purposes, either with the idea of gaining compensation from three or four societies, or a false interpretation of the existing symptoms. Now, we classify those cases into true malingerers and false malingerers. The false malingerer is the one that I just mentioned, that misinterprets existing symptoms. He may have pain in his heel, and he feels that if he uses that foot that he is doing himself a great bodily injury. That case is a difficult one to handle, and it can only be handled through the salesmanship of your physician.

Your physician has to be more than a physician. He has to be a salesman. He has got to sell that man the idea that he is able to return to work, and his being able to return to work is for his own good. The doctor who takes the stand of representing the company—or if the patient feels that the doctor is representing the company and is trying to get him back to work to save the company money—there is a certain amount of resistance developed in that man. That mental resistance is going to be present, and the more you examine him, the greater momentum your case is going to gain, because that man is going to stand up before the commission, and he develops a group of subjective symptoms that even the commission, or any one else, can't determine, and the commission takes the man's word for it, and you are penalized. Now that case, if handled in the beginning, and the man were sold the idea that he should return to work, for his own good—why you take some of the big cases, and they would amount to nothing if handled properly in the beginning.

Now, in the other type, where the man is attempting to get money under false pretenses; as a rule he is not difficult to handle, because, if you make an early investigation—there is one of the things the doctor can do for you. The doctor has to sign the reports for an application into these various organizations. Now, if the doctor will just bear in mind, instead of merely writing them out, and will just get right down into it and start his sales talk, he can terminate the disability. So it is really a matter of psychology. The doctor has to be more than a physician. He has to be a salesman and sell the man the idea that he is able to return to work, and complete his records accordingly. In that way, some of these cases, as I say, that start out innocently, do not grow into a great big snow ball.

MR. DRUMMOND: Mr. Chairman, again I will say that I really covered that. If the proper confidence has been built up in your medical department, so that the men recognize that the doctor is more than a physician, that he is really a friend—if you might call it that—he is sympathetic, or should be, that he is glad to see the fellow come into the office, not just because he is injured, but just on account of his personality; but his attitude should be, as you say, not that of a high-pressure salesman, but a sympathetic salesman—and if he can make the man understand that his entire purpose is not hurrying him back to the job, but one of complete rehabilitation, and let him understand that he is not dealing with anybody except a friend. Only in that way can a confidence be built up in the medical department, and if that degree of confidence has been built up, and all your other things covered, in the way of investigations and reports, up to the time they come before your Compensation Department, I say, again, that most of your compensation should be a matter of simple computation.

CHAIRMAN CAMPBELL: Any more questions to be asked?

MR. SCHWARZE: There's a question I'd like to ask Mr. Drummond, how he finds his organization being willing to take care of permanent or partially disabled employees, men who have suffered the loss of a hand or arm, or leg—some permanent injury of that kind. Do you have to make allowance in your production records for the inefficiencies of such a man, compared to a normal man?

Rehabilitation a Duty

MR. DRUMMOND: Well, a physician industrially can not be any different from what he was during the last war. As a matter of fact, the attitude of the physician was to rehabilitate and put the man back into fighting shape. As to those who were maimed, other arrangements had to be made. So it is industrially. If a man is injured to the point of no longer being able to perform the functions he performed before, it does not mean that he is entirely barred from employment, but such employment can be found for him as is in line with what he can still do. That is an unfortunate way of looking at it, but it is the fact. If a man is required to have his full faculties, all his arms, limbs, eyes, etc., on a particular job, that does not mean that we can't fit a man for some other job, not necessarily paying less money, but one requiring a different degree of skill. I remember that during the war we made a survey, anticipating a lot of loss of eyes in conjunction with the Red Cross organization. We figured, from the experience of previous wars, that there would be a lot more wrecks than did come back. We were fooled on that, and I'm glad we were. We found it was possible for a man with only one arm, no eyes, and no legs, to perform an operation in our plant. That thing was carefully rooted all the way through. There wasn't a single job that was not surveyed for the possibilities of putting handicapped men on the job. We still have that information, and we are using it. It seems almost impossible to believe that men without any eyes, no hearing, only one arm, and no legs, could perform an operation satisfactorily, but it can be done.

MR. SCHWARZE: In conjunction with that, the person would earn a living wage?

MR. DRUMMOND: Yes. Of course that would mean some additional assistance. The man would have to be placed on the job, but he could perform that function—necessarily on a chain operation, when the stuff would be brought to him.

MR. SCHWARZE: His production cost would not exceed that of a normal man?

MR. DRUMMOND: No.

CHAIRMAN CAMPBELL: Any more questions to be asked?

MR. DRUMMOND: I want to say that at the time the survey was made, it was also made on the basis of time study—just to cover your point, Mr. Schwarze.

Report of the Nominating Committee

CHAIRMAN CAMPBELL: I might add that the nominating committee is ready with its report:

The chairman of the nominating committee, Mr. McClellan, has appointed a full organization to serve for the incoming year:

Chairman, E. E. Drews, Libby, McNeill & Libby, Chicago, Ill.

Secretary, Herbert L. Clover, International Shoe Co., St. Louis, Mo.

Chairman Poster and Slide Committee, Fred Schwarze, Pfister & Vogel Leather Co., Milwaukee, Wis.

Chairman Membership Committee, Wm. Corey, Delaware Leather Co., Wilmington, Del.

Chairman Publicity Committee, Charles Boncholt, Hammond Standish & Co., Detroit, Mich.

Chairman Program Committee, S. R. Jensen, Armour & Company, Chicago, Ill.

Chairman Statistics Committee, Dean Money maker, International Shoe Co., St. Louis, Mo.

Executive Committee, The Officers and N. L. Brainard, Swift & Company, Chicago, Ill.; J. M. Eaton, Libby, McNeill & Libby, Chicago, Ill.

LOUIS BARR (Armour & Co., Kansas City, Kansas): I move that those committee nominations be accepted.

(The motion was seconded and carried.)

CHAIRMAN CAMPBELL: Well, these gentlemen are elected for the incoming year.

Now, the next thing on the program is "Accident Statistics—How to Compile and Use Them to Get Results," by E. Drews, safety engineer of Libby, McNeill & Libby.

Accident Statistics

By EDWARD DREWS

Safety Engineer, Libby, McNeill & Libby, Chicago

The first casualty in the history of mankind of which there is any record, appears to have taken place in early bible times, when Abel lost his life at the hands of his brother Cain.

We, as children at our mother's knee, have often heard this little story, also the story of Cain's reply. "Am I my brother's keeper," when the Lord questioned him as to the whereabouts of Abel.

In our impressionistic childish minds, we immediately decided that Cain was an onery sort of a cuss to feel that way about his own brother, and I believe, we still think so.

We are now grown up, yet as we look about in the hustle and bustle of our busy lives, we still see altogether too much of the spirit of "Am I my brother's keeper?"

The spirit of Libby, McNeill & Libby in regards to Safety is to always help and teach others, and this requires nothing more than team work and cooperation.

I believe it has been discussed on several occasions that it is not good policy to rely upon the foreman in putting safety over in their departments, and also that the reporting of accident statistics was not of much benefit.

I am going to try to give you a little outline of the manner in which we function with regard to Safety Work.

We are not by any means 100 per cent perfect, but our records show a marked

improvement each year. Considerable amount of Safety Work has been done by Libby, McNeill & Libby as far back as the organization of the National Safety Council, but it was not until the year of 1926 that a record of accidents was kept, listing them by departments. Also itemizing them as Minor, Major, Neglected, Infected Cases, Lost Time, and Causes.

Although we have been members of the National Safety Council almost since the time it was organized, and have held Safety Meetings regularly, there never had been a monthly report of accidents made to our foremen. It was somewhat of a surprise to many of our foremen when they received a copy of the first report in 1926, and naturally it created considerable thought.

A report is received daily in our safety department from our doctor's office, listing all accident cases handled. This report is segregated by departments, and a copy sent to each foreman, which gives him a record of the previous day's accidents that occurred in his department, and this report should agree with his records. The neglected and infected cases shown on this report are underlined in red. If a foreman finds a neglected or infected case on his report, he immediately calls the employee into his office and requests an explanation why he or she did not report to the doctor's office at the time of the accident.

All employees receive instructions at the time of hiring that they must report to the doctor's office every accident or near accident to themselves at once. If this is not complied with it means dismissal.

This system of compulsory reporting by each employee produces very good results in getting them to receive medical attention.

A comparative statement is made of all safety records for the previous month and the previous year. These reports are read at our regular safety first meetings.

Personal investigation is made of all serious cases, and I am subject to call day or night by our doctor's office. The foreman of the department in which the accident occurred is also called into the doctor's office so that a thorough understanding is arrived at as to how the accident occurred, and steps are taken so that there will not be a recurrence.

Every foreman, sub-foreman, and department head is held responsible for safety work in his department. He must give a satisfactory explanation on all accidents—equally as well as keeping his production up to standard.

I do not want to give the impression that we demand our foremen to do their duty in safety work. The interest that our foremen have in safety work is entirely voluntary and better results are obtained.

Our Chicago plant consists of thirty departments. The largest is our can factory, manufacturing lard pails and all our cans for canned meats.

Approximately 100,000,000 food containers were manufactured during the year 1927, using 27,500,000 pounds of tin plate. You can readily visualize the hazards connected with this one department. 70 per cent of our minor accidents are tin cuts.

The canning department is next in size—packing 75,000,000 cans of food products annually.

The Beef Cutting, Freezers, Curing Cellars, Labelling Rooms, Box Factory, Smoked Beef, Dried Beef, Extract, Shipping Departments, Mince Meat, and Mechanical Departments follow in size respectively.

The average number of employees for the year 1926 was 1692 persons, with a total of 4,712,026 working hours. During this period we had 12 permanent disability cases, and 174 temporary disability cases. Comparing these figures with the year 1927 which shows an average of 1632 persons and a total of 4,267,312 working hours. During this year we had six permanent disability cases, and 160 temporary disability cases. You will note there was a 50 per cent decrease in the permanent disability in the year 1927 over 1926. We believe the constant drive for safety guards protecting dangerous hazards has accomplished this decrease.

Major cases described as fractures, broken bones, severed tendons, dismemberment, hernia, etc., have also shown considerable decrease in the last three years. Our record shows for the year 1926-38, for 1927-31, and for the first eight months of 1928-11.

Reports of minor accidents are constantly increasing. This is due to the fact that we encourage our help to go to the doctor's office for immediate attention no matter how small the cut or bruise might be.

A complete record of lost time and the value of same in dollars and cents is kept. Lost time is where an employee who has been injured in any way loses one hour or more of his time while away from the factory.

Comparative figures for the last three years show

1926—196 employees lost 15,151½ hours equal to \$7,630.66

1927—168 employees lost 10,247 hours equal to \$5,063.22

And for the first eight months of 1928 we show 72 employees lost 6365½ hours, total value, \$3087.10.

As we have stated previously our total number of cases treated in the doctor's office have considerably increased, while the lost time in hours and dollars has shown a steady decline during the same period. This decrease is of great importance, not only to the employee, but also to the employer.

Reports covering neglected and infected cases for the last three years show

For 1926—520 neglected, and 218 infected

1927—506 neglected, and 190 infected

First 8 months of 1928—206 neglected, and 67 infected

This report also looks very favorable and we look for a substantial decrease during the year of 1928.

We do not conduct periodical campaigns or safety rallies. Our policy is a continuous, steady application practice in safety work, meeting once a month or oftener. Every one is encouraged to do at least one good turn in safety work each day.

In November 1926 we installed in our Chicago plant a system which we term "Self Inspection System." This is one of the most valuable forms of inspection. The department foreman in charge of each floor or department inspects this department and makes a personal report to his department superintendent, who in turn makes a written report to the Department of Safety. This makes for close cooperation between the safety department and the operating departments. Better results can be obtained from these inspections than by having one or two men cover the entire plant. It gives a better opportunity to keep in touch with all departments at one time.

Before we installed this "Self Inspection System" we found that the foreman and operatives were relying more and more on the work of the safety organization instead of applying safety to their own duties and gaining safety responsibilities therefrom.

Our Chicago plant conducts a Foremen's School. The foremen meet one day a week for one hour, after working hours. A general discussion is encouraged and suggestions are requested covering safety, insurance, sales, piece work, employment and general plant policies.

In conclusion, it is my belief that a reduction of accidents to employees, or loss of time through injury, can only be obtained through close cooperation by every individual.

CHAIRMAN CAMPBELL: Any questions to be asked of the speaker?

N. W. PIERCE (Raritan Copper Works, Perth Amboy, N. J.): My name is Pierce, from the Raritan Copper Works, Perth Amboy, New Jersey. I realize that our industry isn't parallel with the packers and tanners, but I believe that this accident prevention problem is common to all of us. I came in here particularly to hear this paper on "Accident Statistics and How to Compile Them." I read,

from time to time, or glance over, long periods of time without lost-time accidents, sometimes for two or three years, a firm employing several thousand men. We have about 1,000 employees in our plant, a comparatively small plant. We think we have a pretty effective safety organization, but we never have been able to go one calendar month without a lost-time accident.

It is true that certain departments in our plant have gone long periods of time. I have one department that has gone pretty nearly six years without a lost-time accident, but I am talking about the plant as a whole, and I am particularly interested in finding out what a lost-time accident is. We are using the National Safety Council method, but I heard, in one of the meetings yesterday, an interpretation that this meant until the man could be returned to work, no matter what the work was. Now we don't put a man on watching, nor give him a broom to push around the plant. We figure when he is able to return to the job on which he was injured that he has recovered, and we have to figure the time lost until he can return to that job. I'd be very interested in hearing what the experience of some of these other gentlemen is along that particular line.

CHAIRMAN CAMPBELL: There are a good many concerns, you know, that have different kinds of jobs to give a man when he is injured. In my own firm, if a man is working on a wet job and he gets the point of his finger torn off by the machine—the same as this gentleman said—if there is some grit in him and he doesn't want to lose any time, and he doesn't belong to the organizations which give him compensation, we take him in and give him something easy to do. Therefore we avoid the lost-time accident.

MR. DRUMMOND: I can realize absolutely what this gentleman is up against, for the simple reason that when a person is drawing up statistics he draws them up for a certain purpose, and unless we know how they are arrived at, sometimes they don't mean what we think they should. There is a variance, of course, in how people handicap themselves.

For instance, I was very much interested in what you said, that you considered a lost-time accident one in which the man did not return to the job on which he was working at the time of injury. How could that always be possible, depending upon the extent of injury? Further, take your Interstate Commission. They have set up a certain set of rules as regards what should be considered a lost-time accident, which is entirely different, I believe, from what most of you here figure on, so far as your own plants are concerned. Mr. Drews made a statement of what he considers a lost-time accident. In figuring ours up, we figure anything over the day on which the injury occurs. Mr. Drews said "over one hour." I think the Interstate Commission is three days—I may be wrong on that, but I think it is.

You can readily see that where we assess ourselves on anything over the day on which the accident occurred we'd be reporting lost-time accidents, and the railroad company would not be reporting any, with a three-day leeway. On the other hand, Mr. Drews is reporting everything over one hour. Statistics don't mean a thing unless you know who drew them up. I believe it is a shame we don't put them on the same basis. As it is, he feels as though he hasn't done a darned thing. I don't think you should feel that way. You should get back of the system used, and I think you'd be a good deal heartened when you got through. After all, none of us is really bad.

CHAIRMAN CAMPBELL: Any more questions to be asked?

MR. DRUMMOND: Just one thing, Mr. Chairman. We have found that, instead of calling people together for a common agreement in regard to an accident, as Mr. Drews mentioned in his paper, we get a separate report from each fellow, —and we get that in written form—and then we have our meeting afterward. Sometimes we find some discrepancies that might be ironed out in the discussion,

that show up on the reports, and the written report has a marked effect, especially when it comes to cases of treatment by your medical department before your industrial commission board. The spoken word doesn't hold up like a written record will, so we have gone absolutely on the written record. We want it down in black and white what the fellow thinks at the time. We don't want to give him a day or so to change the story.

MR. BRAINARD: Just one word on statistics. While they are very interesting as a matter of comparison, they are of no real value to us unless we use them as a measure of the progress we are making. If we simply make statistics that we have gone so many days with so many days lost per 1,000 days worked, or something of that kind, it means nothing unless they are made on a basis whereby they are a true measure of the progress we are making in accident prevention; and such statistics, I think, are of value; but unless we do, when we are making the statistics, as accident prevention people, make them for our own guidance, and not to make a record, they are absolutely of no value. We are simply kidding ourselves if we get up statistics and do not use them to show just what is occurring. The statistics which we use are made from the records of the casualty company, showing the type of injury which is causing the greater number of accidents at our plants—the type causing the greatest amount of compensation, and the number of days lost—and I will say that we have been somewhat surprised when we got the statistics kept in that manner.

For instance, one might think, in the packing business, that we are going to have the greater number of lost-time accidents as a result of knife cuts, counting days lost, and severity, etc., but our statistics show at the end of the year that we have a greater number of accidents as the result of handling objects—handling objects classified in three different ways; first, handling of heavy objects, strains due to hauling, lifting or handling; second, handling of sharp objects, that is, other than knives, etc., and third, the handling of hand trucks and carts, etc., which result in a greater number of accidents, even in the packing business, than we get from knife cuts. And the same is borne out by the statistics throughout. We find, by a careful analysis of that kind where the accidents are occurring, and what type of accidents are causing the greatest degree of disability, and to that extent, I think, our statistics are valuable, but as to showing that we can go so many days without a lost-time accident, we are simply kidding ourselves.

MR. SCHWARZE (Pfister & Vogel Leather Co., Milwaukee, Wis.): I'd love to ask Mr. Drews regarding compensating foremen for attendance at foremen's meetings after working hours. Do you pay them extra in addition to salary?

E. E. DREWS (Libby, McNeill & Libby, Chicago, Ill.): No, sir; we do not.

MR. BRAINARD: I presume the foremen are on steady time, anyway?

MR. DREWS: Most of them are. I might say that fifty per cent of our foremen attend such meetings on steady time.

MR. DRUMMOND: I think Mr. Schwarze is bringing out whether it wouldn't be better to have the meetings on company time, or the time that belongs to the man, regardless of steady time or not.

MR. SCHWARZE: Do you get 100 per cent attendance, Mr. Drews?

MR. DREWS: We have about 80 per cent attendance at our meetings, and possibly 10 per cent of the balance are probably at work and can't leave the jobs, probably working after the time that we call the meetings.

MR. SCHWARZE: Do you feel that 80 per cent represents the wholehearted cooperative spirit?

MR. DREWS: There are at least one or two persons from each department present, either the sub-foreman or regular foreman is present.

CHAIRMAN CAMPBELL: On their own time?

MR. DREWS: On their own time, yes, sir.

MR. DRUMMOND: Is that immediately after closing time?

MR. DREWS: About ten minutes after the whistle.

CHAIRMAN CAMPBELL: We have tried that, and had nobody there.

MR. DRUMMOND: It is just a question depending upon your organization. Personally, we feel that those meetings should be held on company time, and that is when we hold them.

MR. BRAINARD: Ours has been about 50-50. We start the meetings about thirty minutes prior to closing time, the meetings that we have been holding, partly of plant foremen and partly of what we call the safety men in the organization, but we have been able to stimulate the meeting by a good moving picture for the first fifteen minutes. Some of those pictures have been safety films, pertaining, some of them, to the National Safety Council—not particularly in relation to our business, there are none that I know of—but they are of a general nature, and they are very good, and some which are educational films, but they stimulate the interest, we have found.

CHAIRMAN CAMPBELL: We have had good results for three or four months by having the meeting at noon time, for instance, while the men were having their lunch the safety talk was going on, and we had very good results from that.

MR. DRUMMOND: That is possible only where you have one general eating place. A meal is a wonderful stimulant.

O. F. W. CROMWELL (United States Leather Co., Ridgway, Pa.): How much of a lunch hour do you have?

MR. BRAINARD: We have thirty minutes.

MR. CROMWELL: If you have an hour, you can start in about twenty minutes to one and have the meeting last until half past one, for best results.

MR. BRAINARD: We are able to hold, sometimes, a short inspirational meeting, but it must be short.

MR. DRUMMOND: And you must confine it to one particular subject.

CHAIRMAN CAMPBELL: Any further questions to be asked on this subject?

Now the next on the program is "Anticipating Hazards," by N. L. Brainard, Director, Social Service Department, Swift & Co., Chicago, Ill.

Anticipating Hazards

By N. L. BRAINARD

Director, Social Service Department, Swift & Co., Chicago, Ill.

I have been asked to talk on a phase of accident prevention under the title, "Anticipating Hazards." The committee has added an explanatory clause, "A review of methods of making sure that accidents that have never happened will not happen," which may sound inconsistent. The thought is that conditions sometimes exist which are the setting for a bad accident and that this latent peril should be properly dealt with by prior action and the unforeseen mishap prevented.

This is nothing more nor less than "accident prevention." There are, however, hazards which should be anticipated in the sense that they should be foreseen or forestalled. Special reference is had to placing the responsibility for hunting out hidden and obscure conditions and finding the corrective measures before the accident has occurred, or seeing a risk which may be in plain sight and has never been recognized because it has not been seen from the right viewpoint.

Avoidance of the unseen danger and escape from such unforeseen accidents or disasters comes more by discovery than by protective measures and a review of methods can do no more than suggest some general lines of action. Many of the accidents which should never happen are unusual, something of a nature which

has not occurred before and may never occur again. The danger which exists is not likely to come to light in a routine check up by the plant safety committee or safety supervisor. The greatest menace in such hazards comes from the tendency to take things for granted. It is difficult to meet and overcome the argument that the thing has been done for years without an accident. The fact that accidents which have never happened do happen means that we cannot permit the old to prevail simply because of long usage.

Hiring and Adaptation

Investigation of an accident or an occurrence which might have resulted in a disaster may disclose that a mistake has been made in the placing of men. One of the means of anticipating a casualty, then, is that the employment office give consideration to the fitness of the man for the job. The employment offered must be in accordance with the capacity of the man. There are jobs which require men of particular aptitude; the right man for the right place.

Instructing New Men

Experience shows that a large percentage of lost time accidents and resulting costs results from accidents in occupations and operations not ordinarily considered hazardous, yet owing to lack of instruction, the workman did not know how to do the job safely; and this also means efficiently. It must not be taken for granted by the superintendent or foreman that a man hired for a common job needs little or no instruction other than to keep moving. The instructions should be competent and sufficiently cover the nature of the work and how it is to be performed. It is important to teach employees safe methods of loading and unloading, piling or taking down piled material, and any common hazards of the job.

A man may be hired who says he is a butcher. The man who hires him don't know just how much of a butcher he is, and in sizing him up the way he does his work with reference to safety should be given first consideration. The foreman knows the ways in which an employee may get hurt and should teach safety personally to the new man.

Cautioning Men

The time to discipline a man should be determined by the circumstances. A workman is not always hurt the first time he makes a misstep, but there is some question as to how far we should go before we resort to severe discipline. If he has been instructed in the beginning and doesn't go according to instructions, it is possible he did not understand them. He should again be cautioned and if he still disregards the warning, he should be penalized.

Some foremen do not think of safety as regards men, their concern is for the material and machines used. When told that the company wants safety on the job, he shows his idea of safety by spiking a scaffold so hard that it is necessary to destroy the material in order to dismantle the scaffold. The foreman should take the new worker in hand and in a friendly way, without letting him forget who is boss, train him to work safely.

Introducing New Methods

A great deal of work is more or less routine and is done in a matter of fact sort of way. In such operations a workman has his mind pretty well made up as to how he is going to proceed on a job. If a suggestion looking toward safety in any way changes this routine, it is likely to be received indifferently, if at all, unless there is an appeal to the practical side of the employee. It is always best to

get his cooperation by such an appeal than to say, "Thou shalt," or "Thou shalt not."

When introducing new methods or processes the safety element should not be overlooked. It is not always apparent what the hazards are until the accident occurs.

It is not always possible to convince superintendents, foremen, or workmen that there is danger in a particular operation until an accident has occurred. Unfortunately we do not always get such hazards guarded or preventive means taken until we accumulate some costly experience.

Lay Out

The matter of lay out is important. Frequently new machines or new processes involving change in location of equipment are made in old buildings. Such changes are made with a view to improvement from a production or a cost standpoint. As a result the safety factor is not given full consideration in the lay out. Work may be carried on under cramped conditions. Congestion will result and where there is congestion, there will be an accident.

Temporary Hook Ups

Temporary hook ups should have the special attention of the engineering department and safety supervisor. Some of the most serious hazards may be produced here. Included in this category are portable electric fixtures which are plugged into sockets on the wall; and rigging a job, where material is lifted by crane—the lashing of a load. Machinery is sometimes placed temporarily and later complete and permanent installation is made. The responsibility for being positively sure that temporary hook ups are not hazards must be lodged with some one thoroughly competent and dependable.

Near Accidents

There are many near accidents that almost result in personal injury and which should admonish us. If we have a number of minor accidents, not lost time accidents, but near accidents which might have resulted seriously, we are going to have personal injury accidents that will be serious. Grave consideration should be given to near accidents to learn what warning there may be in them or what possibility of a bad casualty. When there has been a bad accident, it is often found there has been a counterpart in a near accident, which if analyzed would have given a clue to a more serious occurrence.

Frequently after an accident has happened, it is said, "I knew it was going to happen because so and so was doing such and such." It is just as important to make a "preventive investigation" and place the responsibility for a near accident as it is to go into the causes of an accident which has resulted in personal injury. The possible cause of an accident should be located without the accident happening first and having the responsibility fixed. Accident investigations should deal with those near accidents that discover bad practices as a preventive measure and instructions given for their correction.

When an accident has occurred with a serious injury or a fatality resulting, we are greatly moved and an investigation is made to determine what the conditions or practices were that led up to the mishap. There are also accidents sometimes where there is an escape from death or serious injury which border on the miraculous.

For instance, the clothing of an employee working around an ice crusher caught in a revolving shaft and there was the beginning of what is usually a shocking fatality. The man realized his danger in a flash and caught hold of a cross timber

which was so placed that he could brace himself and hold on firmly. He was a powerful man and was able to save himself from being wrapped around the shaft. All his clothing was stripped from him and he was taken to the doctor's office in an overcoat belonging to another man. The only injuries were superficial abrasions of his back, arms, and hips. His nerves were badly shaken but he was at work the next day.

We should be warned by an occurrence of this kind to as great a degree as we are when the outcome is not so fortunate, so that action will be taken to guard against a recurrence at this particular place and a check made to make sure that similar conditions or practices do not obtain elsewhere.

Horse Play

There is another practice which should be most emphatically condemned and that is horse play which is more or less frequently the cause of a serious accident. The responsibility can usually be placed on several men, and if those men after having been given a fair chance to stop the practice do not heed the warning, they should be dismissed.

Machine Accidents

Accidents arising in connection with the operation of machinery average of greater severity than those due to other causes. For this reason machine hazards should receive a liberal share of attention. The biggest problem is education with reference to hazards wherever we may find them and putting into practice what has been learned. Accidents are not the fault of the machine but the result of poor practice.

It is probably more difficult to inspect safety equipment made for special purposes than it is on equipment which is standard and common to all such as buildings, elevators, and boilers. There are such things, however, as belts running so that they jump off the pulley, gear teeth becoming worn so that there is a possibility of breakage and so on. These are apt to be inspected rather casually by some mechanic. It pays from a financial and a safety standpoint to have them looked after by some one thoroughly competent who would do the job regularly.

Forewarned is forearmed and every plant should be given the experience of all the others. The warning from such occurrences should not go unheeded. We get out letters concerning unusual accidents of the kind we are considering here, those that have never happened. Some of these are of a nature that might occur anywhere and they teach a lesson that is very general: that is that we should study and analyze every accident, as each one has its individual lesson. And this is true no matter how similar they are to something which has occurred.

Each packing plant uses machines and carries on operations which are common to all, and they have similar hazards. Both the packing and tanning businesses have hazards that are common to all industries. Whether they exist or not may never be known until you have an accident. When we hear of an accident which has occurred at another plant, we may pick up something concerning a risk that exists unknown in our own plant. Sometimes we have to learn by experience to go ahead in accident prevention work, but we try to avoid the necessity of having an accident if we can profit by the experience of another.

The following are from letters which have been sent out as warnings and are presented here not only as illustrating hazards that we should anticipate but they carry suggestions of value to the others:

These instances that I cite may suggest a bad accident record, but the incidents are taken from records covering quite a period of years, involving over twenty-five packing plants.

"A young man employed as a clerk met with an accident by falling into the hot water tank in an ice manufacturing plant. He had a ten o'clock start and was not employed at the ice plant but went there seeking another employee whom he desired to see.

"This man wore glasses and the morning was damp and chilly and the room was full of steam and vapor. No doubt this had something to do with his walking into the tank. He inquired of a workman who directed him to the part of the building where the man he wanted was pulling ice. He started in that direction but seemed to lose his bearings in the heavy steam in the room and turned slightly to the left, stepping into the hot water tank where the ice cans are dipped to remove the ice.

"There is a safety device over the hot water tanks but the particular device was not working. The young man was painfully scalded and was taken to a hospital where throughout the day he seemed to be getting along well, but in the night he became worse and in the morning was in a very critical condition. He died at four o'clock that afternoon."

Safety Tags for Use of Mechanics

"A machinist with his helper were repairing belts close to the ceiling in the Hog Killing Department, directly over the hog scraper. The helper was standing on a rod that is part of the hog scraper. The machinist left him, and as he walked out of the department, another workman saw him and took it for granted that he was through with the job.

"It was this workman's duty to test the hog killing machinery to see that it was in order for the day. He turned on the power, causing the rod the machinist helper was standing on to move, carrying him along for a considerable distance, throwing him against the framework of the machine, severely injuring him across the abdomen.

"The investigation showed that the starting switch controlling this machinery had not been tagged by the machinist before starting to make the repairs, and it is this feature of the incident that we wish to call to your attention. It suggests the need of checking up on the use of these tags occasionally, and we believe it would be well for your Safety Inspector or Safety Committee to report on this at regular intervals."

Elevator Accidents

"The operation of elevators presents one of the most serious hazards we have to meet. Even when the elevator is properly built and all parts adequately guarded, a large number of accidents, many of them fatal, occur on elevators as a result of careless operation. Nearly all elevator accidents could be easily prevented.

"In a fatal accident which occurred at one of our plants, the regular operator left his elevator, leaving the door open. While he was gone a trucker stepped on to the elevator with his truck. Then a checker came on and, the elevator man not responding to the bell, the checker attempted to run the elevator but was unable to do so. Another dock laborer, who was passing, stepped on to the elevator, turned on the switch, and the elevator immediately started up. The trucker became excited, attempted to jump off, and was caught between the floor of the elevator and the top edge of the shaft opening.

"This is a striking example of what can happen when the rules governing the operation of elevators are violated. This was brought to the attention of the mechanical force, as well as foreman, safety supervisor, and safety committee."

"A fatal accident occurred at one of our plants in which an employee was crushed while passing between two cars.

"A string of cars had been placed upon a switch track with an opening of about

four feet left between the cars at one point. While the deceased and a companion were carrying provision racks from another track to the wash room, passing through this opening between the cars, a switching crew came in to move some of the cars. It had not been the practice to place track flags at the end of the cars on either track. Just as the coupling was made the victim of the accident was passing through the opening and was caught between the couplers.

"This was brought to the attention of foremen, the Safety Committee, and safety supervisor, who were impressed with the need of taking every possible precaution, particularly with reference to passing between, over, or under cars. Each manager was asked to look into the practice at his plant with reference to placing flags so that switching crews would know when employees are working in or around cars or passing between them, making it necessary to remove the flag before coupling on to cars."

Insecure Scaffolding

A millwright with the assistance of other employees of the gang, was raising a 12 inch eye-beam up into place. Not being able to lift the beam without some additional scaffolding, a truck was used for the men to stand on. While lifting the beam the truck slipped with the result the injured man was thrown to the floor and the eye beam came down crushing one arm, necessitating amputation at the elbow. A permanent stable piece of scaffolding should have been used in raising the eye beam.

Fatal Accident Resulting from Infected Wound

An accidental death was reported as the result of a neglected wound. The case is a striking example of the risk there is in failing to secure prompt and adequate care for a seemingly insignificant wound. The occurrence seems to have been quite commonplace; something of a nature that *might* occur anywhere.

A workman ran a piece of bone from frozen meat into his thumb. The accident occurred about 4:00 p. m., and had he gone immediately to the plant nurse, he could have received attention at once. Instead he delayed until after changing his clothes to go home. The doctor's office was then closed and the wound did not receive medical attention until the next day. Infection had set in and the blood poisoning had progressed so far that death resulted five days later.

Tractor Accident

Disregard for standing instructions and a foreman's indifference toward safety precautions recently resulted in a serious accident.

The driver of a gasoline tractor started his machine, at the same time making a left turn. As the tractor man made this start another employee jumped on the tractor to ride allowing his foot to hang over the side. In making the turn this man's foot was crushed between the tractor and a wooden retaining wall. It was necessary to amputate the injured foot.

Investigation showed that both men were familiar with the instructions about men not riding on tractors. There was a rush of work at the time, however, and the driver was intent on handling the orders and did not pay attention to the other workmen or observe the usual precautions.

Summing up, we must study the accident experience and hazards at our own plants as well as similar information from every available source. The information and the facilities for its application must be made available to plant managers, superintendents, foremen, safety supervisors, and Safety Committee. The individual workman must be properly placed and properly educated, as well as being provided with safeguards, safe working conditions and methods.

FRED SCHWARZE (Pfister & Vogel Leather Co., Milwaukee, Wis.): I'd like to ask Mr. Brainard what the general disciplinary methods are for the violation of safety rules.

MR. BRAINARD: The degree of discipline should be determined, somewhat, by the circumstances.

MR. SCHWARZE: How do you dispose of the cases? Do you have a trial board?

MR. BRAINARD: We don't have a trial board. We have a safety committee, which operates, probably, in a good many respects, the same as a trial board. They make an investigation and determine the circumstances, and if disciplinary measures are necessary, they make a recommendation to that effect. But as I said in the beginning, the first thing to check up, I think, is whether or not the man was properly instructed. Sometimes it is pure carelessness, but if it occurs more than once there is only one thing to do, and that is to get rid of the man. These accidents that I have recited, I think the record will indicate that almost all of them were due to carelessness, not due to lack of safeguards, nor due to lack of instructions. You get right down to the biggest problem of all in accident prevention, and that is education, instilling in the man habits of careful working.

A. B. DRUMMOND (Wilson & Co., Chicago, Ill.): Mr. Chairman, Mr. Brainard brought out, in a way, the thing I tried to stress in my own report, and that is the value of reports. For instance, I can remember a case where a man had been sweeping up a floor under a large generator. The generator pit was about eighteen feet deep. In pushing the broom, or, rather, pulling it backwards, he went down at a spot not properly protected by a rail. Why he wasn't killed, I don't know. He should have been, under the circumstances, but when he went to the doctor's office all he had were some superficial bruises. His clothing was torn a bit, but he returned to work after treatment. Now, if your reports are not filled out completely, that sort of thing is lost sight of. You will probably have a report from the doctor that there was a superficial wound on the dorsal tendon or the muscles of the right hand—the dorsal muscles and deltoids might have been ripped—but the man returned to work. The doctor's report, however, should bring out the full detailed story of how that thing happened. It is quite possible that the foreman will not be in touch with the situation personally, and it may seem a bit out of order to say that when you send this printed slip to the foreman, notifying him, that you are taking a step that should not be taken, but it is possible that he does not know that that accident has happened. It draws it to his attention, and he makes out his report.

Now, in so far as compensation goes, the man may be returned to work. It may take two or three treatments to put him into shape. But following through on your reports, and getting it down in black and white, absolutely makes the stories jibe, so everybody understands exactly how it happened, and you can follow straight through, as in Mr. Brainard's paper on "Anticipating Hazards," which you could not do if you had only the surgeon's report of what the extent of the injury was, not the story of how it happened. I think that by focusing your attention on the reports being completely filled out, by the time the people concerned get them, they know just the situation in each case.

DR. J. R. FRENCH (Golden State Hospital, Los Angeles, Cal.): I'd like to make one suggestion relative to the foremen's reports, which perhaps would help them out a great deal. I don't think that the foremen are properly instructed relative to making out reports. The foremen are very apt to take the man's statement of what occurred, and, as I mentioned to you a few moments ago, lots of times some little insignificant thing will work itself up to a great big case, that you have a hard time settling. What I mean is this: A case was called to my attention, the other day, where a foreman's report came in about a man who was lifting and strained his wrist. Now this was purely subjective. The man went to the foreman and told him he was lifting, and strained his wrist. When he got to

the doctor's office, careful investigation revealed the fact that the lifting he was doing was nothing more than what had been taking place every day. It was no accident, but he noticed pain when he was lifting. Now, on a careful examination, it was determined that that man was suffering from an acute arthritis, probably, in this particular instance, of a specific origin.

Now that was a case in which his employment was not responsible for his disability. In other words, his disability did not arise out of the course of his employment, but his employment was the occasion of his disability, the cause of which was independent of his employment. Now that can very easily slip in unless your doctor catches it and works it out, but I think a great deal can be done by training the foremen, in making out their reports, not to take the man's statement for everything that exists, but to investigate and put down the facts.

MR. DRUMMOND: We have found that usually the story that is given, if the doctor has been properly sympathetic and built up the confidence in his employees that he should have, we usually find that the statement of the man at the time of the injury is mighty accurate. Now there may be cases such as you called to mind, of an arthritis condition, called to the man's attention by some strain in the course of his work, but the cause itself not being due to the employment. Ordinarily, however, the condition will be revealed by the medical report. I was merely following through on the basis of the value of those reports from the standpoint of disclosing, or, rather, anticipating hazards, and rather than just merely taking a report that would cover the medical side of it, with nothing on there to indicate just what had happened; that is what you would get if your doctor were merely filling out a report from the medical standpoint alone. But where they have been trained to get the story, and get it on a friendly basis, we have found that usually they are mighty accurate, much more close to the real causes of the injury than the foreman's report would be, because he has a lot of jobs. He is pushed for production, and the problem of how many men he is going to need tomorrow, and how many next week—pushed mighty hard.

DR. FRENCH: The point I was making is that many times the man believes that he strained his wrist. He is not falsifying. He believes that he strained his wrist then and there, but you have to get into it very carefully to determine that he did not.

MR. DRUMMOND: You have a multiplicity of reports. You have one from the medical department, one from the foreman, and the two, of course, have to jibe.

DR. FRENCH: The point I was making is that the foreman many times just writes out his report that the man strained himself. The foreman should take a little more pains.

MR. DRUMMOND: Oh, there's no question as to that.

DR. FRENCH: And give the facts. I am referring particularly to a case where a man was lifting a quarter of beef. It was no accident, but he noticed pain when lifting that quarter of beef. The foreman reported that he strained his back, which was not the case. Now, the mere fact of going before your Industrial Board with a report from the foreman that the man did strain his back sometimes causes lots of trouble.

MR. DRUMMOND: Of course that is a matter for our trial board. Those matters are pushed in that.

MR. BRAINARD: Such reports are only taken on their face value. The foreman sometimes lacks ability to express himself. He doesn't know. The common expression for him is to say that the man sprained his back, and probably nine out of ten would say "strained his back." He does not know how or why, but that is the easy way for him to describe the incident. We can not give very much value to the foreman's report. I think the foreman should inform himself on conditions, and after the investigation has been made and it has been determined, then the foreman might be informed for his future guidance; but as far

as giving any too much weight to the foreman's report, it can not be done, because he is not in a position to say. He may report as to physical conditions which brought about the accident, but as to the nature of the accident or the injury itself, he can't say.

MR. SCHWARZE: Mr. Chairman, we answered that situation. To allow ourselves an opening, we use the word "claim." "The foreman claims," "the man claims." We don't definitely accept the statement. We set it up as a claim, merely as a statement, but not as a fact.

MR. BRAINARD: We say "the man says so-and-so."

MR. DRUMMOND: That is the way our report is drawn up, excepting in two questions. One is, "How did the accident occur?" and most of them say it was not an accident. The other question is, "What can we do to prevent a recurrence?" When this thing has been going on for fifteen or twenty years, with apparently no rest, you will find that most of us are inclined to put our best foot forward. Most of those figures are a post-mortem or an alibi, because they know they are going to be held responsible for conditions. In that case, they back up anything the medical departments say. Those are two vital questions on the foreman's report.

MR. SCHWARZE: We find out in qualified diagnosis that the investigation will either prove or disprove that particular claim, and we feel it is our first duty to try to assist the employee in proving his claim. If he can't prove it, it is naturally disproved.

MR. BRAINARD: I think that there you stated something. We should not take an antagonistic attitude toward the man who has the injury. In our company it is one of the duties of the Welfare Department to act according to the claim. We are there to represent the man, primarily, to look out for his interests, and to see that he gets all that is coming to him, not only in the way of compensation, but other things. We have some rather stiff battles, once in a while, to see that the man himself is properly represented. We have what is known in these plants as "Plant Conference Boards," with employees' representation, and where those organizations are functioning, as they are pretty generally, a man is pretty sure to have his case very thoroughly aired, and all of those facts brought out. Those cases, even in cases of personal injury, accidents and disability cases, are brought into the assembly, plant assembly, and the whole committee of workmen review them and pass on them.

MR. DRUMMOND: I think perhaps we have been misunderstood from the standpoint of what angle we are handling these claims. We are handling this matter from the standpoint of the safety in connection with it, and not the cost of the compensation. After all is said and done, compensation is really the small part of the economic loss of an accident occurrence. I have in mind the case, some years back, where the general manager's office was facing out on a large yard where the men came in and went out from work. A man had his leg broken, and I know, absolutely, that there were 300 people there around that man, who lingered on the ground for a half an hour apiece. You can imagine what that cost in time, from stoppage of work, and all the other things that mount up. Those are the hidden losses that we really do not anticipate, and our whole attitude is to eliminate those losses and at the same time not lose sight of the fact that the man shall get something he is entitled to. I'd like to get that clear. Our discussion is not a matter of holding down the compensation.

CHAIRMAN CAMPBELL: Mr. Drummond, a man came to our hospital limping, with a stick. He could hardly walk. The doctor happened to be in, and put him on the table. The cords of his hip were all out of order. They were all jumbled together. He claimed that coming up the stairs he had slipped. The doctor said, "That is too bad. We'll have to take you to the hospital." They got an ambulance

and sent him to the hospital. He was in there about three weeks. It was more serious than the doctor thought it was. By and by, a couple of fellows came in and told the doctor he had been playing baseball, while he had said he had done it on the stairs coming in. But we had to pay the compensation, just the same.

MR. SCHWARZE: Mr. Drummond brought out a point as regarding the attitude of the personnel men, or the medical men, in safeguarding the injured employee's interests. I think the matter of time lost, departmental or plant standing in the campaign, be it what it may, from the standpoint of a measuring-stick basis, is the last thing considered. If that is the first thing considered after an accident, forget about it. I think it is a matter of cause, effect, and remedy—remedy first. Our policy is this, that any physician, or surgeon, or group of medical men, that are placed at the disposal of an injured employee, shall treat him the same, as a private patient, and absolutely lose sight of the business connection. In that way we shall reduce the eventual disability period, and we shall cultivate a better feeling, cultivate the confidence, and the mere facts will be very easily determined. Now, no matter how serious a case is, if it is regular—by that I mean that the facts are right before you, and there are no altercations, no disputes—you can settle for a case of permanent disability which may run into \$40,000.

But when you don't have the facts, as in the case that Mr. Campbell brought out, of a man coming in and alleging an accident—we have had a good many of those minor accidents, those Monday morning accidents, those "day after" accidents, reporting at eight o'clock the following morning that a cinder or foreign object got into the eye the day before, and the man felt that first aid was not available on account of the lateness of the day—those cases, though trifling in their origin, may lead to major cases. How are you handicapped, and what do you do to control those delinquent notices?

MR. DRUMMOND: I think, Mr. Schwarze, you answered that question a short while back, when you said that all the claims put forward are a question, first of proof, and then of disproof. In other words, if a man had claimed an accident while in the employ of the company, unless he was working in an isolated location, all by himself, it ought to be either possible to substantiate the claim by some one who knew of it, or saw it, or disprove it on the same basis.

MR. SCHWARZE: I have in mind a case where no witnesses are available, yet it borders on probability and possibly on fact, that the man received a foreign object into his eye at that particular time and place, and that he was there at that time and place. The fact is that he may have received that during the week-end, away from work.

MR. DRUMMOND: Well, as Mr. Brainard said, those are cases which must be handled depending upon the situation surrounding each case. Now I have in mind one case where a man claimed he had received an injury as a result of stepping into a hole. He did step into the hole, but after we had taken the man to the hospital, we found his automobile standing outside of the employees' gate, and in that automobile was a chain fall. He had received the injury, all right, in stepping into a hole, but he had been taking a chain fall out of the plant, to use for his own purpose, or not to return it—I am not sure which—but the disclosing evidence was revealed in the chain fall that lay in his automobile after he was taken to the hospital. The hole he stepped into was outside the gate.

Summing it all up, I think first an endeavor should be made to prove the man's claim, and if that can't be done, the reverse is true. There isn't any routine that could be set up for that, because each one of those things is revealed in a different way. Sometimes it is just a matter of hunch.

O. F. W. CROMWELL (United States Leather Co., Ridgway, Pa.): A thorough investigation should bring out all the facts in connection with the accident.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Paper and Pulp Section

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October 1, 1928

W. J. PEACOCK, Chairman

Head, Department of Personnel, Northern Paper Mills, Green Bay, Wis.

The first session of the Paper and Pulp Section at the Seventeenth Annual Safety Congress, was called to order at one o'clock by the chairman, W. J. Peacock, Head, Department of Personnel, Northern Paper Mills, Green Bay, Wis.

CHAIRMAN PEACOCK: The program this afternoon is somewhat in the nature of an experiment. Those of you who have attended former meetings of the section will remember that at the close, usually on Thursday morning, we have held an informal conference confined strictly to the affairs of the section as such, and have had trouble in getting men interested in other features of the congress, to give that additional morning. Because of the importance of matters that belong to the section, I asked the cooperation of the Program Chairman in getting this informal meeting the first thing.

But first, it is the custom here to get acquainted. What I hope will be accomplished through getting acquainted will be something of group acquaintance, also something of regional feeling. As I call the different paper-making states will the members of these groups stand up and give your names, please. Now, those from

Wisconsin, from a long way off, there won't be many of them so we will dispose of them first. Get up and give your name, please.

(Representative groups from Michigan, Minnesota, Illinois, Ohio, Louisiana, Pennsylvania, New York, Massachusetts, Maine, New Hampshire, New Jersey, and Canada were then called on by Chairman Peacock.)

Report of the Chairman

By W. J. PEACOCK

Head, Department of Personnel, Northern Paper Mills, Green Bay, Wis.

During my three terms in office, it has been possible to get things said by others in ways that afford pride enough in being sponsor. This year, however, the Council has asked me to make a report covering the activities of the section, and I accept that task eagerly in the hope of passing on to the section some of the valuable impressions that have come to me.

At the outset I want to bear my testimony that holding office in the section has been a schooling in organized safety methods which I might never have received otherwise. For every hour of service I have given the Paper and Pulp Section I have received a week's wages in group vision and national outlook. I never began to utilize the services of the Council to the fullest degree until I was called upon to extend those services to fellowmembers, while the importance of my own job at home never appealed to me as strongly, taken alone, as it did after I began to see points in which my interests merge with the interests of 700 other plants.

I want to take time, then, to help the entire section to appreciate that profitable field in which the things that are "ours" enhance the importance of everything that may be called "mine." In somewhat the same respect that we are better men in proportion as we are worthy Americans, it can be said that a paper manufacturer is on the line to personal success in proportion as he participates in the vision and achievements of the industry as a whole. In three sessions to follow, you are to be handed the results of the work of others for the good of your own mills. This afternoon I ask you to think of yourselves as fellow-workers in a group which makes our individual efforts profitable.

One of the most useful tasks to me in connection with the chairmanship came the first month of my term in 1925. *The Annals of The American Academy of Political and Social Science* wrote asking for a chapter on "Safety in the Paper Industry."

The time limit given me was one month. Getting together historical data consumed most of the time. The article had to be written rapidly, mostly at night, with revisions by telegraph. Looking back now, I regret that so important a piece of work had to be done in a hurry; yet, coming as it did, the necessity for studying the records of the section was a valuable initiation into a section which has always been doing things.

For instance, in 1925 we might have thought we were originating the *News-Letter*. I discovered that in 1918 under the chairmanship of G. E. Williamson the *News-Letter* had been employed to stimulate interest in the affairs of the section. Imagine my respect for history to read E. P. Gleason in the transactions of the first meeting of the section advocating the safety contest as a method of creating safe habits. Like other safety men, I had been stirred by the discovery that the human element rather than machine causes, accounts for the majority of industrial accidents. The proceedings show that starting with the first program and repeatedly thereafter our leaders have emphasized the point that accidents are due to inexperience, ignorance and other human causes. What the American Engineering

Council finally worked out to a scientific conclusion, namely, that safety and increased production go together was stated with emphasis in 1915 by President H. W. Stokes, of the York Haven Paper Company.

I mention these things as showing the sort of leadership the section has had from its organization. To some of you present, this may be your first National Safety Congress. A banquet of 3,500 persons, a Council of 4,600 members, 3,000 of them member-companies, representing 153 industries—these are vast concepts. This Congress is, as the bulletin of the Massachusetts Safety Council puts it, "The most important convention of its kind in the world." We are proud of the fact that the Council itself only multiplies the spirit of the Paper and Pulp Section. The founders of this section were present formerly at the organization of the National Safety Council and contributed to its vision. We are fortunate that Shattuck, Williamson, Lundrigan, Turner, Costigane, Gleason, Wilson, Altman, and Phillips, men capable of growing themselves, have remained with us as pace-makers.

Organization Days of the Section

The Paper and Pulp Section was organized in 1915, four years after the National Safety Council came into existence. Philadelphia was host to the Congress that year and 25 of the 30 persons present were from eastern companies. The attendance and program had been worked up by S. F. Shattuck, of Kimberly-Clark Company, G. E. Williamson of Strathmore Paper Company, and R. B. Robertson of Champion Fibre Company. Thirty-six member companies had signed up and Mr. Shattuck was elected first chairman. During the year following, the membership increased to ninety-two companies, but Chairman Shattuck, with vision that still characterizes the industry, reported "five hundred or six hundred companies who have not yet found their place in the fold." Today, with two hundred four member companies, controlling about 400 or 500 mills, we are still far below Mr. Shattuck's dream.

I should like to cull items from year to year with the double purpose of appreciating our past chairmen and of visualizing their plans for the section.

Some of us have felt that we might make a leap in progress if we could only hold a session of the section in connection with the American Paper and Pulp Association. In February, 1917, that experiment was tried out for us by Chairman Williamson and we note the impression that the attendance and response did not justify the effort. Apparently safety interest centers in actual operatives. The most successful meetings depended upon men and management. At any rate the annual meetings were not displaced by the New York experiment and the following fall found a regular session in connection with the National Safety Congress.

At the 1917 meeting we note a suggestion from the secretary, A. G. Poundsford, that all the members of the Safe Practices Committee be appointed from one locality in order that numerous face-to-face meetings might be held. Mr. Poundsford was very early putting his finger on the geographical problem of our section, extending shoestring fashion from Maine to Ohio, and up into Minnesota, with flapping ends in the south and on the Pacific Coast and a strong side coil in Canada. Some of you present today probably have not attended a national congress since the last time the meeting was held in the east. The same thing is true of western mills. How to sustain interest, how to avoid loss of useful men, more especially, how to carry the influence of the National Safety Council every year into every region of our industry has become a live problem.

In the report of the 1917 meeting we run across some names with a familiar sound—G. W. Phillips, A. P. Costigane, John Lundrigan. In 1918 we find a few more—C. E. Jackson, Amiel Umberham, Franz H. Rosebush, R. M. Altman, pace-makers today in the section. At the 1918 meeting, also, we note the beginning of

another experience succeeding meetings have encountered. It was reported that while twenty-five new companies had joined during the year, ten former members had cancelled. Also, we note that the meeting in St. Louis, an out-of-the-way city for paper makers, attracted only thirty-two persons representing fifteen mills. However, Mr. Williamson, for the second time chairman, reported that the business of preventing accidents had begun in earnest. Frequency statistics showed an improvement of 31.1 over the preceding year.

The year 1919 was significant as seeing the start of our Safe Practices Pamphlet. Mr. A. P. Costigane, eminent as a safety engineer, was at the helm that year and R. M. Altman was pressed into service as the head of the committee which was to work together under the sponsorship of the National Safety Council in the drafting of a Paper and Pulp Safety Code. Mr. Altman, Mr. Costigane and Mr. Williamson, associated with other outstanding safety men five years later gave the industry a Code which was published as Bulletin No. 410 Bureau of Labor Statistics, U. S. Department of Labor, and was approved by the American Engineering Standards Committee.

Be it noted in passing that whatever safety literature may be on the shelves of paper mills, this code is our leading authority. If the section had accomplished nothing more in its history, the Code would justify all the money and time spent in its proceedings.

The congress returned to Milwaukee in 1920, the city of its birth, and R. M. Altman was elected chairman; during his chairmanship the section responded to the call of the Council for statistical data on accidents.

Forty-five mills voluntarily began reporting annually. In succeeding years the number of mills reporting increased to fifty-five, sixty-six, ninety-nine, one hundred thirty-three, one hundred eighty-six. This is a service which becomes exceedingly valuable in connection with studies of accident experience upon which our rates are based. What happens in the industry as a whole determines the premiums of each of us, and what can be done to reduce premiums of each of us depends upon the concerted effort of all of us.

Boston entertained the congress in 1921 and G. E. Williamson of Strathmore Company was again drafted for the chairmanship. Safety Bulletins, printed and distributed by the Council, but originating in the members' plants, came up for discussion. Amiel Umberham, chairman of the bulletin committee, reported that seven member companies had cooperated in the production of twenty-six bulletins.

Mr. Williamson followed with a request to all member companies to submit their ideas in the shape of photographs or drawings. At this meeting, evidence of the active cooperation of the American Paper and Pulp Association was furnished by Mr. Oliver M. Porter, Secretary, in plans for a membership drive. The time was inopportune, however, the period of readjustment having begun, and only nine new members responded to the appeal. Nevertheless the plans suggested by Mr. Porter for securing new members should be dug up again and the resources of the American Paper and Pulp Association employed to the fullest extent.

During the last nine years we have received one hundred seven new members and have suffered seventy-four cancellations. Apparently our sales problem is two-fold; to sell a new member the value of concerted safety work and to keep him sold. But more about that later.

What "prospects" for membership have we in the industry?

Without checking the figures, the following illustrations will bear consideration. In the United States there are six hundred fifty-six companies operating eight hundred sixty-eight paper mills and three hundred twenty-five pulp mills. In Canada there are ninety-five companies operating seventy-two paper mills and one hundred thirteen pulp mills.

By states, companies, and membership, figures are as follows:

State	Companies	Mills	Members
New York.....	127	138	45
Maine	23	29	11
Pennsylvania	60	63	10
New Jersey.....	37	40	5
Massachusetts	66	67	23
Connecticut	34	39	2
Michigan	41	41	11
Illinois	27	27	11
Indiana	23	---	1
Wisconsin	47	---	42
Ohio	51	---	11
Minnesota	10	---	4
Vermont	14	---	---
Virginia	10	---	2
W. Va.....	8	---	2
Delaware	6	---	1
Louisiana	9	---	5
Maryland	11	---	---
New Hampshire.....	22	---	3

There is no mystery about these figures. All of the mills of the industry, large or small, would profitably enjoy membership in this section. So far, half of the mills of the states have been reached. The question is: How can the section, dependent upon voluntary service, organize its efforts so that a larger proportion of our mills may be enrolled?

Coming back to our story: The next year, 1922, saw W. A. Gleason as chairman in the Congress assembled at Detroit. Mr. Gleason reporting on membership matters, stated that mills forced to cancel on account of business conditions had given assurance of their faith in the section and of their purpose to resume membership at the earliest moment. Nine new members had been gained, and the bulletin committee reported a new method of securing poster material. The National Safety Council had begun sending out a staff photographer to pose subjects suggested by interested members. The committee got together in one place and studied out a list of desirable ideas which were posed in various plants. We note at this meeting that much interest centered around methods of training foremen in safety matters. The foreman began to figure as the key to accident prevention.

The 1923 Congress met in Buffalo with an attendance of sixty delegates representing twenty-nine member companies showing interest in a program related to health conditions and their bearing on accidents. Such matters as eyesight, hernia, specific diseases, high blood pressure are to be considered when men are put on the pay roll. Physical examinations pay for themselves from the standpoint of management and men. Safety was discussed in a large way by Dr. Hugh P. Baker, secretary of the American Paper and Pulp Association. He pointed out that the industry itself needs the watchful care of all whose livelihood is derived therefrom.

Protection of raw materials, assurance of a market for our product, provision for educated labor and protection against the inroads of European competition were pointed out as calling for widening vision.

At this meeting, the section applied itself to the discussion of the new Code, a preliminary draft of which was furnished for criticism. The committee was continued and given encouragement to complete their important venture.

The next year, 1924, saw G. W. Phillips, of Champion Fibre Company, a veteran safety man, in the chair and a congress in Louisville, Ky. Here was a test of the pulling power of the section. Louisville is well out of the line of paper-mill locations but for all of that nineteen mills and interested organizations, including the U. S. Bureau of Standards and several state industrial departments, sent

thirty-two delegates to continue the discussion of the Code, now recognized as the most important task before the section. The Code, in mimeographed form was presented with parts covering the Yard, the Pulp Mill, Rag and old Paper Preparation, Acid Making, Chemical Processes of Making Pulp, Preparation of Pulp for the Machines, the Machine Room, the Finishing Department. It was decided that in form and substance the Yard and the Sulphite Divisions were fairly well taken care of. The committee, with John M. Sandel of the Council staff as chief editor, was encouraged to continue the task.

Cleveland, approximately at the center of our industry, claimed the 1925 congress, and M. G. Hoyman, safety man for Kimberly-Clark Company, the same company which furnished the first chairman, presided. At the preceding congress the section had decided that it is best to have the officers come from one region making it possible for several face-to-face executive meetings.

Mr. Hoyman is an indefatigable worker and under his inspiration a *News-Letter* was started. An intermill contest was held during the month of August sponsored by *The Paper Industry* with forty-one contestants. The cup was won by Nekoosa-Edwards, one of the charter mills of both the National Safety Council and the Paper and Pulp section, and some idea of the interest aroused will be gained from the fact that sixteen mills, all with perfect records, came to Cleveland with strong hopes of carrying home the trophy. Fortunately an equalization factor was worked out by the Council and the entire sixteen mills were given standing according to the hazards and difficulties overcome.

The contest immediately appeared as a unifying activity between congress meetings, and *The Paper Industry* was persuaded to continue the contest idea. To maintain interest and especially to help mills to train their men in safe working habits, the forthcoming contest was slated for a period of six months. Mr. Hoyman, experienced in inter-mill contests, pleaded for an entrance list of not less than fifty mills and was rewarded by a registration of seventy-two mills. It is only fair to state at this time that the wide-spread publicity given the section by its annual contests is due to the inspiration of Mr. Hoyman who with Mr. Edward B. Fritz, publisher of *The Paper Industry*, actually made a plan work which the section had talked of for years.

As a postscript, it should be charged also to the enthusiasm of Hoyman that another Wisconsin man was chosen as his successor in office.

In connection with the Cleveland meeting, a special conference was called of officers and committeemen new and old. The Chairman-elect, W. J. Peacock, of the Northern Paper Mills, Green Bay, Wisconsin, afterwards stating the program which this conference advocated mentioned the need for recovering the presence and counsel of former officers in an effort to build a section mid-year program that would interest members apart from the incidental stimulus of annual meetings. The contest feature, stimulated by a regular news-letter and by magazine publicity, appeared like an activity around which the service to members could be concentrated.

At the Cleveland Congress announcement was made by the Council of a decision to specialize during 1926 on regional conferences to bring the inspiration of the Safety Movement to the plants of its members.

This was welcome news and the new officers, all from one region, decided to ask for such a conference in Wisconsin. Whether by compliment to the chairman or by his own designs, the record is that such a conference was held in Green Bay, the chairman's home town. Under the guidance of the National Safety Council, this first conference was held in December of 1925, two months after the Cleveland congress, having the sponsorship of the American Pulp and Paper Superintendents' Association, the Engineering section, the Public Utilities section and the Wood-working section of the National Safety Council, the Industrial Commission of Wisconsin and the Chamber of Commerce, of Green Bay. The attendance in a

one-day program was six hundred seventy-four, good enough for a beginning, but what interests us is that one hundred forty-five of this number came from thirty paper mills and allied industries accustomed to attending our section programs. The attendance at the Cleveland meeting, drawing from thirteen states and Canada was forty-three delegates representing twenty-six member companies. Here was a regional meeting, in the heart of a paper and pulp state, costing members a nominal \$3.00 and traveling expenses per man, which tied all attendance records of the parent section. The Fox River Safety Conference became an annual event and one of its immediate results was ten new members for the section.

In the past a fortunate few were able to follow the section wherever it went, to Milwaukee, to Philadelphia, Detroit, New York, Louisville, Boston, Buffalo, and Cleveland, but the majority attendance each year came from the mills of the vicinity. Enthusiasm lags in the member who cannot feel the pulse of the section oftener than once in three years. No wonder we had seventy-four cancellations in nine years. There was too little to hold members.

At the 1926 congress in Detroit the Wisconsin experience was sold to the section and from those present selections were made of eight Regional Directors, each to be in effect chairman in his own state, all being expected to radiate the influence and service of the section.

As a result during the following year conferences in which this section had some active part were set up in Appleton, Wisconsin, Erie, Pa., and Grand Rapids, Mich., with a combined paper and pulp mill attendance for the year far greater than any meeting of the parent section. 1926 saw, too, an increased interest in the Cup Contest. There were as many mills with a perfect record each month as figured in the perfect column of August, 1925. In addition to the winner, the Neenah Mill of the Kimberly-Clark Company, six mills were given certificates for outstanding records, and such was the sportsmanship engendered by the contest that ninety-nine mills, an increase of thirty-three over the past high-water mark, sent their accident statistics to the Council. The activities of the year also served to increase interest in the annual meeting. Forty-one member companies sent seventy-three representatives to Detroit.

From now on the history of the section between congresses includes activities calling for more attention than the former programs. Midyear service enlisted the talents of many participants. Bob Altman and a patient committee completed their Code and had the satisfaction of seeing it published with the Government imprint. The contest became a monthly feature in the *National Safety News* and *The Paper Industry*. Our trade papers featured safety items and certain contributions of our programs appeared in print so often that they were practically broadcast throughout the industry.

The twelfth annual meeting of the section met with the sixteenth safety congress in Chicago and brought eighty delegates from thirteen states and two provinces of Canada, representing forty-seven mills. Our Regional Directors, eight in number, reported participation of the Paper and Pulp section in regional safety conferences in Boston and Worcester, Mass., in Erie, Pa., at Blue Ridge, N. C., at Grand Rapids, Mich., and at Sheboygan, Wis. Two cities in Wisconsin reported foremen's safety schools as a direct outgrowth of the Fox River Conference. One hundred thirty-three mills contributed their accident experience for 1926, an increase of thirty-four mills over the previous year. One hundred nineteen mills entered the 1926 contest and one hundred seven stayed to the finish. The severity rate for the one hundred seven mills was .63 and frequency 33.01. The severity rate of the first annual contest in 1925 was 1.746. The average number of mills with a perfect score for the contest was 37. Sixteen new members enrolled and nine transferred to our section from others. We closed the year with two hundred one members.

During the year our Regional Directors contributed an important set of articles

for the *National Safety News*, secured entrants for the contest, helped to build programs in five conferences, encouraged mills to send in statistics, produced posters, gave considerable voluntary service to neighboring mills, and attended to the reporting of programs in the magazines of the industry. It is interesting to note the different ways in which Regional Directors, new to the game, found and made their own contacts.

It requires no imagination to see the possibilities for increased service to members as these Directors continue to originate plans for their own states.

The present year, 1927-28, saw the foundation of three more annual regional conferences to serve paper mills as the result of the work of our regional directors. Ohio mills, to the number of seventeen, only two less than attended the Congress at Louisville, met and formed a region last November. Mr. Faist will tell us more about this Region.

Another Region, in the Valley of the Wisconsin River, under the leadership of Walter L. Mead, held its first conference also in November of 1927. Two hundred fifty paper and pulp men from twenty-five mills is the inspiring story.

At Blue Ridge, N. C., our veteran director, G. W. Phillips, in connection with the Y. M. C. A. is working up a conference in which safety matters play an important part.

The Michigan region, under the leadership of C. E. Torrance, of Bryant Paper Co., Kalamazoo, with only eleven members to draw upon, held a meeting in connection with the Michigan safety conference. Only four mills sent representatives but they received the worth of their money. Mr. Torrance is a valuable leader and with forty-one mills in the state, we hope he will feel that the beginning was worth while.

Under the encouragement of eight regional directors, our contest in 1928 enrolled one hundred twenty-four mills, an increase of five over 1927. Eight of these mills, we are told, completed the entire six months without a lost-time accident. The contest has been an improvement over that of 1927 in the totals achieved. I do not wish to steal the thunder of forthcoming reports, but a reduction of frequency among a hundred mills to the tune of 15.2, of severity 17.9 per cent makes one feel that the section, twelve years in training, is arriving at its stride.

I must forbear further comment on the things our regional directors have started. They will have something to say for themselves. What I have tried to accomplish in this sketch has been the development of a leading section from small beginnings, all the while under the inspiration of men of vision, all the while accumulating resources in experience, in members and esprit de corps.

But lest we think we have mastered our task, let us consider the facts pointed out to the industrial world by the American Engineering Council after an investigation covering over a year.

We are encouraged by the findings of the engineers that organized safety work is profitable in high degree. The correlation between Safety and Production is 0.84. To put it in picturesque form. Fourteen thousand plants were investigated to discover whether the safest factory is the most efficient factory. Eighty-four times out of a hundred that was the case, making the most convincing proof of the worth of safety work ever produced.

Our statistics in the Paper and Pulp industry indicate that the rule applies. Safety does pay. It pays so certainly that a plant is blind which does not organize against accidents. We have one hundred eighty-six plants aware of the facts sufficiently to be willing to turn in their statistics. How about some six hundred plants who do not report?

How can we get to their attention certain other findings of the American Engineering Council: That production in the industry increased thirty-four per cent from 1914 to 1925, forty and seven tenths per cent for each person employed. There has been an increase in the intensity of modern production. Accidents have

decreased on the average in proportion to the goods produced but production has become vast and accidents, on the whole are more numerous than formerly. Why?

Mr. Albert W. Whitney, speaking for the engineers, gives us the reasons. Machinery is displacing comparatively safe hand-working methods and machinery produces more accidents of greater severity. Automatic machinery has its influx of injuries due to repairs, always difficult to organize. Speed means increased exposure to danger and God only knows where the speed mania in industry will stop.

In the paper industry the cost of accidents is spread over our entire seven hundred eighty-three mills. I mean to say that premium costs are founded upon our united experience. We have had a demonstration of what can be done by united effort. Accidents can be put in the category of preventable waste and can be made to look foolish. Four times the number of mills reporting in 1920 reduced severity averages from 2.60 to 1.57 and frequency from 46.34 to 27.42. We might have expected the original forty-five mills to make an improvement of this kind in seven years but the influence of the section has been such that new members have brought new blood to the fight. Witness the St. Croix mill in 1928 going the entire six months without an accident, and a score of other new members falling into stride within a year or two. The methods of the section and the backing offered make it highly probable that any new mill will reap with the rest of us.

The vision I want to give you is of a section organized into regions, each with a director keen for results. We have eight regions now. We might start as many more with profit to the industry. The machinery is at our command for doing a significant piece of work, more significant by far than anything we have done heretofore. There are men amongst us who like to attempt big things. My suggestion is that we consider men and methods and possible regions and take up the task of realizing the hopes of the men who have gone before us.

Continuing, gentlemen, will you remember that in this first meeting we are trying to think in terms of the group as a whole. I am asking you to bring your individual contribution to that thing which makes this other thing possible for us, the strengthening of this section. Let's keep that in mind.

CHAIRMAN PEACOCK: We were to have an informal report on conditions in Maine, by Mr. Alvin Record, Supervisor of Safety, International Paper Co., Chisholm, Me. Mr. Record is our regional director from Maine and he writes me he is unable to be here, so I will read for him the report he sends to us.

What Has Been Done in Our Region During the Past Year?

By ALVIN F. RECORD

Maine Regional Director; Supervisor of Safety, International Paper Company, Chisholm, Me.

The States of Maine and New Hampshire comprise that part of the Pulp & Paper Section of the National Safety Council known as the "Maine Regional Section." In these states are 61 paper mills; 26 ground wood mills; 20 sulphite mills, and four soda pulp mills; or a total of 111 paper producing units out of a total of 1,149 in these United States, or approximately 10 per cent.

While much has been accomplished by individual manufacturing concerns and by insurance companies carrying liability insurance, and a start made in a few communities by such organizations as the Kiwanis and Rotary clubs along lines of public safety, this region seems to have lagged behind somewhat in real organized safety and accident prevention methods. No determined efforts have ever

been made to interest the public at large and direct attention to this increasingly important phase of industrial life and general welfare.

Efforts put forth by individual manufacturing concerns have been productive of amazing results. The State of Maine boasts of a progressive concern, the St. Croix Paper Company of Woodland, employing nearly 500 men who passed through the first six months of the current year without a lost time accident. These people should be among the leaders if not the leading competitor for the Class "B" cup offered by the National Safety Council. The Riley Mill of the International Paper Company located at Riley, with 70 employees has been since March 17, 1926, without a lost time accident; in fact nearly two years of this period without having to call a doctor to give surgical attention to any of its employees. These, as well as others, have made outstanding records which are the result of intensive efforts to interest employees and managements in this humanitarian work.

It has appeared for some time to many interested in a small way in accident prevention work, that the time was ripe for a state wide safety get-together to stimulate interest in and draw attention of the general public to the possibilities along lines of safety and accident prevention.

With this end in view, a general safety meeting was called—the first of its kind in the State of Maine—for August 11, under the sponsorship of the Maine State Department of Labor; Maine Automobile Association; Associated Industries of Maine, together with the Maine Regional Section of the pulp and paper division of the National Safety Council. However, through the advice of G. E. Burns, of this section, on account of the national convention coming on so soon, it was decided to postpone the meeting until November 15. Programs are now out for this event which will be held in the House of Representatives at the State House in Augusta. A very interesting and profitable program is assured with such speakers as Governor Brewster, Mr. Lundrigan of the International Paper Company; Mr. Beals, Labor Commissioner; Judge Cleaves, Secretary, Associated Industries of Maine; Mr. MacBrayne, Manager of the Mass. Safety Council; Mr. Geo. Burns of the Council and Nat. F. Bartlett of Hollingsworth & Vose Company of Boston.

The opening session is called for 9:30 a. m. Dinner will be served at the Augusta house nearby to all registrants, and the afternoon session starting at 2:30 p. m. A very cordial invitation is extended to all those interested in accident prevention in this section to be present and help us make the meeting a real success.

CHAIRMAN PEACOCK: According to Mr. Record's report, our section has a regional director starting the first regional meeting of its kind in the State of Maine. I hope all the men from Maine and New Hampshire who can possibly do so, will attend and assist in making this conference a great success.

I wonder if you will tell us something, Mr. Parant, about the enterprise of the safety movement as it begins to get out into the State of Maine as a whole?

L. J. PARANT (St. Croix Paper Company, Woodland, Me.): I don't know as I can say very much on what is taking place at the present time, except that the meeting is planned for the 17th of November, I believe, at Augusta. Mr. Record has asked me to act as chairman of that meeting. There hasn't been very much real work done toward planning the meeting as yet, but this morning I ran into Governor Brewster, and he spoke to me about the meeting. Now, the Governor of the State of Maine is interested in it and I feel we are going to have a very large attendance and a very interesting meeting.

CHAIRMAN PEACOCK: The next speaker on the same subject, for the State of Massachusetts, is Mr. N. F. Bartlett:

N. F. BARTLETT (Hollingsworth & Vose Co., Boston, Mass.): In Massachusetts, gentlemen, I am positively optimistic. I know what has been done in Massa-

chusetts by coming in contact with several of the large safety directors, men who have been imbued with the spirit and know what they are talking about.

A lot of you are conversant with the fact that in Massachusetts we are of a modest and retiring disposition. Immediately upon receipt of the letter to give this five minute report as regional director of Massachusetts, I corresponded with most of the paper mills, and received replies which were very, very gratifying. For instance, approximately 15 to 20 mills have reported that they have never had such a promising year, that their lost-time accidents had diminished greatly. Take Mr. Rogers, of Bird & Son. He reported to me that in one department of that large manufacturing industry, employing 225 men, they had not had a lost-time accident since October 11th, 1927. I also received a very gratifying and optimistic report from my good friend Mr. Wyman of the Strathmore Paper Company, at Mittineague, Mass. Mr. Wilson, of the American Writing Paper Company, Inc. of Holyoke, Mass., also reports progress and, in all modesty, I can say that the mill where I am employed have a very gratifying report for the first six months, one they are a little proud of.

I figure this way, that if young fellows can go into an industry and bring our lost-time accidents down, as we are doing in Massachusetts, from we will say, 40, 50, 60, 70 per cent in a year, the section as a whole will note improvement.

I would like to see the National Safety Council, the Paper and Pulp Section, provide a secretary who could go around to the different mills, in Wisconsin, in Maine, in New Jersey, where we see we have so many mills and only such a small percentage of membership, and sell to them the membership of the National Safety Council.

I know that the spirit of safety in the industries has taken a firm grip. Take the Massachusetts Safety Council, made up of various organizations, of all kinds of organizations, and they have every week in the John Hancock Mutual Life Insurance Building, in Boston, a meeting at which able speakers are secured who give to those present valuable information that they have had from actual experience. These meetings are doing much to stimulate the interest in diversified industries in Massachusetts and in closing, I am confident, in my position in Massachusetts, that I can report to this Congress and to you members present that Massachusetts has grasped the safety movement in earnest and the results of its efforts will be manifested in the days to come.

CHAIRMAN PEACOCK: You notice that Nat Bartlett is working out his problem in connection with an organization already on the ground.

We were to have, next, a report by C. E. Torrance, the regional director from Michigan. Mr. Torrance is unable to be here and I will present a report based upon information given me in a letter he wrote me.

Mr. Torrance, who is superintendent of planning and personnel, Bryant Paper Company, Kalamazoo, Michigan, reports that he circulated the 41 mills of the state in the interest of an All-Michigan Congress, to be held in May of 1928, in connection with which the Paper & Pulp Mills were to hold a sectional meeting of their own. While only four mills responded with representation at the two day sessions, the quality of the program and the interest manifested on the part of those present justified this beginning activity. Mr. Torrance compliments the Michigan Mutual Liability Company of Detroit for their participation in the meeting and their efforts in stumping the state on behalf of the attendance.

From his own mills, those of the Bryant Paper Company, Mr. Torrance had some striking reactions. Five mills were given an accident survey in 1927 and a thorough organization was set up. A large amount of guarding was effected, superintendents of the plants were called together by the management of the Bryant Company and were given strict responsibility for all accidents within their divisions. A safety committee was organized in each of the five mills, with divisional foremen as members, the superintendent as chairman and Mr. Torrance

himself, superintendent of Planning and Personnel, as secretary. Accidents were reported and analyzed and plans were made on the basis of facts discovered. The result in these five plants was a reduction of fifty-five and a half per cent in lost days during the first seven months of 1928, as compared with the same period of 1927.

Mr. Torrance reports that the problem of machine workers going barefooted was met with a strict order to wear shoes. Superintendents were firm in their insistence upon the order and counsel was afforded the men as to proper type of shoes, leather-soled and leather-heeled shoes being favored as against rubber.

I am sure that we can say the report of Mr. Torrance is received with satisfaction by this section, as indicating that a promising beginning has been made.

(Mr. Torrance was unanimously requested to serve in the capacity of regional director in Michigan for another year.)

CHAIRMAN PEACOCK: Next, we would like to hear from our New York regional director, Mr. C. H. O'Connell, Supervisor of Safety, International Paper Co., New York City. Let me say for Mr. O'Connell that his main task as regional director this year has been here in New York City. We have asked him to serve us in the setting up of matters relating to the Congress. He has been a member of the local committee and we have him to thank for a great deal that has been enjoyed.

C. H. O'CONNELL: I haven't done a great deal. As a matter of fact, I visited twelve mills, all over New York and part of Canada, and a good deal of my time is taken up by travel. However, I tried to do what I could before this meeting. I can't report much activity for the section except that of our own company. We have five mills in New York State. Our accident experience has improved a great deal during the year. In one of the mills where they had probably 300 lost time days last year, I don't believe they have had 25 this year. I think the biggest thing that we have done, and it doesn't originate with me, is the introduction of the safety movement in the schools. In two of our mills in New York State, with the assistance of the Metropolitan Life Insurance Company, we have introduced the teaching of safety in connection with the schools. This is correlated with the subject matter they have from the first grade up to the High School. I believe that is a good idea. It is nothing new but it will do a whole lot toward safety when these children get to be of working age.

CHAIRMAN PEACOCK: From Ohio we are to hear from Mr. Kenneth L. Faist, regional director, Safety Director of the Champion Coated Paper Co., Hamilton, Ohio.

"What Has Been Done in Safety in Your Region During the Past Year?"

By KENNETH L. FAIST

Safety Director, Champion Coated Paper Company, Hamilton, Ohio

In our region, or State, the Ohio Industrial Commission with Mr. Thomas Kearns, superintendent, inaugurated a state safety conference in November, 1927, and incidentally plans are under way for a still larger one on the 13, 14 and 15 of this November. It would be impossible to give enough credit to Mr. Kearns and the commission for their endeavors along these lines as this conference was second to none but the National Safety Council Congresses each year. Last November there were a dozen or more sections represented and a large number of paper mills in our own section.

In the pulp and paper section the first speaker, Mr. Roland Jones of the Surety Manufacturing Company, Chicago, Ill., had as his subjects, "Why Make Standard

Guards and What Can You Accomplish by Guarding?" Mr. Jones gave us insight into the part standard guarding plays in accident prevention. Mr. Jones brought out what real safeguarding of machines, etc., is, not just a makeshift to get by with if lucky, but real guards that are fool proof. Correct designing, said Mr. Jones, saves in two ways: correct designing saves by conservation of floor space. Pipe rail guards oftentimes take up quite a great deal of space where a guard properly designed would give you this additional space as added room for aiseways, etc. Mr. Jones referred to a case where an excellent looking guard was built costing in the neighborhood of \$200 but the State code on standards had been ignored resulting in the State Inspector condemning same and it had to be rebuilt.

Provisions must be made for oilers, maintenance men, etc., to get at the particular equipment with ease and speed and yet with the utmost degree of safety.

Guards must be tailor-made. Big brother's pants on little Junior gives an appearance so that you can't tell if he is coming or going. Some guards incorrectly designed give practically the same impression.

A real live discussion followed this splendid address.

We were more than fortunate in the first meeting of the Pulp and Paper Section to have as one of the principal speakers none other than our own "Bill" Peacock. Mr. Peacock's subject was "The other 75 per cent." His first words to quote direct were:

"I want to tell you fellows of Ohio that you have got a bigger thing here today, I won't say the number of mills represented but certainly in the number of men, than we had in Detroit in 1922. Ohio has a bigger thing here starting, than we had in the National Safety Council six years ago. Mr. Peacock laid special stress on the potential accident. The pipe that is hanging overhead ready to fall on someone, anyone at anytime. That is an accident even though no one has as yet been mangled or cut. These accidents cost hundreds of dollars, even though we may be lucky and have no one injured."

I am not going to take up a whole lot of your time in telling you what "Bill" said as further remarks would be futile, but recommend, if possible, you get a copy of the proceedings and read it word for word carefully. Hundreds of splendid points brought out in his own unique way of putting it across.

Officers in the Ohio Division

After the meeting the section went on record as a permanent organization and elected the following officers:

Chairman—K. L. Faist, C. C. Pa. Co.

Vice-chairman—Mr. Hiers, Ohio Boxboard Co., Rittman, Ohio.

Secretary—D. D. Thirkield, Sorg-Ogglesby-Smith Paper Co., Middletown, Ohio.

On March 16, 1928, there was held at the Anthony Wayne Hotel at Hamilton, Ohio, a Paper and Pulp Safety Conference. This Conference was exceptionally well attended considering the fact it was the first. I believe, that has been attempted in our section.

The program consisted of:

1st Welcome address, Dr. Mark Millikin, councilman, City of Hamilton.

2nd Address by Mr. Thomas P. Kearns, Superintendent, Industries Commission, State of Ohio.

Mr. Kearns' talk inspired all present.

Mr. Kearns pointed to making April, 1928, a no-accident month. This was done but the results did not come up to expectations by all mills. This month, i.e., October, is the second no-accident month to be tried this year. The April issue of the Paper Industry carried an account of the Conference and the high lights of Mr. Kearns' address.

During his discussion Mr. Kearns gave some very interesting data relative to the causes and rating of accidents—(This is Ohio only.)

Cause	Frequency	Severity
Machinery	1	3
Handling of objects.....	2	2
Stepping on or bumping into.....	3	5
Falls of persons.....	4	1
Handling tools	5	6
Falling objects	6	4

The National Safety Council, as per usual, came readily to our assistance with Mr. E. W. Corn who had everyone on their toes. If anyone here has not heard Mr. Corn and ever gets that chance don't fail to make use of the opportunity. It will more than pay you. I'll leave that to Mr. Augustus or Mr. Grant or anyone else here that heard him at Hamilton.

Mr. Corn's talk was divided into three basic points: Recognition of the Hazard, Mental Alertness and Dexterity and Watch Where You Go.

After Mr. Corn had been deluged with questions and remarks the meeting adjourned for dinner after which a short entertainment in sleight of hand by Mr. George Steiner, back tender, The Champion Coated Paper Company, Hamilton, Ohio, brought forth quite a lot of merriment.

Mr. Charles C. Barthe, Safety Engineer, Industrial Commission of Ohio, followed with an excellent address on Safety and Hygiene.

Discussion followed and all agreed that a great deal of inspiration had been received from the Conference. A total of 51 were in attendance and ranged from executives to safety committeemen.

Generally taking everything together, it was a very profitable afternoon and evening to all and believe all of us in attendance went back with renewed vigor to tackle our various safety problems.

The greatest values perhaps received in Conferences of this kind are ideas, interchanged which often result in things of value to all of us.

Incidentally one of our members here, Mr. Augustus of Mead Pulp & Paper Co. called at our plant before noon with Mr. F. S. Pope and Mr. Lawrence Bonner of the same organization. During the short trip (as our time was short) Mr. Bonner became interested in a calender roll scraper (details of which you perhaps noted in the National Safety News). According to information later received, believe these scrapers are being used in all the Mead Mills. I am calling your attention to this item merely to show that these get together meetings, etc., are very profitable in many ways besides the actual value of the meetings themselves.

Other visitors were interested in the problem of machine room men wearing shoes. It is compulsory in our plant for every employee to wear shoes. Am looking forward to the time when this will be an adopted rule in all Paper Mills.

Will say in closing, Ohio is heartily in accordance with any activities along the safety lines and we don't expect to let any other State in the Union show us up.

The Report from Pennsylvania

CHAIRMAN PEACOCK: In Pennsylvania, the section laid heavy hands on Mr. Ed. J. Gayner, assistant factory manager, of the Scott Paper Company, Chester, not realizing that his time was very much limited in these matters of safety. We are glad to have Mr. Gayner here and he will tell us how he sees things at this time.

ED. J. GAYNER: Two years ago I attended a National Safety Council meeting similar to this, in Detroit. At that time, as we still are, our company was seeking or rather groping for some solution to these industrial accidents that we had been

having and continue to have, although I can say that we have them in less numbers and of less severity today than we have ever had, accidents that were caused not by the lack of guards or by the failure to use guards, but what I term just plain dumbness. However, after that meeting, getting back into my usual line of work, which is production, I took an interest in safety and was appointed by the management as chairman of our safety committee. We don't have a full-time safety engineer. We conduct all of our safety work through this safety committee, composed of members of the organization. Just a few months ago, Mr. Peacock wrote me, saying that I had been unanimously elected regional director of Pennsylvania. I didn't feel I had the time to devote to this important job. However, my polite refusal of the election did not work, Mr. Peacock and different members of the Safety Council continued to send me literature under the title of regional director of Pennsylvania, so I wrote Mr. Peacock that I would do anything that I could do.

There is one matter that I think is deserving a report and I don't think it ought to be confined to the region of Pennsylvania. At Mr. Peacock's suggestion, I wrote to members of the organizations that supply paper mill machinery and equipment with the thought in mind that the initial safety work should start with them. My attempt was to get them present at this meeting with a view to their becoming a permanent part of this organization. I had some very interesting replies, in which several companies agreed to have men here.

I might mention some of these companies so you will have some idea of those that replied: E. C. Adkins & Company, Samuel Langston Company, Noble & Wood Machine Company, Valley Iron Works, Beloyd Iron Works, Hudson & Sharp, Cameron Machine Company, and Diehl Valve Steam Turbine Company. I wrote to twenty-three or twenty-four companies and didn't even receive an answer from the others. If we can get these machine builders and the engineering departments of these supply companies interested in guarding the machinery as it comes into the plant, we will have accomplished something or, at least, by-pass a lot of work that has to be done after the machinery gets there. Incidentally, we will save a lot of money. Now, as for the work that has been done in the way of group meetings, so far as I know nothing has been done. I do feel that I am somewhat of a wolf in a herd of sheep. My first job is entirely production and, of course, I am keenly interested in the safety end of production work and anything that I can do in the future, that will not interfere with my regular operation, I will certainly be glad to do.

The Report from the Wisconsin Valley

CHAIRMAN PEACOCK: This is a practical service Mr. Gayner has given us in calling to the attention of manufacturers of equipment the advisability of meeting with the rest of us to talk over problems of guarding.

From Wisconsin Valley we are to hear from Mr. Franz H. Rosebush, regional director, who serves as Director of Industrial Relations, Nekoosa-Edwards Paper Co., Port Edwards, Wis.

FRANZ H. ROSEBUSH: Your chairman has indicated that we held a regional meeting in the Wisconsin River Valley last November. We had about three hundred members there, a combination of the paper mills of the Wisconsin Valley and the wood-working industry of the Wisconsin Valley. It was my pleasure to be a member of the committee which set up a regional meeting in the Rock River Valley at Janesville and after that, there was a meeting provided for, which will occur next spring at Rockford, Illinois. I mention that so that you can see that the influence of these meetings is going down the valley and extending from the pulp and paper industry over into the other industries, as the meeting at Rockford will probably take in many others besides the pulp and paper industry.

There is just a word I would like to say in regard to the regional meetings. The object you and I have in attending these congress meetings is to get something to carry back to our own mills. At the regional meetings we have held we have insisted that our foremen, our machine tenders, as many as possible, should attend and catch the enthusiasm that we fellows who come to the congress take back with us, and some mills had twenty-five to thirty men as delegates. The thing I would like to urge is that you broadcast to the man who is doing the labor, who handles the tools, the lessons imparted here, by means of the regional meeting.

CHAIRMAN PEACOCK: Before we call on Bill Ashe, who will be the last speaker, I want to give Mr. Lundrigan a moment for a comment that has occurred to him.

JOHN T. LUNDRIGAN (International Paper Co., New York City): I am wondering if we haven't got beyond the day of requiring so much service of the volunteer, who is willing to give it, and get right back to the proposition that I thought pretty well agreed on a couple of years ago, that we ought to have a paid representative, explaining to members who are tardy in becoming a part of this section and pointing out to those who are using it as the first source of economy when they have to retrench, withdraw their membership in the Association, having, for instance, a man of the experience and knowledge and interest of our Chairman, to personally visit the non-members, to periodically, or as opportunity offers, visit those who are already members. Now, it seems to me that we ought to think ourselves between now and Wednesday, whether or not we are willing to go back to those of our own companies who have to furnish the sinews of war or to the Council itself or make some arrangement for a division of payment and hire some competent individual to take up this burden that we are trying to do. I consider it necessary if we are to progress much further than we have without making sacrifices in our own plants.

Now I believe that is a very serious question of policy, that this particular section of the National Safety Council ought to take some pretty definite action on at this meeting. That is all I have to say at this time, because as I said before, I don't intend to make a speech, but I did want to leave with you a thought which is with me a conviction.

F. H. ROSEBUSH (Nekoosha-Edwards Paper Co., Port Edwards, Wis.): It occurs to me that we ought to take it up with the officers of the National Safety Council a little bit and discuss with them on what basis such a man would be employed, whether or not he be a member of the staff of the National Safety Council and how much they would be willing to set aside for the expense involved and other details before we go too far in a business way of passing such a motion.

B. D. ROGERS (Bird & Son, Inc., East Walpole, Mass.): I heartily agree with Mr. Lundrigan. I was going to ask practically the same questions as Mr. Rosebush asked. If this is the proper place to ask it, I am wondering what has been done along this line before, which our chairman mentioned today.

CHAIRMAN PEACOCK: It would take a long while to go into this matter now. I see no place for any extended discussion, as the program has been made out. If you are willing to remain, some of you, Thursday morning, I am sure we can get Mr. Cameron to explain to us just what our problem is.

MR. ROSEBUSH: I move that this be laid on the table, to come up under item 6 on Wednesday morning, so that there will be something definite done with it.

(The motion was seconded and unanimously carried.)

CHAIRMAN PEACOCK: Our last speaker will be Mr. Bill Ashe, regional director for The Fox River Valley, Wisconsin.

W. F. ASHE (Thilmany Pulp & Paper Co., Kaukauna, Wis.): We had our regional conference this year, with four main sections, pulp and paper, wood-working, metal working and public utilities. In all of these regional conferences, from the first held at Green Bay, the second held at Appleton, the third at

Sheboygan and the fourth at Oshkosh, attention was given to the side of the public in the safety movement, with always one or two speakers to represent the public and the public generally has been invited to the evening session and the afternoon session, the morning session being devoted entirely to sectional meetings. The comment of one manufacturer in our state I think is significant of the feeling of all of us. He is the general manager of a metal working plant and perhaps the largest employer in our section. He said, "The regional meeting is the cheapest and most effective safety that we have got up to date." He said, "We send from forty to sixty foremen to that meeting and it costs us less than the cost of sending a single delegate to the National Safety Congress."

Foremen's Schools Throughout the Fox River Valley

In addition to the regional conferences, there have been started throughout the Fox River Valley, foremen's schools. These run for six weeks during the winter, one night a week. The average enrollment, I think, will run about 350 per city. Those are rather general meetings, with speakers picked from both our own locality and brought from a distance. These schools are run by vocational schools, the community and with the very efficient cooperation of our State Industrial Commission. These have been of great value to us: Last year they were held at Fond du Lac, Oshkosh, Appleton, Green Bay and Sheboygan. Next week there will be schools at Neenah and Menasha. Out of these have come a very fine appreciation of the importance of safety to our foremen.

CHAIRMAN PEACOCK: It is very interesting to see Bill Ashe organize one of these meetings. He begins to plan, not for a meeting, but for definite results. When we first talked about the necessity for getting enough men together to pay expenses, Bill came through with the suggestion, "That simply means a quota from each mill."

"About fifty men from The Northern; twenty-five men from Thilmany Pulp & Paper Company. Hoyman, that mans about forty from Kimberly-Clark." And so on. You can have a wonderful meeting when you have the quota idea. And, at \$3.00 a head, plus the day's wages, about all it costs per man, the more you send the greater the benefit and enthusiasm you will have returned to your plants."

ADJOURNMENT.

October 2, 1928

W. J. PEACOCK, Chairman

Head, Department of Personnel, Northern Paper Mills, Green Bay, Wis.

The second session was called to order at nine-thirty o'clock by the chairman, W. J. Peacock.

CHAIRMAN PEACOCK: I would like this morning to introduce to you the vice-chairmen of the section. First, Vice-Chairman for South, G. W. Phillips, Supt. of Safety, Champion Fibre Co., Canton, N. C.; for Middle-West, M. G. Hoyman, Supt. of Service, Kimberly-Clark Co., Neenah, Wis.; Vice-Chairman for East, W. A. Gleason, Safety Director, Hammermill Paper Company, Erie, Pa.

I am sorry to say that the other three officers are not here, Vice-Chairman for Canada, A. P. Costigane, of the Ontario Pulp and Paper Maker's Safety Association, Toronto; Vice-Chairman for Paper Box Manufacturers, H. C. Sackett of the Alton Box Board & Paper Co., Alton, Ill., and Secretary N. H. Bergstrom, Bergstrom Paper Co., Neenah, Wis.

Mr. Phillips is doing a significant piece of work in the field of industrial relations in cooperation with the Y. M. C. A. Mr. Gleason is serving us in this meeting as chairman of the Nominating Committee.

Now, gentlemen, I want to ask your indulgence in bringing to focus the suggestion made by Mr. Lundrigan yesterday regarding a permanent secretary for the section. I ask permission to appoint as a committee to bring back to us tomorrow some idea of what can be done. On this committee I will name Mr. B. D. Rogers, Bird & Son, Inc., East Walpole, Mass., and F. H. Rosebush, of the Nekoosa-Edwards Paper Co., Port Edwards, Wis. I am now going to ask the chairman of our Program Committee, F. H. Rosebush, to take charge of his own program for the rest of the session.

ACTING CHAIRMAN ROSEBUSH: Mr. Peacock introduced the vice-chairmen and it rather seems to me that it would have been the proper thing for one of them to take the chair this morning. The Program Committee held two meetings and we set up three different programs. Those were mailed out to some twelve members of the section, largely the regional directors and vice-chairmen, and they were asked to indicate which program they preferred. We did that with the idea of getting the sentiment of as many people as possible in the setting up of this program and, as chairman of the Program Committee, in making this statement this morning I say that this is your program.

The first speaker is Mr. W. F. Ashe, Employment Manager of the Thilmany Paper Company, Kaukauna, Wis.

The Relative Importance of the Plant Safety Department

By W. F. ASHE

Employment Manager, Thilmany Pulp & Paper Company, Kaukauna, Wis.

I never made a safety speech in my life, but last summer, sitting up in a hotel in Oshkosh with friends Rosebush, Bill Peacock, Hoyman and some others, I made some fool crack or other; and one of them said, "Well, let's have a speech from you for the New York Safety Congress." I thought it would be kind of easy and I looked around for all sorts of things, just like the rest of you fellows who got down here just because you wanted to come to New York in October. Some of you got away with it without having to make a speech, but like every fellow who has to make a speech I looked around to see where I could steal it and I found a safety speech in the most amazing place!

There's a book that has a more or less authentic story of people, two thousand years ago, who met all sorts of human problems, and in that I found a dandy story on safety organization. I was going to bring the book here and read that speech but knowing that Bill Peacock was formerly a minister, I was kind of afraid to bring it. I found that speech in the Eighteenth Chapter of Exodus.

That's a book some of you are not acquainted with, but the story is there and it goes something like this: Moses had led the children of Israel out of Egypt and after some years, when they had gotten a good ways out, Moses' daddy-in-law came to visit them and spent the day with them. Moses wanted to put up quite a show for his daddy-in-law—just like some of our safety men like to do with our big boss, and Moses was as busy as a one-armed paperhanger with the hives all day. He thought he was impressing the old man a lot. The old man's name was Jethro, if you've forgotten.

Jethro watched him all day and at night called him aside and said, "Boy, what's all this that you are so busy about; what keeps you eternally at this thing, keeping all these people standing around here?"

And Moses said, "Well, I've got to judge these people. They don't know anything; I've got to show them everything. I've got to settle their disputes because they've been in slavery and they just don't know anything." Jethro said, "The thing that you are doing is not good; you are wearing yourself out and the worst of it is you are wearing your people out, because they have to stand around and wait for you to do these things for them. No good; you're not getting anywhere." He said, "The thing for you to do is to get busy and get yourself a bunch of foremen. You want a superintendent over a thousand; you want a foreman over your hundred; you want a sub-foreman over your fifty and you want a straw boss over your ten men; and in all things that come up, let these men do this job." And then he said, and here is the meat of the whole cocoanut, "You hold yourself and the people God-ward; you furnish the inspiration; you furnish the leadership. Let these people do all the things they are able to do and you hold yourself free for only those big things."

I imagine Moses, being human like the rest of us, figured, "Well, there goes my job. If I can't be the big thing around here, I haven't got any job." But he was wise enough to do what Jethro said and for the first time he had leisure to think about his job.

I think there is a pretty good analogy there for the whole safety game. I look around and see chaps who don't know anything at all about it, hustling around and through the mills, trying to tell this fellow and that fellow and the other fellow to play safe. He can't do anything because, in the first place, he doesn't know what safe practice is; he has never been through the game, doesn't know anything about it, and right there, in his own hands, is Jethro's organization all ready for him. All he has to do is steal it.

You are organized for production, you are organized for maintenance, and all you've got to do, it seems to me, to get some line of safety is to say that we will have production with safety, we will have conservation with safety and we will have maintenance with safety and the birds who are running those crews know a heap more about just how to get that safety in it than you or I.

There is no place for a "safety department." There is place only for leadership and inspiration. You will say that we have to teach our foremen how to do the jobs safely. We don't. We have to get our foremen to the point where they will teach us how the job can be done safely. When we get them there, some of us safety men are going to learn a lot about safety.

You say, "That will take the safety man's job away?" No, it will be the first time he has ever had a job he can do. How is he going to do it? I'm not going to tell you that. There are other speakers here on this program to give you that.

We will never get a safe mill as long as that safety is in the hands of one man, never in the world. Now you will say this is a pretty big job for a safety man to get those things done. I have heard lots of fellows say, "The management of my mill is not interested in safety." Of course that's all bunk. There isn't any management of any mill that is not interested in safety. They may not bubble over with enthusiasm about your ideas of safety. Probably they are right about that. A lot of us have injected a heap of bunk into the thing and we have fussed around just like Moses did, trying to impress the boss, and you know he is a little bit difficult to impress.

You may say you haven't any authority. I don't believe the authority given to a man is worth thinking about. I believe that you fellows, a good many of you, will agree with me that that foreman in the mill is most valuable to you who hasn't very much authority and takes a lot. The authority that you take is the authority that is most useful in the mill. You may say, "If a foreman took authority in our mill, he'd probably get canned." No he wouldn't, not if he uses his head. Bear in mind that a man who steals authority, also takes responsibility, he shoulders responsibility and I don't believe there is a management anywhere who isn't looking for just that kind of a man. Looking for him as a safety man? Sure. A safety man has to be willing to take responsibility and say, even to a superintendent, that that particular practice can't go on because it's unsafe. "Well," you say, "our superintendent would sure hit the roof." Of course he will. But if you have behind you the knowledge and can show him definitely that that is an unsafe practice and give him an inkling of a way in which he can make it a safe practice, that superintendent is going to line up with you and go along.

I think the safety man has got to take the responsibility and the authority for saying that such and such a fellow is an unsafe man, both for himself and his fellow workmen. I think you fellows have all had men that you knew, if you kept them there, were bound to have an accident. I had a curious thing come up a couple of years ago. I had to discharge a fellow and he happened to be the father-in-law of the man who worked as secretary for our president. The president called me to one side and said, "Here, I think you are pretty hard-boiled about this. I don't believe you ought to discharge that fellow; he can't work anywhere else, and I think it's pretty rough to let him out. I think you ought to take him back. "Why certainly we'll take him back," I said, "if you will take the responsibility." "What do you mean, take the responsibility?" he asked. "Well," I said, "if we have him back here, we will probably kill him. We've just escaped doing it four times," and I described the circumstances. I said, "Sure I'll be glad to take him back; I like the fellow first-rate. You take the responsibility and I'll take him back and put him to work." He said, "Ashe, how would you like to go to hell?"

We have one job, all of us, and that is running a paper or pulp mill, taking raw material, working it through our process and selling it for a profit if possible. I hope that day will come, when safety is just as much a production and maintenance problem as anything we have got today.

Jethro said, "You be to the people God-ward." I say to us all, as safety men, "Let us be to our foremen the inspiration, the leadership, the backing up, that will allow them to do the job that every last one of them wants to do. Maybe he doesn't know he wants to do it, but he doesn't want to run his department in an unsafe way. There isn't any man anywhere who wants to kill or hurt his men. All right, let's capitalize on that, build on that, encourage them to build on that particular kind of thing until they run us out of a job. I have an idea if we are able to do that, we can find another job in that plant and I don't think we will have to look very hard."

Are we big enough to do it? Frankly, men, I think we are. I think that the

safety men in general who have been chosen to do this sort of thing average pretty well up with the others. So let us build ourselves up, not by asking for authority but by the fact that we put as much into the game as there is in it. Read, study, build, work, until we've gotten into a place of leadership to these men below us and give back the credit to them for the things they do.

ACTING CHAIRMAN ROSEBUSH: Knowing Mr. Ashe as we do in Wisconsin, we came down here prepared to defend ourselves against what he said. You remember, he said there is no place for a safety department, as such, in the organization, and then he proceeded to tell you how his own safety department functions in certain cases. Now, you may want to ask him questions as to how to link those two things up.

CHAIRMAN PEACOCK: I want to take the liberty, as a former minister, of asking Mr. Ashe what version of the Holy Scriptures he used in these quotations this morning?

MR. ASHE: In answer to that, Mr. Peacock, may I refer you to the answer that the president of our company gave me.

ACTING CHAIRMAN ROSEBUSH: What do you think about the statement Mr. Ashe made that the foreman or safety man sometimes would be out of a job, in regard to safety, that he would be all caught up on safety work?

MR. ASHE: I didn't say that. I said that there might come a time when there would be no such place as an individual safety man or safety department; in other words, when safety becomes incorporated in the entire process of manufacturing.

N. F. BARTLETT (Hollingsworth & Vose Co., Boston, Mass.): I would like to repeat a version of Scripture for Mr. Ashe and Bill Peacock. Don't you know in the Bible we read how Job asked the Lord to look after his safety?

J. J. TELLINGTON (Brown Co., Berlin, N. H.): I would like to ask Mr. Ashe how he handles the problem of the worker in his mill who is unsafe and continues to be unsafe—just what he does before he lets him out, that is, before he discharges him finally?

MR. ASHE: We try every means to make him a safe man. Perhaps he is in the wrong department. Perhaps the type of thing that he is fitted for is not the thing that he is doing. There are some men who can't work with machinery. Some fellows can't work in groups. I will say frankly that very often we find there is no place in the mill for some men and we suggest they go get themselves a job clerking in a store.

ACTING CHAIRMAN ROSEBUSH: We will pass on to the next paper on our program, to be presented by Mr. O'Connell, Safety Engineer of the International Paper Company of New York City.

Some Outstanding Hazards in Paper Mills and Their Control

By CLARENCE H. O'CONNELL

Safety Engineer, International Paper Company, New York City

Outstanding hazards in Pulp and Paper Mills have been and are still so numerous that it has taken years of study and endeavor to get them even under partial control. The unfortunate feature is that a great part of the experience gained and corrective measures employed have been brought about at the expense of much physical and mental suffering by human beings.

The hazards dealt with in this paper certainly are outstanding since in nearly every operation mentioned, one or more lives are lost.

In mills where wood is received in its raw state, prepared and stored, the dangers

incidental to its handling are greater than many realize. Thirteen-foot logs traveling up an inclined log haul where at any time a log may be disengaged from the hooks and tumble backwards, can only be guarded against by having sufficient clearance at the sides and at bottom of the incline for men to jump away should this occur.

Saws revolving at a tremendous speed require expert handling and inspection to guarantee freedom from breakage. In addition, there should be swinging guards in front of saws to protect sawyers in case a stick flies back.

Men guiding the wood into chutes where a jam often occurs, necessitates rapid and careful handling to keep things moving and at the same time avoid injury from flying blocks. We believe that men selected for this work should be given particular attention and instruction by the foreman at this operation. It requires a man to be alert and to move rapidly and we know this type of workman is also liable to be daring and a chance taker.

Conveyors, no matter at what speed they travel, are dangerous when, as often occurs, a workman takes the short cut and climbs over a moving chain. Signs forbidding this practice help, but there must also be continual watchfulness exercised by the gang boss.

Wood being unloaded from cars presents a continuous hazard by the fact that in no way can control be exercised to the point when a stick will not occasionally drop from the tier to the car floor; and, in this case, when wood is not piled but dumped into the cars, the hazard is much greater.

It is not unlikely that the loading of cars in this manner besides being hazardous at the unloading point, is false economy. Time is saved, of course, in loading, but the unloading is a very slow process. Not more than one man can work in the car door and he is obliged to be continuously jumping back and forth to avoid injury.

When an accident does occur here, it is usually one or more broken toes, possibly a fracture further up in the foot. What is believed to be a partial remedy is the wearing of safety shoes or metal toe guards. It is certain that either will afford some protection from foot injuries.

When it is necessary to take the wood from piles of 20,000 cords or less, every precaution is necessary to do the work in a safe manner. As the pile is being dug into from the bottom, an overhang shows above, and in warm weather this will usually take care of itself by gravity, but in every instance when wood falls from a height in bulk, workmen must be continuously put on guard to avoid being hit. In winter, the situation is further complicated by frozen piles, wood is hard to dislodge and gradually the pile assumes a dugout appearance at the bottom with jutting ledges above. It has been the practice, too much so, for men to climb the pile and attempt to break portions of it down by throwing sticks from a certain distance toward the edge. Due to the uneven formation, this is always hazardous for when the pile starts to break there is no telling how far back the slide will reach. In recent years the use of a heavy metal drag to rake the face of the piles has worked out pretty well. This device, sometimes an old ship anchor, can be rigged with cables to operate by electric or steam power and by its use a few times a day, sufficient wood is dragged down to keep a force of men working.

Electrical Hazards

The recent complete electrification of paper mills introduces a hazard that to the layman is little understood and to the electrical operator or repair man, a constant source of danger. Experience has shown that all electrical workers expose themselves at times to this danger, new employees due to inexperience, older ones to overconfidence and habits acquired during years of experience when perhaps they were just lucky. How often we hear an electrical worker recite an experience

where he absorbed 550 volts and was only jarred or stunned for a moment. The fact that he did survive a near accident of this sort is no proof that death will not result from even less voltage, depending on the physical condition of the victim, and the tools and appurtenances with which he is in immediate contact.

Without any knowledge of electrical power or its application, we do know that electric railways, public utilities and manufacturers of electrical equipment where apparatus is subject to severe tests, operate successfully and with comparative safety. We know also that this could not have been accomplished without intensive study as to safety standards and safe practices and the application of rules which will insure safety if followed.

Therefore, we who have this problem as only a part of our process, should endeavor to minimize the hazards we have. First, by thorough instruction of electrical workers, continuous inspection of equipment and surely the provision of safety equipment, rubber mats, gloves, fuse pullers, rubber blankets, etc.

Safety meetings of electrical workers apart from regular plant Safety Committee Meetings are recommended. Although rules cover ordinary causes of electrical accidents, it is important that all hands get together at regular intervals, perhaps because of changing conditions and equipment, but at any rate to create and maintain the tendency to think and act in terms of safety.

What cannot safely be dispensed with among any group of electrical workers is a well trained first aid team. Among safety men, the knowledge of this requirement is as old as the hills, yet, lapses in training do occur, changes in personnel perhaps may reduce its efficiency and when the crash comes with a man's life hanging in the balance, regrets and alibis are of no value.

What is of extreme importance in connection with electrically controlled machinery, both for electricians and others, is the use of danger tags on controls whenever it is necessary for a workman to make repairs or in any way expose himself to the possibility of being caught by parts while in motion.

There is to contend with, also, repairs and construction work around exposed current carrying parts, being done by others than electricians. The fullest protection should be given to workmen exposed to this hazard and should take the form of supervision by a foreman or expert who knows whether or not power is off and the clearance necessary for safety when the work approaches live circuits.

We have to also consider the operator of machinery who knows nothing of electricity beyond throwing in or pulling out a switch. This means the lathe operator in a machine shop or perhaps a conveyorman in a chipper building. Our job is not to give him a course in electrical power operation but to teach him a few things he must not do.

There have been occasions in our own experience where men were burned to death in tanks No. 1 because of the failure of the operating steam valves. There is no escape in a case of this kind when such a volume of steam will practically cook a man in a few seconds.

When steam is delivered under pressure to digester, or bleaching tank, where it is sometimes necessary for employees to go for inspection, repairs or cleaning, a safety valve should be installed between the operating and main supply valves, so located as to be easy of access and plainly marked "Safety Valve." Whenever there is occasion for a workman to enter this tank or vat, he should personally see that the safety valve shuts off the steam and is properly tagged by him.

The broke beater, while a very innocent and harmless looking piece of equipment, as generally viewed, is really a potential hazard. Less now than in the past because of more care being exercised in its handling, following fatal accidents in nearly every section of the country where paper mills operate.

Unless employees are carefully instructed, cautioned and watched, they have a tendency to lean too far over while feeding beaters, thus exposing themselves to the danger of being drawn in with the broke. And, not only will they lean toward

the point of danger but will even climb into a beater to relieve congestion or plugged conditions of the stock by treading it down. Any practice of this nature becomes highly dangerous the second the man's feet leave the floor. The control of this hazard can be obtained only through continuous education and instruction by the supervising force.

Belts.—The operation of taking off and putting on belts has been the cause of a great many accidents through employees undertaking to do this while machinery was in motion. When necessary to perform work of this kind driving machinery or power should be stopped, and where it is necessary to slow down or start up to do the required operation, the power should be regulated by a competent man, separate from the man actually handling the belt. It is true, too, that regular belt inspection for condition and repairs when machinery is down, will do away with the necessity for much belt handling during operating hours.

Machine Felts.—In nearly every paper mill accidents occur while washing felts, particularly so on the larger paper machines. Inasmuch as this operation is necessarily performed with the clothing on the machine, it is important that safe running boards, and, when possible, hand rails should be provided. If the running board cannot be used while the machine is operating but can be installed while the felts are being washed, a properly fitted removable board should be provided and used.

It is also important that every employee who performs work of this character be instructed how it can be done with the least possible hazard. Such instruction should be coupled with the actual work. One of the important features should consist of instructing the employee handling a running felt to keep his hands as far as possible away from the inrunning bite or nip between the felt and felt roll. In other words, wherever it is not absolutely necessary to do otherwise, the location of the operator's hands on the felt should be as far as possible away from the point where it meets the felt roll.

Paper machine winders are a constant source of danger on account of their speed and the inrunning nip, together with makeshift devices which winder operators sometimes use. The practice of using rope on winder shafts to prevent rolls slipping is unnecessary as well as unsafe, and should be discouraged. There is a tendency, also, in starting a reel to use a cloth or a piece of broke to drip water on the reel. The danger of this is that hanging cloth or broke may be drawn between the reel and the movement is so rapid that the workman's hand is usually drawn in with it. For this purpose it is recommended that sponges be used as they are so compact and suit the purpose even better than either cloth or broke.

When the reel is started the nip should be protected so that if a man stumbles and falls toward the winder he cannot drive his hand into it. A good practical guard consists of reinforced wire mesh in an angle iron frame about a foot wide and extending the width of the machine, installed to suit the particular type of winder on which it is to be used.

We know that today mills generally are well guarded to comply with state or province labor regulations if nothing more. There remains, however, the human factor; lack of proper instruction, mental lapses and want of cooperation between departments or individuals, not intentionally, perhaps, but nevertheless a primary cause of numerous accidents.

The control of any condition of this sort rests with the Plant Safety Committee to devise ways and means for betterment and for the Department Heads and Foremen to translate into action whatever plan is adopted for correction.

ACTING CHAIRMAN ROSEBUSH: There may be questions that you would like to ask, suggestions, experiences that you have had in your own paper mills.

W. H. JENNINGS (Bogalusa Paper Co., Bogalusa, La.): With reference to putting the rope on the rewinder, is there anybody in the house can give me

some idea of a collar ever devised to fit on that shaft when you start the roll? Now, we use the rope and during the course of a year, we have a number of men who lose a part of a thumb and down in the South, the paper mills are something new and we have had to build up our staff through local people to a great extent and we have had a lot of trouble with that rope on our rewinder. I wonder if the gentleman can give me some idea of a collar of some kind.

MR. O'CONNELL: There has been a collar made for that very purpose. We use it in our mills.

B. D. ROGERS (Bird & Son, Inc., E. Walpole, Mass.): We used to have some accidents to thumbs and fingers on rewinders. Our paper is fairly heavy paper and we use a gum paper in putting it on the shaft.

ERNEST AUGUSTUS (Mead Pulp & Paper Co., Chillicothe, O.): There is one hazard that is quite common in paper mills, that is your calender stack. Now, you can put a guard on the nip of your calender stack but you can't keep a fellow from getting his hands up in there, and on the machine stack, you can't put a guard over the nip in certain instances. How are you going to protect that?

MR. O'CONNELL: Isn't it possible to use air so the operator's hand won't approach the nip within six or eight inches?

MR. AUGUSTUS: Well, if the operator will do it. But we had a fellow just a month ago, pulling an armful of broke out between the first and second stacks. In some way, this caught the armful of broke and pulled five fingers of his two hands before he could do anything. We couldn't put a guard over there to keep that fellow from being drawn up; he had hold of it in such a way that he couldn't let go of the broke quick enough.

MR. O'CONNELL: That is on the front side? Yes, I don't know how you could overcome that, except by education.

MR. ROGERS: We had a very similar case and it was a wonder the man didn't lose his arm and he just plugged it in time as his arm stopped right at the nip, but we have since put in that guardway across the stack.

MR. O'CONNELL: I didn't mention the calender stack; I meant the paper machine winder.

MR. ROGERS: I thought you put a guard across the stack?

MR. O'CONNELL: Across the winder.

MR. ROGERS: We have a guard on our bottom nip so that in pulling broke out, the paper can still go between the stack but it won't go up in the nip and pull him in.

ED. J. GAYNOR (Scott Paper Co., Chester, Pa.): We had quite a little trouble in our calender stacks with fellows getting their fingers in there. Of course their arms wouldn't go through. We run a little sheet. We don't do much calendering, but the way we finally solved the problem was to instruct one man on the crew very definitely how to put the paper through the calenders and take the broke out and that's the only man who dares go near the calenders.

ACTING CHAIRMAN ROSEBUSH: What kind of paper do you use?

MR. GAYNOR: Twelve-and-a-half pound sheet, very lightly calendered, and it only goes through one nip.

H. A. FISHER (Bird & Son, Inc., E. Walpole, Mass.): We have had quite a few accidents where the men have lost the ends of their fingers by getting caught in the calender stacks and on a visit this summer that I made to another mill, I found where the end of the paper goes into the calender stack, about six inches long of, well, a piece of a broom handle will do, rounded off, and we are doing that now and we don't expect we are going to have any more accidents that way.

ACTING CHAIRMAN ROSEBUSH: Of course that means a matter of educating the man to use that stick. Someone else might say, "What happens if he mislays the stick?"

FRANCIS WOODCOCK (Hercules Powder Co., Brunswick, Ga.): I was very much interested in Mr. O'Connell's article, particularly that part relating to the handling of wood out of cars and the fracture of feet and toes. I would like to ask him what method he uses in inducing the men to wear safety shoes?

MR. O'CONNELL: To be frank with you, we haven't had a great deal of success in the wearing of safety shoes.

MR. WOODCOCK: Do you have the steel slippers?

MR. O'CONNELL: Yes. We find them satisfactory, except where a man has to jump around very much. If he remains on one level, they are quite safe but on uneven surfaces, not so good.

J. J. COFFEY (Pennsylvania Department of Labor and Industry, Philadelphia, Pa.): I came here to learn something about these calender stacks, because it is quite a serious proposition with us in Pennsylvania, in the number of people that have been caught.

W. A. GLEASON (Hammermill Paper Co., Erie, Pa.): That seems to be the general question before the Department of Labor and Industry and I know our district supervisor, Mr. Carey, is very much interested. We have the calender stack guarded by a simple angle arm placed in front of the nip, possibly about an inch and a half away from the exact nip and when the man puts the paper down there, his hand goes against this angle arm or guard and it doesn't interfere.

MR. COFFEY: I suggested such a guard and they all told me it would never do.

ACTING CHAIRMAN ROSEBUSH: Mr. Augustus asked that question when he inquired about the interference with the air pipe. Can anybody answer that?

MR. GLEASON: I think possibly he was talking about the calender on the paper machine. We have what we call the super-calender. The air pipe on our machine is only at each corner of the machine, one from each side, and in addition to that, we have this angle guard. On your paper machines, your doctor will answer as your guard. Now is that clear—on the paper machine, the doctor board answers as your guard. On the super-calender machine, we have this angle iron guard.

ACTING CHAIRMAN ROSEBUSH: Fine, but it doesn't answer Mr. Augustus' question as to how to guard the nip where the air pipes are used. Some of them have five or six air pipes in front of the nip.

MR. GLEASON: We only have two and our doctor board answers as our guard.

MR. COFFEY: Yet we know of accidents where they have the doctor board, so while it may decrease the accidents, it doesn't eliminate them.

MR. FISHER: There are some cases where we used the angle irons but on our paper machines we make a very heavy sheet, something around twenty-five to thirty-one thousandths, and it would be impossible; in fact, we found the angle iron was a detriment to us, there was more danger and in fact the men couldn't get the paper to the calender stack with a heavy paper like that.

CHAIRMAN W. J. PEACOCK: Mr. Faist has an invention that eliminates a lot of hazard on calender rolls.

KENNETH L. FAIST (Champion Coated Paper Co., Hamilton, Ohio): The majority of our accidents, we found, are due to scraping rolls. We were averaging five or six accidents at least, per month, on the super-calenders and they were due to scraping rolls. They used a piece of steel or anything they could get hold of to scrape a roll, to get all the marks off the roll. We made a small device that was in the May issue, I believe, of the *National Safety News* and you can get a copy of that or a copy of the blue print. We still use the blade in scraping the roll, but it has a handle protected by two wings. In case the blade should happen to get in the nip it will pull the blade right out from the handle but your hand is always covered.

ACTING CHAIRMAN ROSEBUSH: Has this question been satisfactorily answered for those who raised it?

MR. COFFEY: This gentleman back here states that on the heavy paper they found the angle iron was not practical. Now, that's just the point these people brought up with me, and by the way, Mr. Gleason, it was through me that Mr. Carey called on you.

MR. AUGUSTUS: I would like to ask Mr. Gleason for a further explanation on the calender stack of his paper machine. When the thing runs over 450 to 500 feet per minute, how are you going to get the paper behind that angle iron without wasting a lot of paper?

MR. GAYNOR: We have tried all manner of guards and angle irons. We have gone so far as to put a guard away from the calender, so the man could not get his hand in the calender. Our sheets run 755 feet a minute on one of the machines that have calenders, and we have found the only thing we could do was to insist that nobody but the back tender put the sheet through the calenders. I think the biggest job that we have in safety is just that matter of education; there are a lot of places that we can't guard against and that is just one of them but it is just a matter of education, to follow up and see that the proper methods are used.

F. L. IRVIN (St. Croix Paper Co., Woodland, Me.): We are represented here today by a practical papermaker, Mr. Coons. We would like to have him tell us about his work on calendering.

FLOYD S. COONS (St. Croix Paper Co., Woodland, Me.): I am working on a newspaper machine, running about 750 feet a minute. We take care of that by the process of air. The paper is blown through the stack and the broke is taken care of by going through broke holes, so the attendant doesn't have to touch the paper at all.

L. J. PARANT (St. Croix Paper Co., Woodland, Me.): Let me add something to Mr. Coons' statement. We reduced the hazard around the stack very materially by first cutting the slot into the floor on each side of the stack, to let the broke go down to the basement. Then we used the Warren doctor, which was another good move. The next move was the adoption of the air, which has reduced all hazards around the stack.

SAMUEL PRUYN (Finch-Pruyn Co., Inc., Glens Falls, N. Y.): I can vouch for what he says. We manufacture news print paper running about 750 feet a minute. During the last ten years we have never had an accident around our stack.

MR. FAIST: I think part of us are talking about one calender and the other part on another subject, that is the super-calender and the calender on the paper machine. The majority of our trouble has been on the super-calender, not the one on the machine. It is true that education has a lot to do with it. As long as a man takes the paper and feeds the paper in through the nip with his fist, there is little or no danger, however, when you have a green man on there ever so often, he will take his hand and run it in and eventually he will have his fingers in it. I would like to ask Mr. Gleason if he uses the angle iron on his super-calender.

MR. GLEASON: Yes. We have used it for years.

GEORGE E. AMES (Falulah Paper Co., Fitchburg, Mass.): We have tried out the angle iron on one calender and the operators immediately said it slowed them up, so that production didn't go well, and finally, on their promise to be careful, we took it off again. Now, I want to ask a question. If you find that is the experience of men from different mills and find the angle iron is not the correct thing, and the men object to it, how are you going to put it over?

ACTING CHAIRMAN ROSEBUSH: Increase your bonus.

A. S. WILSON (American Writing Paper Co., Holyoke, Mass.): Our Board of Commissioners down there is very much interested in these guards, especially

at the point of operation, and I was much interested in the angle iron discussion here. Our people have been able to work with it for some time. We got one of our local machine shops to devise what I think, on the whole, unless you are running some heavy board, works out very good and is adjustable, very inexpensive, and we are having success with it. But in our coarse mills we have had to move that guard back. I would be glad to give anybody interested the address of the manufacturer. It fits right into the hole and you can see your scratches, your marks on your rolls and see that they are scrubbed and cleaned with the guard on. It is not a hundred per cent guard and I don't believe they make them for us on all grades and weights of paper, but that guard is good for the finer mills. You can take it back half an inch when you are running your heavier sheets.

ACTING CHAIRMAN ROSEBUSH: Now, Mr. Augustus raised this question of wearing shoes around the paper machines and I am sure that there are a lot of folks here who are interested in that question. Who has the answer?

MR. GLEASON: Answering that in a short way, we put in cement floors in the paper machine rooms.

ACTING CHAIRMAN ROSEBUSH: Well, I'll give you our answer to it. At the Nekoosa-Edwards Paper Company, the question was repeatedly brought up. We had had accidents where men were barefooted on a cement floor and it was brought out that it never had been insisted upon by the management and the superintendents. So we said, "All right, we'll insist upon it," and within a week we had the problem entirely solved.

F. H. FISHER (Bird & Son, Inc., E. Walpole, Mass.): Bird & Son insist that the men wear shoes. All the time I have been going through the mill I don't believe I have ever seen a man without shoes.

ACTING CHAIRMAN ROSEBUSH: As a matter of curiosity, how many men representing mills here have operatives barefooted? Seven of you.

W. F. ASHE (Thilmány Pulp & Paper Co., Kaukauna, Wis.): Those of you who raised your hands, how many of you consider it is an unsafe practice? All of you? Then why don't you stop it?

J. J. TELLINGTON (Brown Co., Berlin, N. H.): It does seem strange but it is a fact nevertheless; we have no accidents and the papermakers go barefooted.

ACTING CHAIRMAN ROSEBUSH: Have your men persuaded you that they can do better work barefooted than they can with their shoes on?

MR. TELLINGTON: There has been nothing done about this. Our machines are running on a standard and everything seems to be O. K.

W. J. BRENNAN (St. Croix Paper Co., Woodland, Me.): In discussing this last point, there will be a conflict there immediately on first-aid treatments and dressings to feet. You can imagine what will happen if you drag a cotton bandage through a general machine room. First-aid is immediately handicapped if you permit those men to drag a clean dressing through the dirt. Our policy, and it seems a logical one, forbids it. A warning by bulletin, a rule issued from the papermaking department, a suspension on the first violation, which always hurts, and discharge on the second.

EARL E. GRANT (Crystal Tissue Co., Middletown, Ohio): From the standpoint of public health and hygiene, we don't allow our men to go barefooted because statistics show that about fifty per cent of the people have ring worm between the toes so from a first-aid standpoint we have to prohibit that.

CHAIRMAN PEACOCK: We have had a suggestion from our mill manager, Mr. W. A. Kelly, that has gone a long way in helping us to enforce our rule requiring men to wear shoes. When we put in a locker room with shower baths and other facilities for the comfort and health of our men, he ordered that we put in foot baths. We have three of them, designed to stand about 16 or 18 inches from the

floor, hot and cold water, and a stool. As a result we have a lot less foot discomfort.

GEORGE E. AMES (Falulah Paper Co., Fitchburg, Mass.): Our men wear shoes in all departments; but for all that, in the first six months of this year, we have had five fractured toe accidents. The feet don't seem any larger than the ordinary man's but they seem to be in the way when they are handling anything. It is usually a case of dropping things on their feet. I want to ask a question here as to what the experience of these men has been on shoes that are specially designed and reenforced around the toes, and whether any of your employees use them?

ACTING CHAIRMAN ROSEBUSH: Do you mean around the paper machines?

MR. AMES: In any section of the mills.

N. F. BARTLETT (Hollingsworth & Vose Co., Boston, Mass.): About six months ago we had a representative from a shoe firm, a safety-first shoe company, so I wrote a letter to each superintendent at our mills and sent out a sample of the shoes which were given to me by the salesman. That shoe was sent around the mill and shown to every employee and they were asked if they would like the privilege of purchasing that shoe—the cost was small and it was a good looking shoe, the toe strong and firm, and we sold a lot of shoes to the men. Now, Mr. Ames, if I can help you on that, you and I being neighbors, I would be glad to do it.

Hazards of Going Barefooted

A. S. WILSON (American Writing Paper Co., Holyoke, Mass.): I can't forget about five years ago, just about when I started with the American Writing people, the question of going barefooted came up then. We are getting away from it now, the superintendent has insisted on it, and they are going around with their shoes on. I think at times the men who perhaps go barefooted in the paper machine rooms, if you don't follow them up they will go down in the repair shop and they don't put their shoes on and they get splinters in, pick up a nail in the finishing room, and there is a lot of our trouble in that way.

ACTING CHAIRMAN ROSEBUSH: We watched our men both barefooted and wearing shoes and the superintendents were convinced that the men could wash up quicker and didn't have to pay as much attention to where they stepped and the way they went at the work when they had their shoes on.

MR. FISHER: Our men don't wear any stockings in their shoes. Just simply put their shoes on. And I wouldn't recommend rubber heels or soles for men in the paper machine rooms because the floor, as a rule, is wet and a little oil on that wet floor will flop a man mighty quick.

MR. AUGUSTUS: I would like to ask those fellows who require the men to wear shoes, whether they require them to wear them while washing up?

MR. FISHER: Always in Bird & Son mills.

ACTING CHAIRMAN ROSEBUSH: Always with us, too.

MR. GLEASON: Immediately when we have a wash up job, the men change from shoes to boots.

JACOB RECORD (St. Croix Paper Co., Woodland, Me.): I have been about forty years in the mills and looking after and around the paper machines. I agree with Mr. F. H. Fisher. No rubber soles. Have leather soles on your shoes. A leather sole is the safest, if you have got to wear a shoe.

ACTING CHAIRMAN ROSEBUSH: I am sure that if Mr. Costigane of Ontario had been here this morning, he would have enjoyed this discussion because it was his suggestion that we have a topic of that kind. The next speaker is Dr. J. G. Cunningham, of Ontario.

Health Promotion in Conjunction With Safety

By DR. J. G. CUNNINGHAM

Director of Industrial Hygiene, Ontario Department of Health,
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Sickness and accidents caused by industry have claimed considerable attention from industrial executives. General sickness among employees, although common to the community at large and not primarily the responsibility of industry, is receiving more and more consideration by industry, irrespective of its cause, on account of its influence on the workman and his work. This has brought those responsible for safety and health closer together mainly through problems presented in employment—workers with some disabilities are unsafe in certain occupations. They are indications that ill health influences accidents in ways much less obvious than this. So that the supervision of health in industry, apart from its importance in the reduction of absence and other benefits associated with the control of sickness, has a definite bearing on the number of accidents incurred.

Sickness and accident control have passed through parallel stages. Efforts toward the maintenance of health were first directed against nuisances with a purely external influence analogous to the machine-guarding stage in accident prevention, both important as far as they go. Then followed the period of general health education which still continues and cannot be underrated, having its counterpart in the efforts made in the last few years to encourage industrial workers to think in terms of safety, i. e., the application of what has been learned regarding the principles underlying health and safety. In health matters, not only in industry but in the community at large, an increasing amount of attention has been given to the health of the individual, this often taking the form of clinics of various kinds, all actuated by the idea that health education to be applied most effectively must be directed to individual needs and cannot have more than passing significance unless related to the condition of the individual as determined upon physical examination. Hygienic advice given at this time has been shown repeatedly to be of real value in that it is accepted and acted upon.

Reduction of the amount of sickness in industry by attention directed to the *individual* was at first confined to those exposed to specific poisons wherein mechanical safeguards and physical examination were used. Notably, in this country in many plants this has been extended in the effort to prevent general sickness among all workers. The grouping of large numbers of people together day after day makes it possible to bring medical diagnostic service conveniently within their reach so that they use it at the time when it is of most benefit, i. e., when the first indications of illness arise. The individual too frequently is not conscious of a pathological process in his body until considerable damage has been done and knows nothing of it until physical examination has revealed it. It is on this latter account that periodic examination is even more important than examination on employment. The rapidity with which the physical character of the same industrial group will change is sometimes very striking and by means of physical examination these changes will frequently be detected at an earlier stage than when complete reliance is placed upon complaints of ill health.

This second safeguard for the early detection of illness, i. e., complaints of ill health presupposes, easily accessible and good medical facilities for diagnosis and the worker's complete confidence in them. Experience shows that under these circumstances, the health problems presented by workmen for assistance extend far beyond purely medical considerations.

It is a common experience of industrial nurses that some unfavorable situation at home or at work seems to be the major factor in lowering resistance to disease

and that the situation only comes to light when circumstances of a minor or serious illness are investigated.

It is generally recognized that the causes of sickness and accident are many and varied so that any effort to control them often involves looking beyond the plant, to the workman's home. This is not resented when workmen have been convinced that the only motive is the reduction of sickness and accident.

This attention to individual needs, as practiced with respect to sickness has already furnished examples of the importance of the same procedure in reference to accidents. Physical examination of workmen limited to the discovery of the presence of hernia, varicose veins and gross heart lesions, is common. It is very incomplete. However, this attention to the physical condition of the individual in accident control is a step in the right direction and is in line with the indications furnished by the work of the Industrial Fatigue Research Board pointing to the existence of individual susceptibility to accidents. Certain persons having no gross defect, such as epilepsy, blindness, deafness or abnormally low reactions are, nevertheless, whether for physiological or psychological reasons, poor accident risks. At present, they can be identified only after the event by knowing their history with respect to major and minor accidents at home and at work. Progress is now being made in work which it is hoped will enable these susceptibles to be recognized at the time they are assigned to their work. One would expect such a condition to be materially influenced by general health. Some of the conclusions of the Board bearing on this interesting point are that—

(1) Persons of the same age and experience under similar conditions will show widely differing accident experience.

(2) To a considerable extent those who suffer industrial accidents also suffer home accidents.

(3) There is no definite relation between multiple accidents and ordinary environmental factors. This suggests that accidents might arise out of some inherent quality in the individual and would seem to warrant the idea that those who have three or four minor accidents should be removed from dangerous processes.

General sickness and industrial accident experience among industrial workers present some common characteristics. Uniformity in deaths from the predominating types of illness extends to the number of cases and even to the amount of lost time from year to year. Similarly, in industrial accidents this uniformity in deaths extends to the number of cases of over seven days' duration and even to the liability of various parts of the body to sustain injury. The accident record of the pulp and paper mills in Ontario shows that each part of the body mainly affected sustained injury with almost the same frequency for each year from 1922 to 1926, inclusive.

The total number of accidents and illnesses is greatly influenced by a comparatively small proportion of the numbers employed. The inexperienced and the young suffer both more accidents and more sickness. Environmental conditions influence both, either directly to produce accidents and sickness, or indirectly to put the individual in a condition where he readily succumbs to these. Susceptibility to some diseases can be determined, i. e., smallpox, diphtheria and scarlet fever. It is now suggested that certain individuals are inherently liable to accidents.

Further it has been determined that while there is no relation between the number of accidents and the amount of time lost from sickness, there is a small but constant relation between the number of accidents and the number of visits to the first aid room for minor sickness—the latter is a truer index of the number of cases presenting some maladjustment somewhere.

This again emphasizes the importance of correcting minor complaints of illness, which are generally the expression of minor derangements, rather than a minor indication of a more serious illness. The correction of these minor derangements

leaves the individual practically as well as he was before their accumulation is likely to result in incapacitating illness. The minor accident may similarly be the first manifestation of some condition easily corrected if recognized, but which, left alone, will accumulate in its effects, resulting in some more serious condition. A relation has been shown to exist between serious and minor accidents in most groups studied.

There is much to be learned regarding the problems in the control of sickness and accident and the indications are decidedly that the whole question cannot be dealt with en masse, but that each individual case requires separate attention, and, further, that the control of ill health desirable for itself is also desirable for the prevention of accidents. When incapacity from illness and accidents has arisen, facilities for the maintenance of health should be used to insure the best treatment which includes maximum restoration of function. The importance to industry of the patient's early return to work and the outside physician's duty in respect to his safe return to work frequently seem to be in conflict. This situation arises from the casual relation too frequently existing between the physician and industry. To delay return to work following illness or accident is not the best treatment and is decidedly uneconomical, but return to "light work" can mean nothing unless the employer is prepared to provide it and the physician is sufficiently familiar with the plant to be able to indicate what work the man could do.

When the period of active treatment is completed, whether it is a lung or a leg that is affected, this work should be such as to require the use of the injured part in therapeutic doses until function is restored. In the prevention of illness, with its influence on accidents, or the reduction of disability and unemployment associated with these conditions, those responsible for employment and safety will receive assistance from consultation with the physician, provided he is one who appreciates what incapacity for work means to employer and employee.

ACTING CHAIRMAN ROSEBUSH: I wonder if any of you have questions that you would like to ask Dr Cunningham.

J. T. LEAVENS (Standard Accident Insurance Co., Detroit, Mich.): About a year ago, I was transferred into a territory which includes about fifteen paper mills. This was due to high accident frequency. In my first inspection of my mill, I suggested a physical examination for all employees. The officials of the companies were very much in favor of it but the employees themselves were against it for the reason that they thought a physical examination might throw them out of employment. I would like to have the doctor's advice, if possible, as to the proportion of accidents that can be charged to a man's physical condition, insofar as the number of industrial accidents are concerned.

DR. CUNNINGHAM: The number of accidents affected by gross conditions of health or gross disability, or the number of accidents that may be influenced by minor ill health, may be quite considerable. I am sorry that I can't give you anything more definite.

ERNEST AUGUSTUS (Mead Pulp and Paper Co., Chillicothe, O.): Dr. Cunningham made mention of the relation between the number of accidents and the number of minor illnesses reported to the first-aid hospital. For the past three years we have been trying out a little scheme—I don't know whether it is original with us or not—but we have between twelve and fourteen hundred minor illnesses, ailments, etc., reported to our first-aid hospital every month, a record of which is made on our hospital day sheet. Then we take that hospital day sheet and transfer information to an individual card for each employee in the plant showing the date, nature of the illness or injury or whatever it might be on which first-aid is given, and the approximate cost, if any, of the dressings and if the man lost time, the amount of time and compensation.

Now, at the end of the year, or any time during the year, it is surprising what you can find from those records. You will find that possibly you have a certain

employee in a certain department who is continually coming in for headaches, or maybe he has colds frequently or something of that sort. Then, once in a while, that fellow has an injury, it may be lost-time or it may not; and then the personnel manager or superintendent or foreman goes over that record—we have it arranged so that if a man comes in a certain number of times for a particular ailment or particular type of injury, a little flag is put on his card—then you can go down through those cards and pick them out, study those cards, and frequently you will find the man is on the wrong job. His ill health is due to the wrong job and frequently he stops coming to the hospital when he is transferred.

We have been using that for three years and have found a number of instances where men, injured to the extent of losing time, could be traced right back to some physical ailment or certain peculiar condition surrounding that job to which he might not be adapted. Then we transferred him.

We do not have periodical health examination; we examine everybody when they come in and they must pass the examination before they can be employed. After they are in we don't tell them to be examined again, but from the information on these cards, if we find a big preponderance of accidents on his record, we call him in; maybe he is not aware of the fact that he has been having a lot of colds or stomach ache or minor accidents of a particular type; and then the doctor consults with him and advises him to go to his own family physician and have a medical examination or get treatment for what he thinks is wrong with him. Frequently the men have acted on that advice and kept their jobs where, otherwise, they might either have been injured or we would have had to discharge them because of being unsatisfactory.

ACTING CHAIRMAN ROSEBUSH: Tomorrow morning we are going to have Dr. Hourigan, physician of the Larkin Company, who I believe is present today, to take that theme right up there—"How to Administer First-Aid in the Small and the Large Plant."

DR. P. H. HOURIGAN (Larkin Co., Buffalo, N. Y.): I would like to say something on this health activity in the industry as referred to accidents and referred especially to efficiency and to compensation costs. You can easily trace from experience the connection between bad teeth, infected tonsils, infected nose and inflammation of the muscles, inflammation of the nerves, inflammation of the joints. Now those things, of course, weaken the man and a weakened man in a group of men is easily likely to be the factor that causes an accident.

And the other thing, along the line of knowing your men through a physical examination, is the special factor of eyes. It is well known that 40 per cent of people, working people, are badly in need of glasses. They can't see what they are doing, and if they can't see what they are doing, they are going to make mistakes, they are going to shove their fingers in and get them caught and 40 per cent means that they are badly in need of glasses.

Now, there was a thought in my mind when they were talking about the wet floors and the bare feet. Such a condition should not be permitted, without special precaution against ringworm, as mentioned here this morning. It is a common thing and I wonder if a physical examination of your employees wouldn't show that those men who go around with bad feet, haven't ringworm? That means cracked feet, sore feet, soft corns, etc. Then along the other line of following up your health conditions, we often run across people with bad physical condition.

Only last week in our plant a man wanted to return to work. He came in to me first some six weeks ago, not feeling well, out of breath, wasn't moving so fast. Physical examination showed a bad heart and he was laid off. After being home six weeks he wanted to come back to work. His condition wasn't good and we found he had not been taking care of himself, he was walking around more than he should and after a couple weeks more he told us he had seen his doctor and he said he was all right. We checked up a little more thoroughly and found

the employee had not gone to the doctor at all and he was bad enough, three days afterward, to drop dead in his home. He might have dropped dead on your job, he might have been the cause of a big accident.

Now, we meet those things and help to solve them and we prevent actually a great many accidents. Another important thing, I think, is the matter of handling your health problem with your sick insurance or benefits, and sick benefits also have operation benefits attached to them. You will find that necessity of many people is the dominant thing in their claims for compensation as a result of accident in your industry. Check up on your knowledge of those people and relieve their necessity and it will often reduce the number of your accidents, that is, in minor cases, because you have the relief in operation of a sick benefit.

ACTING CHAIRMAN ROSEBUSH: I would just like to mention a specific instance of what Dr. Hourigan is talking about. We had a man raking flumes. His boss came out and passed him and then heard some kind of a splash and looked around and the man had disappeared. Of course, at once he commenced to search for him and saw his foot sticking out of water right next to the flume. He called to his helper and they pulled him out and revived the man. At first it appeared as though there had been an accident, as though the pole or something had caught and he had lost his footing and gone in there. Some two weeks later he was downstairs near the hydro-electric wheel and toppled over on the bench; and then we became more suspicious than we had been before and sent him to the clinic at Rochester and found out that for a long time the man had been suffering from a tumor of the brain. Fortunately, we have our own sick and accident off-duty insurance, which does the same thing that Mr. Augustus told you his reports do.

B. D. ROGERS (Bird & Son, Inc., E. Walpole, Mass.): I just wanted to speak about a similar thing to that which the doctor brought out on the benefit associations. Safety and health are equally important in our program and we have found that a reduction in the amount of time lost from sickness has been reduced perhaps by half in ten years with a corresponding reduction in accidents. Now, that may be little Bill Peacock's corollary on efficiency and accidents, but I do believe sincerely with the other speakers that bad health is the origin of a lot of accidents. One way that we have benefited our employees and brought about better health is through our benefit associations and the employees are doing it themselves.

About ten years ago we selected for our different plants the best doctors in those communities and any member of the association was allowed to go to those doctors free of charge and the doctor would send the bill to the association and we soon began to find that there was less time lost due to sickness than before. I think that it was shown over a period of ten or twelve years that the amount that we saved in benefits has more than paid for the physicians' services. The member of the association goes to see the doctor and it is entirely confidential. He has no hesitancy about it, he can go to see the doctor when he begins to feel sick and not when he is sick in bed and has to send for a doctor. They don't lose any time at all in availing themselves of that privilege. The majority of our Benefit Association cases are office calls, and I think that in itself has proved to us that our Benefit Association is a mighty good scheme.

A. S. KLOSS (Hercules Powder Co., Brunswick, Ga.): May I ask the doctor what he considers the length of time between the original examination and the re-examination should be? In other words, how often in general should you re-examine the employee?

DR. CUNNINGHAM: I don't think there is anything particularly gained by having regular periods. The thing should depend entirely on what you find in the first examination, the kind of work the individual is doing, what degree of hazard he is exposed to.

ADJOURNMENT

mills, helping to set up regional conferences, organizing the contest and, in fact, all the activities of the section, but the main problem is something like ten thousand dollars a year which must come from the paper mills. It certainly wouldn't come from the National Safety Council. I am rather interested in this suggestion of our honored Director of the National Safety Council, that he could go out and raise the money. Now, the man he happens to have in mind is my own boss. Well, my own boss is not going to put ten thousand dollars a year in this thing. Your boss is not. The Paper and Pulp Section is not making money hand over fist like the Petroleum people are. All of these things have to be taken into account. I want you to face this matter, gentlemen; it has been on my mind for several years and because of the difficulties involved, those of us on your official staff have tried to help you organize efficiently such voluntary service as might be available. Now maybe we are helping you to decide this thing beforehand.

MR. ROGERS: Another thing that Mr. Rosebush and I discussed was the possibility of linking up in some way with the National Paper and Pulp Association. At the present time they have a technical association and a cost association. Most of us probably belong to those different associations. There may be some way that we can go back to our plants and talk to our managers who are members of the technical association, and get them to put up this money, or a part of it. It seems to me it is right along this line of work and they are, as I say, a very big organization, with headquarters here in New York.

MR. ROSEBUSH: There is one other point that I would like to make in regard to this representative. I think any scheme that looks toward having such a representative ought to be based on the idea of having it somewhat permanent. I think it ought to have three to five years of trial anyway. It would not be fair to take a man for one year and make an experiment of it for that period of time. I don't think it would be fair to the man nor fair to the section, and any scheme we might adopt for putting a paid representative in the field ought to have in it a three-year to five-year period of time so that it could be given a fair trial, and the man who undertakes the work ought to have a chance to show what can be done.

CHAIRMAN PEACOCK: Has anyone any further light to throw on this question at this time?

W. F. ASHE (Thilmany Pulp & Paper Co., Kaukauna, Wis.): I don't believe the main question in this thing is the question of money at all. Personally, I am not convinced that this is the thing we want to do if we had the money. It seems to me that the main talk about getting a paid representative has been with the idea that he could do the work that the volunteer fellows are doing now. He can't. He can't at all take the place of the fellows who volunteer to do it in this section. Neither can he expect the cooperation that the volunteers get. He will have no particular status in any mill, he will have the entire country to cover and I think we would be inclined to say, "Let George do it," if we had a paid man. I wonder if that is what we want to do? I wonder if we are not better to be a rather loose organization, working cooperatively, rather than an organization in which we have a paid secretary who comes around and tells us what to do. He can't tell us what to do. It isn't likely that the men here would tell him what to do, either, and I think he would have a rather odd sort of position. Personally I am not convinced that that is the answer for us at all.

CHAIRMAN PEACOCK: Let me inject another question in your minds, start you thinking. You remember, two years ago at the Cleveland meeting that Mr. Lundrigan exposed the fallacy of a six-thousand day penalty for a death case. He showed us that fatal accidents bring us an actual average penalty, based upon the facts, of less than four years, and that if we continue suggesting to the world that the actual damage involved is something like twenty years (continuing the figure of six thousand days) after a while we will have to meet that in the form

of actual premiums to meet increased compensation. He made the suggestion that we take a thousand days in our section as the charge for a death case and permanent injuries in proportion. Now, in our contest we are reporting on that basis—a thousand days for death cases. Mr. Lundrigan raised an objection to translating the reports of our sections, contests and mills, individual mills, into this six thousand day basis for reporting in general in keeping with the other sections of the National Safety Council. I am going to ask you whether you feel the time has come for the Pulp and Paper Section to direct the National Safety Council in the reporting of our statistics to use the thousand day basis instead of the six thousand day basis. Think it over during the day. Mr. Lundrigan may have a motion to make to that effect. We are now ready for our program and Mr. B. D. Rogers, of Bird & Sons, Inc., East Walpole, Mass., will act as chairman for the program.

ACTING CHAIRMAN ROGERS: In one of our plants, where we have 225 employees that have gone since the eleventh day of last October without a lost-time accident—about a year ago we put in a new lighting system there, a very thorough and efficient one—and I believe that lighting has had a lot to do in that plant to reduce our accidents to the minimum. Today we have with us a man who is going to give us some fundamental facts in regard to lighting, and it gives me great pleasure to introduce Mr. W. T. Blackwell, General Lighting Representative of the Public Service Corp., of Newark, New Jersey.

The Importance of Lighting and Its Relation to Safety

By W. H. BLACKWELL

**General Lighting Representative, Public Service Corporation of New Jersey
Newark, N. J.**

In casting about some time ago for an apt quotation to use in connection with the annual report of my activities with my company, I came across a quotation from the Bible which seems to be not only apt, but also most appropriate for this occasion: "And have no fellowship with the unfruitful works of darkness, but rather reprove them. But all things that are reprov'd are made manifest by the light—for whatsoever doth make manifest is light." Ephesians 5:11-13.

Now, the importance of lighting and its relation to safety is, as I indicated a few minutes ago, one of the hardest things that we have to prove. We know, axiomatically, that a person can't perform his duties properly unless he can see. You can't walk the streets unless they are lighted. We know intuitively that accidents result through lack of illumination but what percentage of accidents are caused by the lack of illumination, is where we stumble.

We endeavored to get some data on that subject, and the difficulty is that the accident reports do not split up the classifications sufficiently to enable us to get to the cause of the accident.

I would like to illustrate in this way. Suppose in the aisle of an industrial plant someone had carelessly left an industrial truck with the tongue extending across the aisle. Assuming further that that plant was poorly lighted, a man working on a lathe, which had local lighting of rather a bright order, started to walk down the aisle. He tripped over the truck and injured himself in some manner. You people and the casualty companies in general, record that as a tripping accident. Now, is it? What was the underlying cause? Take the same thing with stairways. A man falls down the stairs. Did he slip due to improper tread on the stairs, or was it due to lack of light?

Mr. Williams, in his chapter on Hoover's "Waste in Industry," states that from five to six per cent reduction in accidents may be obtained through the use of

guards and other protective mediums, but a very much larger percentage of reduction might be obtained in the less obvious causes of accident, such as inadequate illumination, dangerous manufacturing practices, etc. I want to plea with you gentlemen investigating and reporting on the causes of your accidents to find out really what causes them.

Now, to revert to my text, it seems to me "The unfruitful works of darkness" is a good name for accidents. They are unfruitful and they are works of darkness, many of them. It seems to me that the remedy is rather clear. We don't expect you to be a specialist in every form of engineering that might enter into the prevention of accidents, but engineering advice is obtainable and I would no more suggest to you men that you lay out, or have your plant maintenance man, or even your engineer, lay out the lighting in your factory than I would suggest that you try to fill your own teeth. Every man to his own task.

Now, because people are familiar with light, everyone feels confident to pass judgement on the amount of light, the direction of light, the color of light; and I might say that is one of our great difficulties, because everybody feels he is an illuminating engineer. You go in a factory and endeavor to talk to the man about it, and he says, "There is nothing like that here." "How do you know there isn't?" we ask. "Why; I can tell that with my eyes," they say. I am accustomed to dealing with this subject and I can't tell you now, within five hundred per cent, how much light there is on this sheet of paper at the present moment. The eye, without the aid of an instrument, is absolutely undependable when it comes to judging illumination.

Now, this intangible thing, light, with which we are all so familiar—nobody knows how mankind became acquainted with it, possibly through lightning striking a dead tree, the tree burning and then pre-historic man learned that it gave not only light but heat and that his food possibly tasted better when subjected to the heat of the fire, and so on as we went through the ages. But it is interesting, just as an historical back-flash as it were, to know that up until 1879 light was produced in one way, simply by burning things, oils, fats, torches and what not. The caves in Europe, which are of the Stone Age, show that the people were familiar with light. Since 1879, light of course has been produced differently, by the incandescent lamp, and I think I am not wrong in saying that the industrial progress of this country has been largely due to our ability to extend the hours of usefulness into the night, which has enabled us to increase production and has enabled the country to progress.

I can't understand, when I go into factory after factory and see the lighting conditions there, what the superintendent or manager thinks about when he goes through his own plant. How can he shut his eyes to the conditions that exist? It is beyond me to explain, but it seems to me that there is the cause of the whole trouble there is the thing that we have got to overcome. It can be overcome only by education.

There have been efforts made by the American Illuminating Society to get the casualty companies to offer a reduction in rates in those factories where they have improved illumination, as is done in fire insurance where the introduction of sprinklers and other fire fighting means brings about a reduction in premiums. I remember, some four or five years ago, I was in a paper mill down in the South, and in order to prevent the theft of lamps from the sockets in the plant, the plant electrician had wired the whole mill with what we call high tension lighting. I can't imagine a more ridiculous thing to do, with wet floors, where a man could easily become grounded, and then to use high voltage; and what was the reason? Simply to save the theft of lamps by jeopardizing the lives of the workmen there, because his equipment wasn't any too good.

Now, those things are ill-advised, those are the actions of people who don't understand and for that reason I am urging that when you do take up the ques-

tion of lighting your mill, get an illuminating engineer. All of the illuminating companies furnish absolutely dependable advice, the utilities also or, if you prefer, there are consulting engineers who can give you such advice.

Now I am going to quote Mr. Simpson's letter to me. I wrote him and asked him what he thought of the subject and he came back and said, "I think particular attention should be paid to the motive-power side of the machine, also to the low head room, slippery foot space and low, dark passageways in basements." I know they are based upon his experience, that they are prolific causes of accidents, those locations and those conditions.

Three years ago, in Newark, N. J., I became interested in the safety council work there, and in talking the matter over with Mr. Roseman, the manager, I suggested to him that a lighting committee should be organized. The first plan of action that we adopted was a course of lectures for factory executives, casualty insurance engineers and inspectors and other men in executive positions. The lectures covered six evenings and we had an average attendance of about eighty people. That was followed, the following year, by a second course where our average attendance ran to about 125. At the request of 35 or 40 of the men who had been taking the course, we ran a post-graduate course, as we called it, of six lectures covering three evenings. At that course we had 100 per cent attendance which showed the interest. These men, gentlemen, were not illuminating engineers; they were safety engineers largely, connected with the large plants in Newark. I commend that practice, even if it is not possible for your local safety council to undertake such a thing.

Now this organization I have has its counterpart in many other communities and you may be able to draw on them. In other words, the utility, maintenance and service organizations have lighting departments for the use of their customers in order that their customers may use their commodity and get the best of results. In short, if you were in my territory, you could call upon my department. I could go through your mills, make a survey, prepare plans and specifications, have one of my men supervise the work when your contractor was putting it in and then test the installation after being installed, to see that you have the right amount of light in each location of your plant, as required by the work.

Of the five senses there is no question but that sight is the most valuable. And yet it is the most abused. One of the commonest complaints that I have about the average plant is bare lamps. No one can work in front of a bare incandescent lamp, a few feet from his head, without suffering some permanent injury to the eye. The conditions in factories from glare are not only bad but many men enter industry with injured eyes, due to poor lighting in schools. We are getting after that just as fast as we can.

Statistics show that the average child of nine years is far-sighted, and yet the same child at the age of fourteen is near-sighted. There is an increase of over 60 per cent of near-sightedness just during that period of from nine to fourteen, from which it is apparent that as the difficulties of the curriculum require closer application the child's eyes are injured. Mr. Simpson has some very interesting cases which he has run down where a boy has been unable to carry on his school work, dropped from school, gone into the factory and then, through defective vision, has become permanently maimed. Now, if for no other reason than for conservation of vision, you should at least put reflectors over your lamps, even though you may not get the intensity of illumination that we consider productive illumination.

The state has taken recognition of this; the State of Wisconsin, in the preface to their "Code of Lighting Factories, Mills and other Work Places," has stated why the State regulates factory lighting. At the present time there are eleven states in the Union which have factory lighting codes, where mandatory illumination is specified for various locations and classes of work. These codes also

show in the agenda what they call "recommended value." I would like to read this Wisconsin preface because I think it is good: "Why the State Regulates Factory Lighting."

"Insufficient and improperly applied illumination is a prolific cause of industrial accidents. In the past few years numerous investigators, studying the causes of accidents, have found that the accident rate in plants with poor lighting is higher than similar plants which are well illuminated. Factories which have installed improved lighting have experienced reductions in their accidents which are very gratifying. Of even greater importance, poor lighting impairs vision. Because diminution of eyesight from this cause is gradual, it may take the individual years to become aware of it. This makes it all the more important to guard against the insidious effects of dim illumination, of glaring light sources shining in the eyes, of flickering light, of sharp shadows, of glare reflected from polished parts of the work. To conserve the eyesight of the working class is a distinct economic gain to the state, but regardless of that, humanitarian considerations demand it. Finally, inadequate illumination decreases the production of the industries of the state, and to that extent, the wealth of its people. Factory managers, who have installed improved illumination, are unanimous in the conviction that better lighting increases production and decreases spoilage."

That is put out by the Industrial Commission of Wisconsin. Now, many plants in this matter of conservation of vision, are practicing a periodic eye inspection.

Prior to going with the Public Service Company, I was with the Westinghouse Lamp Company. The process of making an incandescent lamp is partly mechanical but largely manual and very close work, requiring the deft fingers of a woman. You are all familiar with the little wire that is wound around on hooks inside of the incandescent lamp. Sometimes that wire is much finer than the hair of a woman's head. I recall that we had trouble in Milwaukee with constant sickness, the girls who did this winding being absent frequently and the cause seemed to be headaches all the time.

I went out there and what did I find? That the tables on which these girls worked were covered with white oilcloth and they had a piece of clean, white paper in front of them and they would hold up this little glass rod with these hooks in and wind that fine wire around there and then they had an electric weld which welded that to the wires that came in through the glass. The cause of the trouble was not difficult to find. It was because they had a large powerful lamp right up over their heads. The light struck the white oilcloth and came up to their eyes at an unaccustomed angle, at an angle to which the eye was not adapted. I reversed the procedure completely. I had the tops of the tables painted a dead black, then sent out and got some cheap black velveteen and had this mounted on little wooden slabs and made the girls work on that black. That black ground gave no reflection back on their eyes. We had a strike immediately. The girls wouldn't work. They all quit, and it took me about a week to settle it, but you go into any lamp factory and you will find now that every lamp factory is using that method.

Now, in every plant there are problems of that sort, which can be solved and which can be eliminated completely, if you get somebody who knows how to go about it. I could go on this way for quite some time, but I would like to close my remarks with this: the unfruitful works of darkness, and reproving them—and that lies within your hands, the reproving of these unfruitful works of darkness. Go through your plants. If you don't know enough about illumination, get somebody who does. At least it isn't going to cost you anything to know what are the conditions in your plant—how does your plant rate as compared with a first-class plant? That is of value for you to know. Whether or not your management will go along with the improvement that may be necessary is probably another story, but at least, having a report from an engineer as to what

the lighting conditions are, would be of value to you in presenting the proposition to your management.

Secondly, if you have men within your organization who have the right foundation upon which to build, it would do them no harm, and probably a great deal of good, to send them to take a course in some one of these schools which, as I have said, are run periodically, probably three or four of them a year, for which there is no charge and I am sure that it would bring results.

ACTING CHAIRMAN ROGERS: I know Mr. Blackwell will answer any questions any of you have. Now, we have heard Mr. Simpson's name mentioned and heard him quoted. Mr. R. E. Simpson is with the Travelers Insurance Company, Hartford Conn., and we would be glad to hear from him at this time.

Discussion of Mr. Blackwell's Paper

MR. SIMPSON: Some time ago I attended a meeting of an accident prevention committee, and during our discussion one of the men described an accident that occurred in his plant. It seemed a man turned from his work place, started to another part of the shop, fell over an armature shaft that was protruding in the aisle, gave a rather headlong plunge, struck his head against the corner of a machine and received a severe scalp wound, knocking him unconscious, and he lost about four weeks from work. In the record of that company there was a dual cause assigned to that accident: partly carelessness on the part of the workman, partly poor housekeeping on the part of the foreman in charge of the shop, and so it passed.

Later on, that committee was going through that shop and we came to the point where the man was injured. He was back on the job, with a bandage around his head. He worked at a turning lathe, dark-colored, as dark as the andirons in the fireplace here. In front of him and below the eye level, was a one hundred watt Mazda lamp. The bowl part had an enamel coating, the other part clear so that as he looked at his work he looked into the unshaded part of that one hundred watt Mazda lamp. I stepped into his working position. I am near-sighted myself, but before stepping in there I took off my glasses, and at the point where the armature shaft was in the aisle, another one had been placed. I could see it but not too distinctly, but I could see it enough so that if I were to walk out there, I would quite involuntarily avoid it. I stepped to the workman's place and stood there a minute and not once consciously did I look at that lamp. I turned away from the turning lathe, looked down and I could not see the armature laying on the floor. I then took off my glasses, stepped behind the workman, put them over his eyes and asked him to look down. He did and said he could see the armature much better than he could without glasses.

There was a dual cause for that accident, outside of that which the company had assigned; first, that man was near-sighted, almost as bad as myself; the second, he had been working under the glare of a light so blinding that if he had had normal eye-sight he could not have seen that armature.

I have had some correspondence with the men at the Council headquarters, with Mr. Cameron and others, with the idea of bringing about an illuminating committee on the part of the National Safety Council. There is an idea that in the membership of the National Safety Council are hundreds, probably thousands, of men daily in contact with working conditions. These men, safety engineers or inspectors, investigate and act immediately an accident occurs. If those men would only place themselves in the position of the injured man, provided they could do that without danger, and judge for themselves whether or not the lighting had any effect on the accident—was it adequate, was there a glaring light from a bare lamp, or from light such as Mr. Blackwell has described—then put that down on your statistics. If the accident was not a fatal one, find out whether

or not the victim had normal eye-sight. He is handicapped if he has poor vision and can't use good lighting to best advantage. If several thousand members of the National Safety Council would send in that information, I think we would have some basic facts, rather startling facts on the condition and effect of improper illumination in our shops.

Mr. Blackwell has mentioned the bare lamp. I think there are about forty-five million incandescent lamps used in our industrial plants, of which less than 15 per cent have adequate reflectors. I have gone into factories and time and again found all sorts of devices used for reflecting the rays because the men unconsciously realized that they could not see as well without a reflector as with one. Not long ago, I went into a shop and found a large lamp on which the workman had spread a layer of laundry soap to cut down the glare which would come to him directly in his working position. There are thousands of conditions like that under which the workmen of this country are laboring every day, and they have affected not only their condition, but also their earning capacity. If we could get that information directly from the members of the National Safety Council, we will have figures on which we can base a campaign to bring about better illumination in the industries generally, not only paper but all, and better illumination in the home, in the school, better health, better longevity to all concerned.

ACTING CHAIRMAN ROGERS: Are there any questions in regard to lighting?

J. J. TELLINGTON (Brown Company, Berlin, N. H.): I would like to ask Mr. Blackwell if the National Lamp Works, of the General Electric Company, furnish an illumination engineer to go into a plant and make a survey, free of charge?

MR. BLACKWELL: Yes, on request. I assume you have a contract for National Lamps. All you have to do is make the request through the local employee that you would like to have an illumination engineer make a survey of the plant and he will be forthcoming.

MR. TELLINGTON: Thank you. Our plant is at Berlin, New Hampshire.

ACTING CHAIRMAN ROGERS: We are in more or less of the same neighborhood and we have had men from Lynn.

MR. BLACKWELL: Also the General Electric Company at Schenectady, and, if you happen to have Travelers insurance, I am sure Mr. Simpson's services can be obtained. I might say further, in connection with the question of glare and the partial blindness that results, you can all experience this yourself. Some sunshiny, bright afternoon, go into a motion picture house and possibly for the space of half a minute you can not see whether the chair is occupied or not. I have watched people and seen some do some funny things. A man comes in and tries to sit on a woman's lap, and things like that, but you will find, after you have stood there probably for half a minute things begin to clear up. Conversely, when you go out from such a dimly lighted place, the bright sunshine almost hurts. Now, that is an exaggerated condition of what the employee is undergoing who is working with the glaring incandescent lamp in front of his eyes.

F. H. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): I would like to enquire if there is a code of any kind published in regard to illumination that would help a person who perhaps could not get the services of an engineer, to make an investigation of their lighting conditions.

MR. BLACKWELL: There is the American Engineering Standard "Code of Lighting Factories, Mills and other Work places." It was prepared by the Illuminating Engineering Society, Lighting Legislation Committee, and adopted by the American Engineering Standards Committee as the American Engineering Standard Code. The same Code has been published by the U. S. Department of Labor. I can't give you the bulletin number, but it is distributed by the Department of Labor at Washington.

I would suggest that you enquire whether or not your state has a Code and if it has, of course your State Code takes preference over the National Code because,

as I remarked, there are some minor modifications and requirements in the various state Codes; New York and New Jersey, Massachusetts, Wisconsin, Pennsylvania, Oregon, California are just a few that I happen to remember offhand.

ACTING CHAIRMAN ROGERS: For the benefit of the Massachusetts members, I might say I know that Massachusetts has a Code that is comparatively new and it was worked up through a committee of various associations in connection with the Department of Labor. I am sure you could get, any of you, a copy of that Code, by writing to the Department of Labor at the State House in Boston.

I know that you will gain a lot of help from Dr. Hourigan, who is the Plant Surgeon of the Larkin Company, Buffalo, N. Y. It gives me great pleasure to introduce Doctor Hourigan.

How to Administer First Aid in Both the Small and the Large Plants

By DR. P. H. HOURIGAN

Medical Director, Larkin Co., Buffalo, N. Y.

This subject is so big and so well known that it is rather difficult to get into the substance and out of it again, in the short space of twenty minutes. You are probably better acquainted with this matter than the speaker. I will merely try, in the short time allotted, to gather some few headings, to touch some high spots and some low spots, and will necessarily miss a great many. With a full conception of your knowledge of the problem and a rather uncomfortable feeling stealing on me, reminds me of a story:

A man on his way home, stopped at a fruit stand and bought a bag of chestnuts. He entered his house, closed the door, looking into the next room, saw his wife there sewing, and he said, "Sweetheart, I have brought you home a bag of chestnuts," and, without looking up, she wearily responded, "Go ahead, I'm listening."

First Aid is recognized as a great humanitarian measure, as well as an economic activity. All of the large plants and many of the small plants are sold on the idea. Some of the smaller plants are rather disinclined to put any investment in this activity. They are not so sure of what they are going to get out of it. Bill Gilbert, the safety man in the Chamber of Commerce in Buffalo, where Larkin Co. is located, tells a good story along this line: Bill is a Scotchman by birth and persuasion, an American by the process of naturalization. A friend, who is also a relative, came from Scotland to visit him. Bill took him down to see the great Niagara Falls. As they stood on Prospect Point, at the end of the Falls, looking at the water tumbling over the edge of the cataract, Bill said to the Scotch relative, "There is a story going about that if you drop a penny into the Falls you will get good luck." The Scotchman stood there, watching the great volume of water tumbling over the cliff, breaking itself on the rocks below and then rushing, fighting and crowding its way into the current farther on. After a bit he turned to Bill and said, "Ha' ye a bit o' shtring?" But it would be more profitable for the smaller plants to take a chance on the investment in First Aid, because they are going to meet the neglected problem afterwards in increasing costs, in their industry and in generally bad conditions, that will surely come back at them in the future. Another story comes to mind of a fellow who died. After the widow had bedecked herself in those so-called "widow's weeds" that make widows so attractive and enticing, she hurried over to order a monument. She had the usual inscriptions cut into the stone, ending with "Rest in Peace." After the funeral, when the will was read, it was found that the dead husband had not

looked kindly on the widow and this feeling was expressed in the will. The widow hurried back to see if the monument with its inscription had been completed. Everything had been already carved. The irate woman noting the words "Rest in Peace" remarked, "Till we meet again."

Let me give you some figures that may be interesting to you—95 per cent of all factories in the United States have less than 1,000 employees. Slightly over 60 per cent of all workers are employed in plants of less than 500 employees; 82 per cent of American industrial concerns employ 100 or less workers, so that the class that might be termed "Big Industries" is something like 18 per cent.

The basic principle of First Aid is the same, whether it is in a large industry or small. It, however, may be carried out in different ways. First, let us go over the type of equipment that might be advisable in industries of different sizes. I then want to come back and touch upon the details of First Aid.

In an Industry Having Under 100 Employees

I would suggest that a suitable First Aid cabinet would be enough equipment for such a plant, of course not enough for the largest plants and it might unfortunately be a rather neglected cabinet in a very small plant. With a First Aid cabinet would go the necessity of having someone who could handle the cabinet and the injury. The matter of the choice of the right individual is generally a difficult problem to solve. We are likely to get somebody who sells himself as a good man but is very much the wrong one. You are fortunate if you can get the right man or the right woman. The cabinet should be a strong box, dust-proof, clean, preferably of metal. Such a cabinet should contain:

- One first-aid for wounds packet
- One ounce absorbent lint
- Four packages absorbent gauze, 1 yard x 36 inches
- One package absorbent cotton, quarter pound
- One spool adhesive plaster, 1 inch x 10 yards
- Six cotton roller bandages, 2 inches x 5 yards
- Four cotton roller bandages, 3 inches x 5 yards
- Four gauze bandages, 1 inch x 10 yards
- Eight gauze bandages, 2 inches x 10 yards
- Four gauze bandages, 2½ inches x 10 yards
- Four picric acid gauze pads
- Six finger cots
- One triangular bandage
- One two-ounce bottle aromatic spirits of ammonia
- One two-ounce bottle general antiseptic and disinfectant solution
- One empty bottle for this solution
- Two three-ounce tubes Bicarbonate of Soda and Petrolatum, three per cent
- One three-ounce bottle boric acid solution, four per cent
- One two-ounce bottle castor oil
- One box of combines compress-adhesive tape dressings
- One dozen wooden applicators bound with cotton
- One dozen wooden tongue depressors
- Four wooden splints, 15¾ x 3¾ inches
- One tourniquet
- One pair scissors, one pair of tweezers
- Two packages of safety pins (small and large)
- One graduated medicine glass
- Six paper cups
- One first-aid manual

The First Aid manual of the Red Cross or Bureau of Mines, is a good thing to refresh your minds on the proper use of these materials. In addition to the manual you will want blanks for reporting accidents and blanks for refills when the contents of the cabinet runs low. In all the different size industries this First Aid cabinet or its equivalent is the essential thing to have.

A Plant Employing 100 to 300 Workers

This number would require a moderate size room with a floor space of about 200 square feet, divided by partitions, and this room should be centrally located with thought given to privacy and comfort. It should be well supplied with heat, light and good ventilation. The floor should be of impervious material as linoleum, tile, et cetera. The walls should be a mild shade of green, light tan, or light grey. The equipment should be the First Aid cabinet as described for the smaller plant. In certain types of industries, extra splints, bandages, et cetera. Where women employees predominate, suitable medicines and cot rooms are needed. Equipment in this size industry should have in addition, a table, waste bucket, two chairs, a cot, glazed sink, hot and cold water, a supply of towels, soap. A stretcher should be available and close at hand with a couple of blankets and pillows.

Industry Employing 300 to 1,000 Employees

Three to five rooms should be available, one a waiting room, the second one as I have already described for treatments and dressings, another room for physical examinations, room for laboratory facilities. This industry will need the same equipment as described in the previous types. The following additional equipment will justify itself:

- One table, metal with glass top
- Focusing light on bracket
- Chair with neck rest
- Head mirror
- Nasal and throat sprays in rack with solutions
- Pus basin
- Metal irrigating can
- Nasal specula
- Ear specula
- Ear curette
- Ear or nasal forceps
- Wooden applicators wound with cotton
- Eye solutions in dropper bottles
- Cataract knives, etc.
- Magnifying glass
- Waste bucket
- Ear syringe
- Petrolated gauze packing strips
- Sterile gauze and cotton

Industry Employing 1,000 to 5,000

Where it is possible, it is advisable to have a Dispensary in a separate building, especially in a hazardous or smudgy industry. The minimum number of rooms should be four. These may be divided by movable screens or low walls. In this way they may be made to include waiting room, Physician's Office, Nurse's room, also to be used for keeping records, physical examination room, small laboratory,

main surgical room, dental department, a room for X-Ray, physiotherapy, rest rooms and conveniences for an oculist and eye examinations. More space, separate rooms where the women are employed in large numbers and separate hospital rooms for severely injured cases. When the plant buildings are scattered, it is necessary to have a dispensary in a second building. In addition, contact must be made with some high class hospital.

The Larkin Co., of which I am Medical Director, comes within the class we are now describing. The number of our employees average from 3,000 to 5,000. Everything that is interrelated with medical problems is centered in the Medical Department. Here First Aid is administered and follow-up treatment when needed, we get out Compensation reports, duration of Compensation periods and the amount of Compensation payments are computed, and all Compensation payments are delivered through our Department. We follow up all cases at the plant, in the home or at the hospital. We have charge of the detail work of the benefit organization. Absence reports from all departments are daily sent to us. Follow up of absent employees at set periods are made by our visiting nurses. Physical examinations are made upon entrance and at various times during the continuance of employment. The oculist examination and method for convenient purchase of glasses are directed. Sanitary conditions of the people and the plant comes under our purview.

The Larkin (sick) Benefit Association gives in addition to the usual benefits an amount of money to help meet the cost of surgical operations. Folks are often dominated by necessity. The necessity for a hernia operation may tempt an effort for relief of this condition, wrongfully, through Workingmen's Compensation. Knowing that an operation for hernia is their right from the Benefit Association, they are relieved of the necessity of faking a story. This same experience applies even to appendicitis and many other operations. The follow up visits cut down markedly the absence percentage. Sickness and outside injury cases are separated from the Compensation cases. The Compensation cases are thereby met at their earliest development and naturally cut down in the extent of their continuance. A knowledge of the Compensation Law and a knowledge of the individual combined with a service that attracts have a great economic value.

All these different activities can be easily interrelated in an industry of this size so that you get a marked lowering of the effects of accidental injuries as far as the individual is concerned with a consequent lowering of Compensation rates. At the last New York State safety meeting an illuminated sign, placed in a prominent position by the State, read, "If the other industries in the State would follow the practice of the Larkin Co. costs of accidents in the past year would have been cut \$20,000,000."

Plants Employing 5,000 to 10,000

This type of plant needs the same class of equipment and a layout similar to the last class of industries. They will need additional or larger rooms, especially where the nature of the work is hazardous and the number and seriousness of the injuries is increased. If this large industry is not located near a hospital, they may find it necessary to maintain their own hospital. There are many such cases throughout the country. When in or near a large city and convenient to a first class hospital, suitable arrangements can be made to take care of very serious cases.

Over 10,000 Employees

And on up to the size of the United States Steel, the Ford Plant, the Bethlehem Steel or industries of that size. The United States Steel and the Bethlehem Steel have many hospitals of their own, which handle the very serious injuries incident

to their great activities. I remember 14 years ago visiting the Ford Plant in Detroit, just after Henry had decided he would build a hospital. A group of Detroit's best citizens were soliciting funds to use for constructing a hospital. When the great automobile manufacturer was approached he asked the privilege of being allowed to take over the whole project. He has since expended millions in constructing that marvelous hospital, where many of his ideas are carried out.

First Aid Work

In Buffalo, in order to meet the demand for the right person in the industry to take care of First Aid equipment, we conduct every year First Aid class under the direction of the Chamber of Commerce. The lectures are given by eminent surgeons who are generally officers of the Medical Society and the Academy of Medicine. Some 12 to 15 lectures constitute the course, followed by a thorough examination, the graduates receiving a Red Cross diploma. We graduate about 100 First Aiders every year, thoroughly grounded in First Aid ideas. Now a little bit of what we teach and what I think the First Aider should have in mind, combined with a knowledge he should possess to effectively handle First Aid problems. Of course, the man must thoroughly enjoy and be interested in this work, especially interested in the human side of it. He must have some sense of what society demands of him, what the State demands of him, what industry demands of him, but above all he must have a feeling of love and consideration for the injured. The First Aider must be a patient type of fellow and have considerable powers of observation. If he is the right man he isn't excitable but goes about his work carefully and soon learns the necessity for considering shock, which he finds present to a greater or lesser degree in almost all accidents.

Shock

Shock, in its severe form, shows its presence by the following symptoms: the skin is pale, white, cold, big drops of cold sweat are seen on the forehead, face, hands and other exposed parts, pupils are dilated, lips blue, hands blue, breathing is irregular. If you feel the pulse, it is weak and rapid and may be hardly perceptible. In this severe type of case, the patient is lying down, he pays little attention to what is going on about him, it is hard to arouse him. If you do succeed in getting a response, patient will tell you that he is tired, weak and cold. This type of shock may increase in severity and has been recognized as a cause of death. There are milder cases, even so mild as to show only a temporary weakness.

Treatment of Shock

There are three essential points in the treatment of severe shock as described above. First, the position. The patient must be lying down with head low. Second, cold must be counteracted by the use of heat. Third, weakness must be overcome by the use of stimulants. As little clothing as possible should be removed from the injured. He must be thoroughly covered with good heavy blankets or their substitute and heat applied by hot water bags, bottles or jars filled with hot water, bags of hot sand, bricks or stone or anything that will hold heat. Care must be taken that the patient, who is partially or completely unconscious, is not burnt. The demand for stimulants is met by giving something hot to drink,—hot coffee, hot tea, hot milk, hot water. The common medicine used for stimulation is the aromatic spirits of ammonia given in teaspoonful doses every half hour. You must be sure your patient can swallow before stimulants are administered in a liquid form. When the patient cannot swallow, the inhala-

tion of the fumes from aromatic spirits or better still, the inhalations from smelling salts.

Hemorrhage

The First Aider must know how to deal with hemorrhage. He must know the different varieties, the arterial, the venous and the capillary. The arterial coming in bright red spurts, the venous being of a darker color in a steady stream and the capillary an oozing. Every First Aid book will state this great truth that the great majority of bleeding cases can be stopped by pressure at the point of bleeding. We are so liable to overlook this great truth because it is stated so simply and in such a short sentence. Tourniquets are good things, just like razors, but a razor in the hands of a booze-crazed nigger is not a good thing and a tourniquet improperly used does more damage than it ever did good. I have never seen a surgeon of great experience talk on hemorrhages, who was not irresistibly impelled to take a crack at the tourniquet. The tourniquet or esmarch has great value but we must learn how to use and not to abuse it.

Infections

Nature has covered the body with skin. It is a marvelous organ and when you cut through that skin or damage or injure it, you destroy the protection of the body inside and open up possibilities of an enormous amount of damage. I have seen a case of a sliver, just a small wooden sliver, removed by the man's jackknife, kill the man in a week. This was in pre-Volstead times. The man was one of those jaundiced, yellow-faced, big-bellied fellows. He got the sliver in his hand and we saw him on the fourth day afterward. The hand and arm were much swollen, reddened and feverish. There was no resisting power to overcome the poison. The best type of assistance in quality and quantity was called in but nothing could save him. His wife died of the same type of infection just about a year afterward. But you can bet the children won't; we have two of them at the Larkin Co. and the slightest scratch of the skin brings them to the Dispensary for First Aid.

That story epitomizes the danger of infection from petty injuries. By careful watching of these small injuries, we have been able at the Larkin Co. (our pay roll runs from \$3,000,000 to \$5,000,000 a year) to make an enormous dent in the cost of compensation from infections. In 14 years compensation from infections has totaled little less than \$2,600. That statement should be an argument that would impress a Scotchman. All petty injuries are brought to the Medical Department for immediate care. As soon as infections do show the most intelligent care is applied. Propaganda to instill the danger of infections is continuously carried throughout the industry. We do not follow the method of giving the man a general bath because he has a scratch on his finger. We do not attempt, in such a case, to wash off his hands with soap and water because we are afraid that all the dirt and all the germs we know are on the hand, will be washed into the cut. We carefully clean the wound and its immediate neighborhood and then carefully apply tincture of iodine. After protecting cover has been applied to the wound whatever bathing may be necessary can be carried out.

Many of the Doctors and First Aiders and Nurses are now using mercurochrome but with the results which I have had, I am compelled to stick to the tincture of iodine. Of course, all local applications must be carefully watched. It is a common practice and a good practice to dilute the tincture of iodine with an equal quantity of alcohol, thereby cutting the solution down from a 7 per cent to a 3½ per cent iodine. You must be careful not to allow your alcohol to evaporate from your tincture of iodine. If evaporation occurs, your solution runs up not only to a 7 per cent but if the evaporation continues, the percentage gets

as high as 15 per cent or 30 per cent. If your patient comes in after the application of such a tincture of iodine you will not have a wound that has been properly treated for infection and that infection destroyed. You will have a wound that has been burnt by a caustic. The tincture of iodine becomes a caustic when a large per cent of the alcohol has evaporated. Time is about up. As I said in the beginning, this is a big subject and I haven't been able to more than touch a few of the high spots.

ACTING CHAIRMAN ROGERS: I will ask Dr. Hourigan to stay here in front for a few minutes because I know there are some questions you will want to ask him.

W. J. BRENNAN (St. Croix Paper Co., Woodland, Me.): I wanted to ask whether you advise treating cabinets throughout the plant, or do you prefer to centralize the treatment?

DR. HOURIGAN: That depends upon the ease with which the injured folks can get to the central plant. If in the central plant we have doctors specially trained and nurses specially trained, with equipment, and the patients can easily be gotten there, no first aid equipment is needed around the plant. If, on the other hand, the other condition prevails, why necessarily there must be cabinets distributed.

MR. BRENNAN: That is our policy and I wanted to substantiate that. I wonder if others are using a system we find very effective. We do not have first aid treatment throughout the plant because we wish to place responsibility upon one or two; but we do have a cabinet, called an emergency cabinet and in that we have a stretcher, burn ointment, tourniquet and some sterile gauze. I will quote one case to show you the efficacy of this thing. A man was struck by a block which was dynamited, some years ago. Internal hemorrhage resulted. A messenger was sent for the stretcher. He took the stretcher back, loaded the patient on it, carried him a considerable distance and a great deal of time was lost. Recently we had a similar case. A messenger arrived saying there had been a severe accident and the door opened and the patient was there. We put these emergency cases in such places as the block pile, on the river, in the steam department and for the one in the latter department, we supply an extra amount of burn ointment, while out on the block pile we pay more attention to the stretchers and pads and blankets and that sort of thing and we have in all of these places such things as would be required in that particular type of accident.

DR. HOURIGAN: There is no question but what that is high class service. With that, I suppose you train first aid teams. If you develop first aid teams, have them properly taught and then compete with each other, you are not only developing first aid but also thought of safety.

R. G. McCONNELL (Niagara Wall Paper Co., Niagara Falls, N. Y.): I would like to ask Dr. Hourigan about the sum spent in compensation for infection over a period of fourteen years. The sum mentioned was twenty-four hundred dollars; was that the cost per year or for the whole period mentioned?

DR. HOURIGAN: Twenty-four hundred dollars was the cost of infection cases for the period of fourteen years.

F. H. ROSEBUSH (Nekoosa-Edwards Paper Co., Port Edwards, Wis.): I would like to ask you, doctor, where you have first aid cabinets throughout the mill, what system do you have, if any, for following up that case to find out what happens to the man after he leaves the first aid station in the mill?

DR. HOURIGAN: In our plant that doesn't happen. Where that condition does prevail, why of course that accident should be reported through some central authority. How do you do it?

MR. ROSEBUSH: We have had the problem and it is a question of getting the report to the nurse in the first aid room. I was wondering if anyone had a quick system of follow-up so that within a short time you would be able to have your

nurse know of that case and follow it up through the foreman. We have not been able to solve it satisfactorily.

DR. HOURIGAN: Education is the thought I suppose. Now, in connection with the danger of infection, I notice that Dr. Ben Slader, of the Eastman Kodak Company, is getting out some wonderful pictures showing these different germs. The germs are streptococcus and syphilis, are realities, and they are just outside that cut, but it is only the doctor that knows it. The nurse may have a little idea of it, but if we could get it across through education, the thought that there is reality there, I think they would get their reports across.

MR. BRENNAN: I think there is no place in safety work to make distinction between tiny cuts and major injuries, because the tiniest cut, as shown you by the doctor, becomes very serious and we know that the major injuries get good care anyway. We in our plant make no distinction whatever between the tiniest skin-break and a broken leg. A report is made if a man merely pricks his hand on a wire rope and it is the foreman's duty to see that he comes in.

DR. HOURIGAN: Do you have a central hospital with nurses, or do your first aid people do that?

MR. BRENNAN: Our first aid is connected with the chemical department. All intermingled. Our plant is small enough and centralized enough so that they can come there and we would prefer to take a man off production for ten minutes—we feel we get a greater return in the end.

MOSE DANIEL (Hercules Powder Co., Brunswick, Ga.): The gentleman who just spoke, to my mind, has the situation just right. There is no difference, no matter whether it is a pin scratch, an abrasion or a broken leg or a very serious injury, because you can't tell. Now, the gentleman who asked the question about these cases, the answer to that is making the foreman responsible. We have a system now by which we have the foreman make out a ticket and report his injuries and the injured can't return unless he does that.

We have no kits throughout the plant at all, but this ticket is taken, with the injured man's name and history of the case, no matter how great or how small it is made out just the same and made out directly, and if he is a day late, the nurse takes it from the injured just as he gives it, then, if that occurred yesterday and comes in today, we have a duration put on there of two days, or three days, whatever it is, and we have found that works beautifully, very effectively. When that foreman gets that duration slip he gets busy and comes right back with the injured man and if possible he wants to avoid that duration because it reflects on his department. I have the plan, after the physical examination of the employees, of talking to these men before they go to work and I impress on them and teach them what first aid means, show them what first aid does and impress on them all I can, not to disregard any injury because we could recite case after case of very serious loss that originated as the most trifling accident.

DR. J. G. CUNNINGHAM (Dept. of Health, Toronto, Ontario, Canada): I think the idea that anyone can render first aid is costing a good deal and particularly with reference to infection. In Ontario, infection, as defined by workmen's compensation, is responsible for about one-sixth of the total compensation costs and in the defining of infection for record purposes, they only take the cases which would not have come to compensation except for infection. We looked into a few figures in connection with one group—and we first of all noticed that when the first treatment came on the day of injury, the number of cases was smaller, but as each day's delay appeared, the number of cases increased. We found that the great bulk of cases, remembering that these are infection cases that actually developed, we found that the great bulk of cases were the cases which the first aid man had seen first; there were somewhat fewer cases that the nurse had seen first and the fewest where the doctor had rendered first treatment. Now that is no brief for the physician; it is his job, and if it is done properly it will reduce

infection by ninety-five per cent, but it does emphasize the fact that not everybody can do it and effective first aid requires people properly trained.

WM. E. P. FULLAM (International Paper Co., Otis Mill, Chisholm, Me.): Dr. Hourigan mentioning the germs, put me in mind of an incident while sitting in a movie theatre. They were showing on the screen some kind of germ—I believe it was hook worm, greatly magnified. Just ahead of me were a couple of youngsters from the local school and when this worm commenced to wiggle, one of them said, "Jimmie, that's the kind of germ the teacher says is going to kill somebody if they spit on the floor and sweep it up."

ACTING CHAIRMAN ROGERS: Our chairman has asked that we close this part of the program as soon as possible now so that the important business of the meeting to follow may be cleaned up.

CHAIRMAN PEACOCK: We have several items of business before us. First of all we ought to hear from Mr. Rosebush, chairman of the special committee on the matter of a permanent secretary. What is your final recommendation, Mr. Rosebush?

MR. ROSEBUSH: Mr Chairman: It will take approximately ten thousand dollars to put this thing over as stated at the beginning of this meeting. If a man is engaged it ought to be a permanent proposition, for at least three to five years; also that the question of responsibility, that is, to whom this paid secretary or representative should be responsible, is a very serious question and, in fact, there seems to be quite a lot that should be talked about and discussed in having such a man. It is a serious problem and I am sure Mr. Rogers will agree with me that we are not certain in our own minds as to how it should be recommended to the section.

B. D. ROGERS (Bird & Son, Inc., E. Walpole, Mass.): As Mr. Rosebush said, we have no definite recommendations, but I will make a motion, that a special committee be appointed to investigate the advisability of a representative—we decided to call him a representative instead of a secretary—they are more welcome at mills when they come as representatives rather than secretaries.

L. J. PARANT (St. Croix Paper Co., Woodland, Me.): May I offer an amendment to the motion to the effect that the committee be instructed to confer with the American Pulp and Paper Association, in addition to conferring with the National Safety Council?

MR. ROGERS: That was in our minds, Mr. Parant, and that is included in the motion.

(The motion was seconded and unanimously carried.)

CHAIRMAN PEACOCK: Now the matter of reporting statistics. We have had this up for discussion for several years. Is anyone ready for a motion? The question has been discussed as to the advisability of the Pulp and Paper Section continuing to report its fatalities in terms of six thousand days, when as a matter of fact insurance companies and commissioners all over the country show they are compensated for in terms of about twelve hundred days.

W. F. ASHE (Thilmany Pulp and Paper Co., Kaukauna, Wis.): I move you, Mr. Chairman, that this section instruct the National Safety Council in reporting statistics from the Pulp and Paper Section, that they use the standard of one thousand days rather than six thousand days in computing our accidents.

W. A. GLEASON (Hammermill Paper Co., Erie, Pa.): I think that we also ought to include in that motion that the National Safety Council compute our past figures on the same basis, so that we will know whether or not we are going forward.

CHAIRMAN PEACOCK: Do you accept that in your motion, Mr. Ashe?

MR. ASHE: Yes, sir.

CHAIRMAN PEACOCK: We have discussed this a great deal in the past, gentlemen; it is not new to any of you who have been here.

(The motion was seconded and carried.)

CHAIRMAN PEACOCK: We are ready at this time for the report of the Nominating Committee, Mr. Gleason, Chairman.

Report of the Nominating Committee

W. A. GLEASON (Hammermill Paper Co., Erie, Pa.): Mr. Chairman and Gentlemen: The Nominating Committee, appointed by the Chairman for the nominating of officers for this section, have attended to that duty and offer in nomination the following:

Chairman, Mr. Kenneth L. Faist, Champion Coated Paper Co., Hamilton, Ohio.
Secretary, Mr. D. D. Thirkield, Sorg, Oglesby Smith Paper Company, Middletown, Ohio.

Vice-Chairman for Canada, Mr. A. P. Costigane, Ontario Pulp and Paper Makers Safety Association, Toronto, Ontario, Canada.

Vice-Chairman for South, Mr. G. W. Phillips, Champion Fibre Company, Canton, N. C.

Extreme Southern District, Mr. W. H. Jennings, Bogalusa Paper Co., Bogalusa, La.

Vice-Chairman for Middle-West, Mr. M. G. Hoyman, Kimberly-Clark Company, Neenah, Wis.

Vice-Chairman for East, Mr. N. F. Bartlett, Hollingsworth & Vose Company, Boston, Mass.

Vice-Chairman for Paper Box Manufacturers, Mr. H. C. Sackett, Alton Box Board and Paper Co., Alton, Illinois.

Engineering Representative, Mr. R. M. Altman, Marathon Paper Mills Co., Rothschild, Wis.

Regional Directors:

Maine: Mr. Alvin Record, International Paper Co., Chisholm.

New Hampshire: J. J. Tellington, Brown Co., Berlin, N. H.

Massachusetts: A. D. Wilson, American Writing Paper Co., Holyoke.

Michigan: C. E. Torrance, Bryant Paper Co., Kalamazoo.

New York: Samuel Pruyn, Finch, Pruyn & Co., Inc., Glens Falls.

Ohio: Ernest Augustus, Mead Pulp and Paper Co., Chillicothe.

Pennsylvania: F. W. Plowman, Scott Paper Co., Chester, Pa.

Wisconsin Valley: F. H. Rosebush, Nekoosa-Edwards Paper Co., Port Edwards, Wis.

Fox River Valley: W. F. Ashe, Thilmany Pulp and Paper Co., Kaukauna, Wis.

Chairman, Poster Committee: Amiel Umberham, Fort Howard Paper Co., Green Bay, Wis.

Chairman, Membership Committee: Earl E. Grant, Crystal Tissue Company, Middletown, Ohio.

Chairman, Contest Committee: A. Scott Dowd, "The Paper Industry," Chicago, Ill.

Chairman, Committee on Health Research: J. J. Plzak, Consolidated Water Power and Paper Co., Wisconsin Rapids, Wis.

Signed:

Ernest Augustus,

N. F. Bartlett,

W. A. Gleason, Chairman.

CHAIRMAN PEACOCK: What is your pleasure in regard to the report of the Nominating Committee? I might say this committee was appointed six months ago and they have been working ever since.

MR. ROGERS: I will make the motion that we accept the report of the Nominating Committee.

(The motion was seconded and carried.)

CHAIRMAN PEACOCK: Our secretary, Mr. Bergstrom, being absent, I will ask Mr. Rogers to serve as secretary. Are you ready for the election? Is there a motion that these gentlemen be elected as the officers of the section?

MR. PARANT: I will make the motion, Mr. Chairman, that the gentlemen named by the Nominating Committee be elected to the various offices.

CHAIRMAN PEACOCK: That means the Secretary will cast the ballot for all names? Are there any remarks?

(The motion was seconded and carried.)

N. F. BARTLETT (Hollingsworth & Vose Co., Boston, Mass.): Mr. Chairman, I would like to move that a rising vote of thanks be extended to the past officers and any retiring officers for the service which they have rendered to this section during the past year.

(The motion was seconded and carried.)

CHAIRMAN PEACOCK: On behalf of the officers who have served you, I take the liberty of accepting with all good will your vote of thanks. We will give Mr. Faist, our newly elected Chairman, an opportunity the first thing at the Luncheon Meeting this afternoon to make a speech.

MR. ROSEBUSH: Mr. Chairman, I hate to inject this new idea at this late time of the morning but it has occurred to me, and perhaps to some others. Now, we have been discussing the advisability of having a representative for this section and I am just wondering if it is in the minds of many of our members that we ought to have a closer knit organization, whether it would be wise for us to select from our officers, vice-chairmen and regional directors, an advisory board, say of six men, two of them for one year, two of them for two years and two to serve for three years, to act in conjunction with the officers as a sort of permanent organization or enough so so that we would have a holdover advisory board or board of directors or whatever you would care to call it. In that way we could get away somewhat from having practically an entirely new board of officers each year. It is not a new idea, in fact, it is an old idea but it can be worked out so that in case we should have, during the year, withdrawals from the list of officers, the advisory board could handle all such matters, in conjunction with the members. I just offer that as a suggestion, because I rather feel that some of the members would like to have more of a closer knit permanent organization.

CHAIRMAN PEACOCK: If you do not care to make a motion, let us keep the matter in mind, as you might feel you want to make the motion later in the day.

ADJOURNMENT

October 3, 1928

Luncheon Session

W. J. PEACOCK, Chairman

Head, Department of Personnel, Northern Paper Mills, Green Bay, Wis.

The luncheon session was called to order at one-thirty o'clock by the chairman, W. J. Peacock.

CHAIRMAN PEACOCK: In opening this meeting, I want to introduce to you, one at a time, all the new officers of the section. First of all, if I can do it without tears, etc., I am going to call on the new Chairman, Kenneth L. Faist, of the Champion Coated Paper Company, Hamilton, Ohio.

MR. FAIST: Ladies and Gentlemen: Mr. Peacock, in the other room this morning, said in about fifteen minutes he was going to give me a chance to make a speech. I don't believe I will make one. I know we are all very much interested in the meeting. We have some wonderful speakers today, and of course, we want to know the result of the contest, so I will merely state that I will do everything in my power to make the Paper and Pulp Section go over big during my term of office. I thank you.

(The newly elected officers and regional directors were then introduced to the section.)

CHAIRMAN PEACOCK: One of the interesting things in connection with our contest is the pace, or the atmosphere, something that starts off mills new to the contest at a much higher speed than you would ordinarily expect, and we are proud of the fact that a new contestant should figure so largely before the paper industry of the nation, in showing a perfect record in the six months' contest this year. I want to give all the time he wants to tell us about it to Mr. F. L. Irvin, Supervisor of Employment of the St. Croix Paper Company, Woodland, Maine—six months without an accident!

The Influence and Results of Safety in Our Plant

By F. L. IRVIN

Supervisor of Employment, St. Croix Paper Co., Woodland, Maine

I shall attempt to give you a general idea of the influence and results of the safety work at the St. Croix Paper Company in Woodland, Maine. Whatever we have accomplished can best be appreciated by an understanding of the work done in preparation.

Organized work in accident prevention began in January, 1927, with the creation of a safety department. Its success has been greatly influenced by the continuous guidance and stimulus of our general manager, who has spared no effort to follow closely every feature of the safety work. Unless the man at the top gives his interest, enthusiasm and full support to the safety organization, it cannot be expected that departmental heads, foremen and workmen will be safety enthusiasts. The general manager or superintendent is the key man to safety.

The St. Croix Paper Company has realized its duty to provide safe working conditions and has spent considerable money in safeguarding "danger spots." Consequently, there has arisen a direct relationship between our management and employees to make the mill a safe place in which to work. Most of the unsafe places have been corrected as a result of suggestions submitted by the workmen

in our monthly Safety Suggestion Contest. Interest is maintained because the management acts promptly to eliminate, where it can, the hazards that are reported. The workmen see the tangible results of their own ideas.

A varied and comprehensive educational work is carried on to teach and train our men to follow the safe methods of work. This includes:

(1) The poster services of the National Safety Council and the Elliott Service Company: The pictures and bulletins from these two sources are placed on bulletin-boards in conspicuous places throughout the mill, and have such an appeal to the self-interest of our men that we would not be without them.

(2) Distribution to every employee of a copy of "The Safe Worker," a monthly publication of the National Safety Council: This booklet is read with much interest and is taken into the homes for the family to read as well. This has the effect of making the family realize what an accident to the bread-winner would mean.

(3) Safety slogans printed on small, numbered, multi-colored cards and placed in every pay envelope each week: These carry general safety hints and personal messages from the safety committee, and are a continual reminder of the truths of safety. The immediate interest is prolonged by paying a small cash prize to the holder of the card bearing the lucky number drawn.

(4) A plant newspaper, "The St. Croix Observer," published every month: This is one of the most effective methods of driving home the safety idea. During the period of the recent National Safety contest our safety editor devoted many special articles to the contest, and his messages were a vital force in arousing the spirit and interest of the men to win the "Class B" cup.

(5) Motion pictures featuring a film on safety: These were held every third Sunday during the winter months and were so impressive that fully 75 per cent of our employees regularly attended the performances.

(6) First aid classes: A series of lessons has been given on the prone pressure and pulmotor methods of resuscitation, and these aroused much interest.

In addition to our work toward the prevention of accidents by safeguarding and a continuous educational program, we have equipped the company's hospital with modern apparatus, and have recently built a new, sunny and well-furnished first aid room. We have a complete line of Victor diathermy machines, such as the ultra-violet ray, both water and air-cooled; a high frequency machine; the Wantz generator; and a complete X-ray unit. These are for the benefit of the employees. The ultra-violet water-cooled lamp is used on all minor wounds, abrasions and cuts, while the air-cooled lamp is for skin infections and poisoning from wood bark, oils, and the like. We are certain that these lamps have prevented lost time accidents.

The influence of this safety work is typified by the attitude of the men toward small cuts and scratches which heretofore were greatly neglected. Many did not seem to realize the seriousness of apparently minor injuries, while there were others who feared that their fellow workmen would say that they were sullen if they reported to the first aid room for treatment. Intelligent and persistent safety propaganda has changed all that. Today, we have every man in the entire organization reporting for first aid treatment for the slightest scratch, thereby lessening the possibility of suffering, of a loss in wages to the workman, and of a decrease in the efficiency of the plant. And who knows but what a life has been saved by this practice?

The results are impressive and justify our claim that our employees are sold on the effects of safety. A comparative record of our lost time accidents for the past two and one-half years discloses that for 1926 there were 85 lost time accidents; for 1927 only 32, and the first six months of 1928—none.

At the close of 1927, it was evident that our safety campaign was taking effect. There was a reduction of 63 per cent in accident-frequency compared with the

previous year, and in November, 1927, we experienced the first "No-Accident Month" in the history of the St. Croix Paper Company. Moreover, we had fewer lost time accidents during the last four months of 1927 than during any similar period of that year, even though more hazardous work had been performed during the latter months. In September, a fire swept away half of the main paper machine building and badly damaged the dry-ends of two paper machines. Several days were spent in clearing away the mass of tangled debris; then followed weeks of reconstruction work on the buildings and the installation of dryers, calenders, winders and other equipment. During all that time there was a daily crew of 75 men of whom one-half were inexperienced in that class of work, yet there was not one lost time accident charged to that hazardous job.

These outstanding accomplishments show that the men have grasped the full meaning of safety and are practicing it. Hopes were high and care was the watch word throughout the mill from the first day of January to the last day of June to establish a perfect record during the 1928 National Safety contest.

Our general manager is leaving no stone unturned to improve his safety organization. He has with him here, today, eight St. Croix men, each representing a different department of the mill. They are here for the express purpose of gathering safety ideas and taking them back to their fellow-workers. Each of them should have a greater enthusiasm for safety work and be a force to keep alive the spirit of cooperation and good will between the management and the men to the end, as expressed by P. B. Juhnke, "that the workman shall live to enjoy the fruits of his labor; that his mother shall have the comfort of his arm in her age; that his wife shall not untimely be a widow; that his children shall have a father, and that cripples and hopeless wrecks who were once strong, shall no longer be a by-product of industry."

CHAIRMAN PEACOCK: I can tell you honestly, gentlemen, whatever is before us, we certainly have a surprise. Concealment has been the order of the day and George Burns, for once, has gotten away with it. George is the best little helper in the entire National Safety Council, so far as we are concerned. George thinks we are a bunch of Bolsheviks, especially because of our resolution this morning. If we were to give him a chance, he would burn us up, but we aren't giving him a chance. We think we are being led into some things and we hope George will see it possible to follow.

We are honored in the presence of Mr. Homer E. Niesz, President of the National Safety Council, who will present the National Safety Council Trophies to mills in A, B, and C Classes.

Presentation of National Safety Council Trophies

By HOMER E. NIESZ
President, National Safety Council

I am very happy indeed to be here and to have the privilege of presenting to the winners the trophies given by the National Safety Council in this safety contest. I want to congratulate the section on what it has accomplished during the period of its activities as a great section of the National Safety Council. It has made a real place for itself among the sections of the Council.

It has the enthusiasm and the ability to go forward and to accomplish the things that the section was created to do, namely, the inculcation of the idea of safety among the individuals constituting the membership of this section, the idea of getting accident-prevention advanced to the stage where there are no more lost-time accidents. That has been accomplished in a number of companies during the

past years in this organization, and if they can do it, I am sure that the others can do the same thing, notwithstanding the hazards that are inherent in the industry you represent.

The ideas brought forth by Mr. Irvin and the methods used in his company, I believe, are the fundamentals of accident prevention. I think he has stated the whole story very clearly to you. But I want to add just this: that I am very much gratified to find that they use one of the newest activities of the National Safety Council, our new publication, "The Safe Worker," an employee magazine which was started just a few months ago at my own instigation and recommendation and that of Mr. Beck, Vice-president for Industrial Safety; because we believe that the information it contains is of such service to the individual worker that it is going to be a very great help to the management in carrying on a safety campaign. You've got to get the individual worker to think safety and to act safely, and that, if it has enthusiastic backing by the management (as explained by Mr. Irvin), is going to do the job.

Now, you have had for several years a safety contest. Other lines of industry have undertaken similar work more recently. The success you have had in your contest has demonstrated that such a method is worthwhile. Now this safety contest, as I see it, is a stimulus to increase the safety in the plant. It is a means to an end. The winning of a trophy is not the end in itself, but merely the symbol of an accomplishment and that is the real objective of the contest—to do the job safely; that is the end, and the contest is the means and the trophy is the indication of what you have done.

For those who may not be familiar with the record of the contest in the past years, I might briefly recite the history of it. The first contest was for a period of one month and was instituted in 1925. Forty-one mills were entered in that contest, which was won by the Nekoosa-Edwards Paper Company. The second contest, in 1926, was for a six months' period and seventy-two mills were entered and this contest was won by Neenah Mill, Kimberly-Clark Company. The third contest, in 1927, was also for six months, with one hundred and nineteen mills entered and that year was divided into three groups, Group A, won by the Nekoosa-Edwards Paper Co.; Group B, won by the Niagara Falls Mill, International Paper Co.; Group C in which three mills tied for first place, all with perfect records of no lost-time accidents. These three mills were the Neenah Mill, Kimberly-Clark Company; Riley Mill, International Paper Company; and Gypsum Mill, U. S. Gypsum Company.

The 1928 contest, which is the fourth of the series, for the first six months of 1928, 124 mills were entered. This was the largest of the series, as you would naturally expect. The winner in Group A, which is the group employing over 500 people, is a mill which employs 592 persons, who worked 794,127 man hours during the contest period. There were four lost-time accidents, a total of 12 days lost time. Frequency rate—5.037 and severity rate—.015. This company accumulated a total of 526.545 credit, the highest of the 23 mills entered in this group. The winner was the Champion Coated Paper Company, Hamilton, Ohio. Mr. Kenneth L. Faist, your new Section Chairman, is the safety director, and it gives me the very greatest of pleasure to present him this trophy. Will you read the inscription, Mr. Faist, for the benefit of the members present, and have it included in the record?

MR. FAIST: "Award For Best Safety Record Among 23 Mills, Each Employing Over Five Hundred Persons—Champion Coated Paper Company, Paper Mill No. 2, at Hamilton, O. The Paper Industry Annual Safety Contest, 1928."

MR. NIESZ: The winner of Group B, employing between 200 and 500 men, has 438 people, who worked 565,977 man hours. They completed the entire period without a single lost-time accident. This mill was the first to enter the 1928 contest and is one of the new members of the National Safety Council. The safety

work is under the supervision of Mr. W. J. Brennan and I know you know the name of the company—the St. Croix Paper Company, of Woodland, Maine. The vice-president and general manager of the company is present and I would like to present this trophy to him. But the modesty of the general manager makes necessary the presentation of this trophy to the safety engineer, Mr. Brennan, to whom he gives the credit.

MR. BRENNAN: First I will read the inscription into the record: "For the Best Safety Record Among 38 Mills, Each Employing From Two Hundred to Five Hundred Persons—St. Croix Paper Company, Woodland, Maine. The Paper Industry Annual Safety Contest, 1928."

In behalf of the St. Croix Paper Company delegates here today, and the boys in the mill and the officers of the organization, I want to express our thanks first, and then tell you that this is the culmination of a sort of supreme effort on the part of our company. To many of you, this is a very enjoyable occasion, characterized by good food and agreeable companionship, but to us it is more. Now in order to understand that, you will have to know our experience of last year.

Mr. Parant delegated me last year to make a serious effort toward bringing one of those things to our mill. We started off with great enthusiasm, only to have our fondest hopes blighted by a death. It seems, of course, there was a bad reaction and as days went on accidents seemed to spring from the ground to drive our record lower, in spite of all we could do we went lower and lower, nearly to the bottom. I have other duties besides safety work and I guess at times we were in despair. I would go to the office, tell the general manager there had been another one and the thing that kept us going, gentlemen, was these few words—"Forget it and use that to build upon for another year."

So I would go forth to the boys in the mill with that message. We profited by our experiences of last year and as Mr. Irvin said, in November we realized a no-accident month, the first in our history. Everything sort of smoothed out following that. The men became safety-minded. We started in the contest, the same as the year before, with great enthusiasm and this continued from that moment until the 30th of June when all hands, foremen, superintendent and general manager, walked through the plant, until the whistles started to blow at midnight.

You have heard this sort of thing before, but I want you to realize our feelings and our position on that night. We are the most easterly mill in the United States, located on the Canadian border; there are no mills very near us. Because of our isolation, we have not the contact that some of you have, therefore we were much on our own except for the *National Safety News* and the good letters from Bill Peacock. I won't say more than this, but I want to pay a tribute to the men who are down at St. Croix today, eating their lunch from baskets while the wheels go round, while we are here in this beautiful hotel, taking it easy. It was not I nor Mr. Parant nor Mr. Irvin that did it, it was the spirit of the boys who said to each other, "It won't be me; you may break the record, but I'll be here tomorrow morning." And, gentlemen, it is spirit that wins contests and in winning contests we prevent accidents.

MR. NIESZ: The winner of the third group, C, employs 200 or less, and also completed the contest period without a single lost-time accident. One hundred sixty-six employees worked 177,744 man hours. The safety work of this company is under the supervision of Mr. R. G. McConnell, industrial relations manager, and the company, The Niagara Wall Paper Company, Niagara Falls, N. Y. I have pleasure in presenting you with this trophy. Will you read the inscription, please?

MR. MCCONNELL: "The National Safety Council—Universal Safety"—and that's what you all believe in—"The Best Record Among Sixty-One Mills, Each Employing Less Than Two Hundred Persons—Niagara Wall Paper Company, Niagara Falls, New York. The Paper Industry Annual Safety Contest, 1928."

I would like to say, on behalf of the employees of the Niagara Wall Paper

Company, we are truly thankful that we have been able to win this trophy and I express the sentiments of those employees back at Niagara Falls.

I had taken a few days' vacation and was in the midst of a great big cornfield when a telegram came for me to come to New York City and I found we were in for one of these trophies. I stopped off at Niagara Falls on my way to New York and found out that the first safety meeting that had been conducted in that mill was in February, 1910. We have conducted a safety meeting at least once a month in the last twelve years. It is about eighteen years, according to record, that they have been plugging away at this safety proposition. I myself have led off in the work with four of these contests, and you see by this record that it is a long, long trail before you arrive.

We never got very good results until we were able to develop a foremen's association, and believe me, that was some task to get that going. I worked on it four years and was never able to accomplish the organizing of that foremen's association until I began to interest the wives of the foremen. Finally, some of those women said to me, "Why don't you come to our house and bring the foremen along and conduct your meeting?" So I snapped one of these opportunities up and one day I told a fellow, "We're coming to your house this evening"—it was on a Sunday, May 9th. I landed there with 49 men and they organized a Foremen's Association in that lady's house. We continued to grow and develop right along in this industrial relations work ever since, we have had meetings regularly once a month for the last three years and have accomplished a lot of good work and these foremen have been right behind this safety meeting work.

I think you fellows who have led off in this Paper and Pulp division have created and developed marvelous results. You have set up a system now whereby we are beginning to receive literature through the National Safety Council headquarters, that talks in terms that paper employees understand. Now, you fellows have from twelve to thirteen hundred paper mills in the North American continent, I am told, and as you go back to sell this at home, it seems to me you have a great field and a possibility to grow and you are going to have a large section in this industry in years to come.

CHAIRMAN PEACOCK: Thank you, Mr. President, for your presence, for all your encouragement, and your appreciation of our methods. We are to witness the presentation of "The Paper Industry" Grand Trophy and we are very much pleased to have as the donor, and in person, Mr. Edward B. Fritz, publisher of The Paper Industry, of Chicago.

Presentation of "The Paper Industry" Trophy

By EDWARD B. FRITZ

Publisher, "The Paper Industry," Chicago, Ill.

Safety is a pretty big word. An ounce of safety is worth many cabinets full of first aid after the accident has happened. Safety might be termed "self-preservation," which is the first law of man.

When "The Paper Industry" was started, or before, I had traveled among the paper mills for a good many years, and I saw that there were many places that seemed unsafe; in fact, I got in a rather bad accident myself one time, although I was just running around the mill. To overcome this, and to educate paper mill men in safety has been one of our main points in publishing "The Paper Industry." Cutting out waste and saving lives or saving time are practically the same thing, because when we save lives and time we are cutting out waste.

It was not very long after "The Paper Industry" was started that we began to come in contact with the National Safety Council, and several years after that

we decided it would be a very good move to offer some kind of a prize, something to strive for. Last year the major cup was not presented; the three smaller cups were presented but the large one I still have in my office. I am not using it and I hope to give it out to somebody, but it is a fine thing to know that there are still three mills that have been running since the first of last year without an accident, and so, as long as those three mills run, two of them will have to have an accident some time or other, or else we will keep the cup.

The rules last year were quite different and it was on account of that that we could not decide. This year the rules were changed so that if there happens to be more than one mill at the end of the six months' time that has not had an accident, a number of men are to be selected as judges to decide which one of those mills should be presented with the trophy, or the one that had the largest number of men with the larger number of possible accidents.

The mill that is going to be presented with this trophy has made a wonderful record and I don't know of anything that has ever given me more pleasure than to present this trophy to them because they have made such a wonderful record. I therefore take a great deal of pleasure in presenting this plaque to the St. Croix Paper Company of Woodland, Maine. Mr. Parant, will you accept this for your company, with the compliments of "The Paper Industry"?

L. J. PARANT (St. Croix Paper Co., Woodland, Me.): "The Paper Industry Magazine of Chicago—Major Award—For Best Safety Record Among 124 Mills, Members National Safety Council—Won by St. Croix Paper Company, Woodland, Maine, during period January First to June Thirtieth, 1928. The Paper Industry Annual Safety Contest."

I don't know that I have any power of speech left. This is rather more than we bargained for. We winners of these trophies are placed in a rather embarrassing position in that we rejoice and may appear to be rejoicing over the misfortune of some other mills. I want to assure you, gentlemen, that we don't feel that way at all. We went into this contest principally for humanity's sake, and that brings to my mind my first awakening to safety work. Way back in 1908 I was connected with Finch-Pruyn Company, at Glens Falls, New York. We had had a number of accidents in our wood room on the barker through the use of the lombard attachment, I believe it was. I personally designed a guard for the lombard attachment and the guards were being put on, and the president happened to come through the wood room—Mr. Morris Hoops, president of the company. Having in mind possibly a promotion or an increase in salary, I called his attention to the wonderful guard that I had designed and mentioned the fact that it would save us a great deal of money in accidents that we had been having to pay for. His only remark was, "For humanity's sake."

They were the only words Mr. Hoops said to me and from that day on, gentlemen, I have been interested in the safety movement for humanity's sake; and we are—and when I say "we" I mean the President of the St. Croix Paper Company down to the janitor—we are interested in the safety movement for humanity's sake and nothing else. If we men here take that attitude—forget the insurance rate and the saving in money, and go into the safety movement for humanity's sake, we are going to accomplish wonderful results. On behalf of the St. Croix Paper Company, I rejoice in accepting this gift from "The Paper Industry."

MR. FRITZ: Aside from the prizes that have been given out, there have been a number of mills that have made perfect records, that have had no accidents, and for six of these mills we have prepared certificates of merit. The first is to the Finch-Pruyn Company of Glens Falls, N. Y. Will the representative of each company come forward and get the certificate?

(Certificate presented to Mr. Samuel Pruyn.)

The next one is the Atlas Mill of the Kimberly-Clark Company.

(Certificate presented to Mr. M. G. Hoyman.)

Seventeenth Safety Congress

The Neenah Paper Mill of the Kimberly-Clark Company, Neenah, Wis.
(Certificate presented to Mr. M. G. Hoyman.)

The next is the U. S. Gypsum Mill at Kansas City.

(No representative of this company was present.)

The next one is the U. S. Gypsum Company at Gypsum, Ohio.

(No representative of this company was present.)

The Riley Mill of the International Paper Company, Chisholm, Me.

(Certificate presented to Mr. Wm. E. P. Fullam.)

I wish it were possible to give each one of you people a trophy like the major award, but I think that by each man in each mill striving for the main trophy, they get some place, even though they don't get the first prize; and I know that as we publish the accident records, each month it seems as though the accidents for the same number of men are getting less. At least, each year they are getting less and this is a wonderful work. I want to assure you that so far as "The Paper Industry" is concerned, we will have equally as good a prize next year, so everybody strive for it.

CHAIRMAN PEACOCK: Now, of course we want to know how the rest of us stand and George Burns is here to tell us.

Outstanding Facts in the Contest

GEORGE BURNS (National Safety Council): As Bill said, I didn't distribute this report so none of you knew what is on these sheets or who won the trophies until the awards were actually made. We prepared eleven outstanding facts on this contest. Here they are:

1. 119 mills registered in 1927 and 124 registered in 1928. This represents an increase of 4.2 per cent.
2. In 1927, 33,786 persons worked 43,802,604 man-hours for an average of 1,296 hours per person.
3. In 1928, 36,357 persons worked 47,673,816 man-hours for an average of 1,311 hours per person.
4. During 1927, 1,468 lost-time accidents resulted in 28,396 days lost, while in 1928, 1,355 lost-time accidents caused but 26,368 days lost.
5. The 1927 average Frequency Rate is 33.514. The 1928 rate of 28.422 represents a reduction of 15.2 per cent.
6. The 1927 average Severity Rate is .649. The 1928 rate of .553 represents a reduction of 17.9 per cent.
7. During 1928, 64 mills had a frequency rate below the average, while only 60 mills succeeded in 1927.
8. During 1928, 76 mills had a severity rate below the average, while only 58 mills were below in 1927.
9. The 1928 ratio of persons employed to lost-time injuries is 27 to 1, with 19 days lost per injury. The 1927 ratio amounted to but 23 to 1, with 19 days lost per injury.
10. In 1928, the ratio of non-fatal to fatal injuries is 150 to 1, while in 1927 this was 147 to 1.
11. During the 1928 Contest, 8 mills completed the period without a lost-time accident as compared with 6 mills in 1927.

I have been perplexed since this contest started as to whether all in the contest really knew how we figured the points debit and credit. The rules read as follows:

- (A) Frequency—5 points shall be credited for each 1 per cent reduction as compared with the average frequency rate of 35.00. Likewise, 5 points shall be charged for each 1 per cent increase.

(B) Severity—1 point shall be credited for each 1 per cent reduction as compared with the average severity rate of 1.00. Likewise, 1 point shall be charged for each 1 per cent increase.

We determined that the average frequency rate had been 35 for the past three contests. Now, the average severity rate of 1.00 is greatly below the average for the section as a whole, as yearly statistics are based on the six thousand day charge. Contest figures are but one-sixth, due to the fact that you only used the one thousand day charge for death. To bring out how the above point rule affected the final ranking, just let me point out the first two items that appear in Group A. First ranking mill, the Champion Coated Paper Co., Mill No. 2, with 592 employees, worked 794,127 man hours, with four lost-time accidents, resulting in 12 days lost time. Now their frequency rate was 5.037, their severity rate .015. The Nekoosa-Edwards Paper Company, Port Edwards Mill, ranking second with 522 employees, worked 802,165 manhours. They had three lost-time accidents but they had 167 days lost time, as compared with the winner's 4 accidents and but 12 days lost time.

The winner had a frequency rate of 5.037; the second mill had a frequency rate of 3.740, but the winner had a severity rate of 0.15 and the second mill a severity of .208.

Based on the rules the winner's frequency rate was 85.609 per cent lower than the average, or a credit of 428.045 points. The record mill's frequency was 89.300 per cent lower than average or a credit of 446.500 points.

However, the winner had a severity rate of but .015, which is 98.5 per cent below the average and earned 98.500 points credit; while the second mill earned but 79.200 points credit as their severity rate of .208 was but 79.2 per cent below the average.

Thus the winner accumulated 428.045 points plus 98.500 points, or a total of 526.545, while the second mill's points credit totaled but 525.700.

Pretty close, to be sure, but under the point scoring plan the severity played an important part even that it had but one-fifth the weighting as frequency.

I don't know that it is necessary to go into detail on all other mills. It is all printed and my only hope is that we are going to continue for the next year. I don't know what action the section took this morning as I could not be present, but I hope the new Contest Committee will get together just as soon as possible and let us not have any last-minute hurry-up orders. This year, in the Council, we have had three very successful contests, one in the Petroleum Section in which we had eighty-five units entered, and one in the Public Utilities Section.

The latter contest is really outstanding. The officers last January at a meeting in St. Louis, decided they would attempt to put on a contest and they declared they must have fifteen units entered in order to award a prize. They established a minimum, feeling that possibly it would be difficult to secure a representative registration. The contest was on a frequency basis only. The result was when the final day of reckoning came, we had seventy public utilities, entering a hundred and fifteen units. The trophies to winners were awarded this afternoon at the Pennsylvania Hotel.

CHAIRMAN PEACOCK: We didn't give the new chairman a chance to say something for his mill. We will let him get on his feet and while he is saying something of the achievement, the method of achievement in his mill, maybe he can line up his regional directors for a meeting after this one.

KENNETH L. FAIST (Champion Coated Paper Co., Hamilton, O.): Last year we were practically in the same place Nekoosa-Edwards is this year. We ran an awfully close second. When I went back to talk to our safety committee and our foremen, they were exceedingly disappointed that I had not come back with the cup, especially when they found out how close the race had been so they went in with renewed effort and said they were going to get the cup this year. They

are waiting and made me promise that I would wire them immediately as soon as I found out. So that is the next thing I have to do.

In our record of four accidents, one was a man who had taken a trail from a driver over to the calender and got a cut on his eye. The doctor felt he could put a patch on his eye and the man could perhaps go to work but the danger was such that we thought we would be taking an extra hazard, so the doctor ordered him to take a few days off. One of the other accidents was a sprained ankle, and he lost two days. The doctor thought it would be better for him to take off those two days rather than run around on it. One of the other accidents, if it can be called such, was one of the young ladies on our sorting line claimed she had sprained her ankle. She didn't report it to the Medical Department but said she had been hurt. It so happened that during the day, she was seen uptown doing shopping; however, we decided as long as she declared she had been hurt in an accident that we would count it.

I am well pleased that I am going to go back to the boys back home, for that's where the credit belongs, to the safety committee men and the foremen and our superintendent, Mr. A. O. Rolfe who went personally on the first day of the month around to each man and gave him a personal talk and told them he wanted to bring back the trophy this time. I thank you.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Petroleum Section

New Section Officers

General Chairman—C. W. SMITH, Director of Safety, Standard Oil Company (Ind.), Chicago, Ill.

Vice-Chairman—R. S. BONSB, Chief Safety Inspector, Standard Oil Co. (N. J.), New York City.

Chairman Atlantic Division—L. W. EVANS, Safety Engineer, Atlantic Refining Company, Franklin, Pa.

Chairman Great Lakes Division—J. P. SUTTON, Manager, Industrial Relations, The Ohio Oil Company, Findlay, Ohio.

Chairman Mid-Continent Division—E. D. MURPHEY, Safety Engineer, Mid-Continent Petroleum Corporation, Tulsa, Okla.

Chairman Gulf Division—C. L. HIGHTOWER, Safety Director, Texas Pacific Coal and Oil Company, Fort Worth, Texas.

Chairman Rocky Mountain Division—L. F. HOWBERT, Continental Oil Company, Denver, Colorado.

Chairman Pacific Division—R. E. DONOVAN, Standard Oil Company of California, San Francisco, Calif.

Engineering Committee—

Chairman—J. C. BERNID, Safety Director, Sinclair Refining Company, East Chicago, Ind.

F. L. NEWCOMB, Supervising Engineer, Standard Oil Company (New Jersey), Elizabeth, N. J.

K. M. FOWLER, Assistant Safety Engineer, Pure Oil Company, Chicago.

H. W. BOGESS, Sinclair Oil and Gas Company, Tulsa, Oklahoma.

V. H. HAYSLIP, Humble Oil and Refining Company, Houston, Texas.

B. V. OSBORNE, Standard Oil Company (Ind.), Casper, Wyo.

S. C. DAVIS, The Texas Company, Los Angeles, Calif.

Publicity Editor—T. N. SHAW, Director, Industrial Relations, The Midwest Refining Company, Casper, Wyoming.

Program Committee Chairman—S. W. CANDEE, Director, Industrial Relations, Tidewater Oil Company, New York City.

Statistics Committee Chairman—J. W. MYERS, Standard Oil Company (New Jersey), New York City.

Executive Committee—THE OFFICERS AND

R. S. BONSB, Standard Oil Company (New Jersey), New York City.

E. J. SENNE, Vacuum Oil Company, New York City.

D. J. WALLACE, Mid-Continent Oil and Gas Association, Tulsa, Okla.

V. R. CURRIE, The Texas Company, New York City.

GEO. F. PRUSSING, Union Oil Company of California, Los Angeles.

Petroleum Representative—H. N. BLAKESLEE, National Safety Council, Chicago.

Retiring Officers

Chairman, GEORGE F. PRUSSING, Union Oil Company of California, Los Angeles, Calif.; *Vice-Chairman*, DR. R. P. ANDERSON, American Petroleum Institute, New York City; *Chairman Atlantic Coast Division*, S. W. CANDEE, Tide Water Oil Company, New York City; *Chairman Mid-Continent Division*, T. N. SHAW, The Midwest Refining Company, Midwest, Wyo.; *Chairman Pacific Coast Division*, F. A. SCOFIELD, Associated Oil Company, San Francisco, Calif.; *Secretary and News-Letter Editor*, A. A. NICHOLSON, The Texas Company, New York City; *Poster and Slide Committee Chairman*, O. W. HUMPHREY, Standard Oil Company (N. J.) Elizabeth, N. J.; *Publicity Committee Chairman*, RALPH E. MOTLEY, The Atlantic Refining Company, Philadelphia, Pa.; *Program Committee Chairman*, RAY E. MILLER, Marland Companies, Ponca City, Okla.; *Statistics Committee Chairman*, J. W. MYERS, Standard Oil Company (N. J.), New York City; *Field Representative*, H. N. BLAKESLEE, National Safety Council, Chicago, Ill. *Engineering Committee: Chairman*, C. W. SMITH, Standard Oil Company (Ind.), Chicago, Ill.; F. L. NEWCOMB, Standard Oil Company (N. J.), Elizabeth, N. J.; C. L. HIGHTOWER, Texas Pacific Coal & Oil Company, Fort Worth, Texas; R. E. DONOVAN, Standard Oil Company of California, San Francisco, Calif. *Executive Committee: THE OFFICERS AND* E. J. SENNE, Vacuum Oil Company, New York City; R. S. BONSB, Standard Oil Company (N. J.), New York City; C. C. BENEDICT, Standard Oil Company of New York, New York City; A. L. BARTH, The Atlantic Refining Company, Philadelphia, Pa.; V. R. CURRIE, The Texas Company, Houston, Texas; D. J. WALLACE, Mid-Continent Oil and Gas Association, Tulsa, Okla.; E. D. MURPHY, Mid-Continent Petroleum Corporation, Tulsa, Okla.; R. B. ROAPER, Humble Oil and Refining Company, Houston, Texas; H. L. EGGLESTON, Pan American Petroleum Company, Los Angeles, Calif.; C. P. ANDERSON, Richfield Oil Company, Los Angeles, Calif.; H. M. WOLFLIN, California Petroleum Company, Los Angeles, Calif.; W. C. LYNCH, General Petroleum Corporation of California, Los Angeles, Calif.

October 2, 1928

GEORGE F. PRUSSING, Chairman

Secretary, Safety Board, Union Oil Company of California
Los Angeles, Calif.

The first session of the Petroleum Section at the Seventeenth Annual Safety Congress was called to order at nine-thirty o'clock by the chairman, George F. Prussing, Secretary, Safety Board, Union Oil Company of California, Los Angeles.

CHAIRMAN PRUSSING: The Sixth Annual Session of the Petroleum Section of the National Safety Council now opens; and I take pleasure, as retiring chairman of your body, to welcome you here and to give you a little résumé of what has taken place in the section during the year 1928.

This is not a formal or written report. Most of you know as intimately as I do what has been the work of the section. We have been fortunate in the character and amount of information that has been circulated through this section during the past year, but I think it is fitting to speak of the high lights so that we may remember what has been accomplished, perhaps if only as a background for what the coming years may bring forth.

In the work of this section heretofore, the country has been divided into three divisions, the Atlantic Division, under Mr. Candee; the Mid-Continent Division, under Mr. Tracy Shaw; the Pacific Coast Group, under Mr. Frank Scofield; and these groups have within themselves held meetings and kept in touch with their

members during the year. I am, of course, personally more familiar with the work on the Coast, and in the absence of Mr. Scofield I can say that there it has been possible to combine the Pacific Coast organization with an already existing one, the Safety Section of the California Chamber of Mines and Oils, and in that way function as a distinctly local organization, with meetings that take place regularly, with an annual Pacific Coast Safety Congress or Conference, in which the oil industry has for the past five years been the largest single group. I know that similar meetings have been held in the Mid-Continent and on the Atlantic Coast, and that in the Annual Congress of the American Petroleum Institute safety has come to have a definite part on the program.

Those of you who have been at previous congresses will remember with appreciation the work done in past years by Capt. A. A. Nichoson, our secretary and editor of the *News Letter*. Due to the condition of his health, it became necessary, early this year for Capt. Nichoson to resign his active position with the Petroleum Section, a fact which we all regretted, not only because in his resignation we lost a very valuable member of our organization, but primarily because of the reason behind that move. I am happy to say that Capt. Nichoson has improved wonderfully in the last year in health, and might even have attended the sessions here this week if it had seemed wise.

On Capt. Nichoson's resignation, the work that he had been carrying so well was turned over to a man whom we deliberately drafted into the organization for that purpose.—I am afraid somewhat against his will—Mr. R. S. Mutch, of the Texas Company. He has carried it through very successfully. I feel the thanks of the group are due to Mr. Mutch for the way in which he has carried on.

Another active part of our work has been the preparation of posters, an exceedingly difficult task, as any of you who have ever tried to prepare poster material will know. Mr. Humphrey, of the Standard Oil Company of New Jersey, has been the chairman of our Poster Committee and has supplied to the National Safety Council a wealth of such material.

Another important function that has been carried on with a great deal of success during the last year has been the preparation and editing of articles dealing with safety in the petroleum industry and their release to the *National Safety News* and to trade journals generally. That work has been under the direction of Mr. Motley, of the Atlantic Refining Company, who during the year, because of the change of his work, found it necessary to resign his position as chairman of the Publicity Committee, but before resigning completed the entire assignment for the year and turned over to the Council enough material to keep the trade journals well supplied for the balance of 1928.

Another part of the work of this section for every year, a very important part to those of us who come to the congresses, is the preparation of a program for the congress itself. That work fell on the shoulders of Mr. Ray Miller, of the Marland Companies, and I want to commend him for the character of the program which he has prepared for us.

A part of the background in the technique of every safety man are the statistics of his own and other companies with regard to accident frequency and severity. To make those statistics of use as between one company and another, between one industry and another, requires technical skill as a statistician; and this organization of petroleum men has been fortunate that the chairman selected for its Statistics Committee has been a man trained in that work. Mr. Myers has for a number of years headed that Statistics Committee; and those of us who have been in touch with the revisions that he has made in the standard report form used by other sections, will agree with me that he has made that report form fit the needs of this organization, as it previously did not.

During the past year the Petroleum Section has undertaken to prepare certain technical data for the use of the members of the section. That work has been

in charge of Mr. C. W. Smith as chairman of the Engineering Committee, and associated with him have been engineers in the three divisions.

A pamphlet on "Safe Practices in Pulling Wells" and one on "Safety in Gasoline Service Stations Operation" have been released and have had wide circulation, a circulation that really is phenomenal when you consider that such information is not always widely accepted by industry. But in this particular case, because of the way in which it was prepared and the fact that the industry had a chance at revision, it was given a great deal of publicity; and perhaps more than anything else, the fact that the information itself was good, has given these first two pamphlets a great sale. There has just been released the third pamphlet on "Safety in Loading Gasoline Tank Cars." It is too early to say what the circulation of that pamphlet will be. It cannot, of course, have the tremendous vogue that was given the second one on service station operation, but it, too, is an excellent piece of work. I have just read the last draft of the fourth pamphlet, one on handling pipe, and I believe you who have seen it will agree that the standard of excellence set in the first two pamphlets has been well maintained. There are more to come, and the work of the Engineering Committee, in my humble opinion, has become the most important single activity of our organization, a thing that we can point to and say, "This thing we have accomplished, and it is good."

The changes that must take place in any organization, if it is to grow, have come to me from time to time by way of suggestion from members of the section. A little later I should like to lay them before you so that when our Committee on Resolutions and Nominations makes its report on Wednesday morning, you will be prepared to discuss these points with a greater knowledge than you might if the resolutions came to you at that time more or less out of the blue. The Chairman of the Committee on Resolutions and Nominations, Mr. Senne, will be glad to hear from any member of the section between now and Wednesday morning, if you have any further suggestion along the line of reorganization, resolutions, memorials, or nominations, which should be brought before the section in its business session.

We have a very interesting program laid out, and because I want to run this meeting on schedule, I am going to ask leave to continue my own report and the outline of the changes in organization that have been suggested to me, from time to time throughout the program up to Wednesday morning, at which time these changes will be laid before you in a formal manner. For the time being, therefore, I am going to discontinue my own remarks and turn to the program as outlined for us.

Those of us who must be called the younger generation in the oil business, I think have no greater privilege (certainly such has been my own case), than meeting and working with men who have been literally the founders of this tremendous, though relatively young, industry. It was my privilege to know Lyman Stewart, and it is a memory which I shall keep with the greatest of pleasure for the rest of my life. And there are men in every large oil company in the United States who belong to that group, the first men in the industry, we might call them, the men who have started and led the industry to the position it now holds. It is my privilege to introduce to you a man of that character, a man who for nearly fifty years has had his place in the oil industry, and who throughout that time has met the one basic standard of success, which has been put thus: That a man in any organization is a success if he has the esteem of the men under whom he serves and of the men who work for him; he may have the one or may have the other, but he is a success if he has both.

I should like at this time to present to you Mr. Edward Prizer, Chairman of the Board of Directors of the Vacuum Oil Company.

Address

By **EDWARD PRIZER**

Chairman of the Board, Vacuum Oil Company, New York City

When Mr. Cameron asked me whether I would come here and speak for a few moments, he said it would be just an informal act; and I wrote him that I would do so on condition that I might come and talk as I might talk in our own board room; on that condition I would cheerfully come.

I don't know but I am something like the minister who apologized to his congregation on Sunday morning and said he had been so busy he had had no time to prepare his sermon, and would have to trust upon the inspiration of the Lord. He said, "Next Sunday I will come better prepared." So if you have me again, perhaps I will come better prepared.

As your chairman said, my memory goes back, not quite fifty years, but forty-seven years, pretty near. I have been thinking over this question of safety since I first joined the petroleum industry, and some things have very much interested me.

Forty-seven years ago, it is a fair statement, the worker carried the risk. He had redress in common law, but the manufacturer was protected by contributory negligence; and therefore between common law and contributory negligence, the worker fell between the upper and the nether millstones. I remember a circumstance before the days of compulsory liability insurance, where we had two men working on a tank, one helping the other, one holding the ladder and the other going up. The man going up the ladder let slip a heavy wrench and killed his helper at the bottom of the ladder. Under the law that man had no redress at that time, because of contributory negligence absolving the employer of the liability.

Today that sort of a principle could not exist, for two reasons. There were a lot of shyster lawyers who made a business of carrying on damage suits based upon their nuisance value, to extract from employers payments for injuries, real or assumed; and the lengths that they went to compel employers to pay to avoid such nuisance, were quite remarkable. I remember one or two cases in Rochester, where unjust claims were taken by such lawyers, were set down for hearing at seven o'clock in the morning, in a country district not reached by railroad, and as automobiles had not yet been invented our treasurer was required to get up at four o'clock and drive out into the country and present our side of the case; otherwise judgment would have been given against us by default. We had cases where our carting was done by contractors having wagons, which carried our signs. When an accident occurred, some lawyer would come along and say, "Your wagon ran into and injured my client," and we said we had no wagons. "Well, the wagon was carrying your sign, and it doesn't make any difference; we are going to sue you anyway. If you don't want the bother of being sued, you had better make payment anyway."

Well, that went on for a considerable time, until there began to be an awakening of conscience through the country, largely led at the time by President Roosevelt, that it was manifestly unjust for the industrial worker to carry the risk; that it must be carried by the industry itself, and that the unavoidable risk of injury and death should be put upon the cost of the products and thus distributed to the community as a whole. Now, I can't say that industry itself overly welcomed this movement. I know for a while there was a great deal of question whether it was wise, whether it might not lead to more evils than the old system; but anyway it went through, and I think there are no industrial organizations, employing a considerable number of men, that are not thankful that the law itself prescribes what shall be done in the case of injury and harm to the employee.

Well, now, the effect of those laws touched the pocketbook of the employer—

that was the first result—and he began to see, on examining his works, how many accidents there were that might be prevented if he deliberately set about to do it. That was his first reaction; and I know a great body of employers in every state where there was a compulsory liability law, who went through their plants with very great care to see whether there were unprotected spots that might result in the injury of others through being unguarded, whether there was not carelessness that might be avoided, and whether there might not be some system of improving the condition of their working people in regard to injury.

But, after a time this went further. There came a feeling on the part of the employer over and beyond a mere question of the money. There was a moral side that he should consider. While he might have been, in the old times, somewhat hardened to industrial accidents and thought they were necessarily a part of industrial operation, now he began to think that he wasn't working with machines as regard to his labor; he was working with men and women, people like himself, who were entitled to every possible consideration and assistance to prevent accidents happening through their own carelessness, the carelessness of other people, or the operation of machinery; and therefore there was a complete revolution on the part of the employers as a whole.

And I know that a great many have gone to lengths that they never would have dreamed possible at the time the first compulsory insurance was talked of. There are few large employers today that don't go beyond the hazard of the shop or the factory. They provide for sick benefits. They consider that a man who is going through the valley of life is liable to something else than getting his hand or his leg hurt. He may get pneumonia, or typhoid fever. You can't throw his family on the charity of the community when he is sick. And therefore something had to be done outside of the mere hazards of the shop and of the factory itself. So we have a system of sick benefit, which I think nearly all progressive concerns now take into careful consideration.

But quite a few of them got a bit further. They say if an employee dies, no matter from what cause (not because he is killed in the factory), but if he dies from disease or his automobile is run into and he is killed, there is his family, and that family should not be put as a charge upon the benevolence of the community, but that industry should take care to a very considerable degree of the needs of that family, particularly where there are small children, until they can restore themselves and get on a self-supporting basis. It has been one of the great pleasures to me in our organization that our death benefit plan has been operating all over the world in every place where we have employees. It has been one of the finest things that our company ever adopted, and has lifted the burden off of many depressed and unhappy families, who did not know where they would turn when the bread-winner was gone, through disease or something of that kind, and they had to look to the future and establish some system by which they might be self-supporting.

Now, I want to say that the word "accident" frequently implies something unavoidable. That isn't so. No accident is ever without a cause. The cause lies back somewhere; and in order to reach and prevent the accident, you must stop the cause. In my business experience I have known a number of cases where the cause was self-evident. When I was in Rochester we had an absolutely ironclad rule, before the days of employer liability, that no man should enter an empty tank which had contained oil unless somebody was there right with him, mainly and principally to have a rope around him, no matter how he might have thought that tank had been steamed out. But one day we missed one of our men, a good worker. We hunted around the works, and found him suffocated in the bottom of one of the tanks that he thought was properly steamed; he had gone in alone, contrary to rules, and was suffocated. We had the same thing happen in one of our tanks in one of our German refineries.

Well, that is carelessness. Sometimes carelessness goes to almost a ridiculous degree. For instance, insanity. We had a man in our Polish refinery who came down one day with a new suit of overalls on. He got them smeared up, didn't like the looks of them, so he drenched himself pretty well with gasoline to take off the smear, and then thought while it was drying he would have a quiet smoke, and he went into an outhouse and lit a cigarette and burned himself to death. You would think that was almost impossible, but it did happen.

Now, I remember a circumstance in Rochester, to show that accidents always have a cause. Our man used to come down to the office with an old horse and a democrat wagon, and that horse would stand without hitching. He usually took a quiet nap while the man went in for orders. One day the circus was coming, and when the man came out to get on his wagon and gathered the reins together, there was a great crowd everywhere, in the streets; people were way out in the middle of the street, and the sidewalk was all jammed. The man thought, "Well, I'll sit here; I won't push through that crowd, and anyway I want to see the circus."

So he sat there in his wagon, the reins in his hands. But when that horse smelled the elephants and looked around and saw them coming behind him, he woke up as he never woke up in his life. He went down through that crowd, and if he hadn't run into an electric light standard, he might have been going yet. He mowed the people down, breaking arms and legs and doing a great deal of damage. Legally the people had no right in the street. Legally our man had a perfect right to be there with his horse. He had just come out of the office, and had a right to do that. The horse was under legal control; but he had no business to be there, just the same, and the people had no business to be in the street. Well, it was our horse, and we felt the responsibility sufficiently to pay eight or nine thousand dollars to patch up broken legs and broken arms, bruised heads, etc. Well, certainly you can trace cause and effect in that.

Now, in the control of your people in your works, constant vigilance and education are necessary. We don't all realize that the old adage, "Familiarity breeds contempt," is absolutely true. A man gets used to doing things over and over again, and finally he gets careless, something happens, injury follows. I think that all employers owe an educational method with their working people, whether they are clerks in the office, whether they are workmen, whether they are salesmen, or what they are, because this reacts a great deal more than just in the industry operation. A man needn't be considered a coward because he is considering safety first. If he is going across a much traveled street, with automobiles flying to and fro, it is not cowardice if he waits until the sign is in favor of his crossing over. If he is driving an automobile, it is not cowardice to exercise great safety.

I was interested in a report in Massachusetts, that of the accidents that they analyzed; very few had come from speed; they had come from recklessness and inattention, but very few from defects in the automobile itself. People don't think. Their minds are on something else. I remember one of our doctors in Rochester who was badly injured once. He was driving down the street, his mind very busy on a case, and he turned right in front of a tram car, and his vehicle was smashed and he was badly injured. The first thing he said was that the street car driver was not responsible. He said, "I heard him clanging his bell, but I was so occupied with thought of the case, that I simply forgot and paid no attention."

That very often happens in the works. The question is how to educate your people.

Then we have got to go a little step further. We have got to make sure that our people are physically and mentally sound for the task that they are to perform. Therefore there has been growing up a system of physical medical examination for employees. When we first installed that there was a good deal of resentment, on

the part of our workers; but we found out some things that were very useful. We found out that men were doing things, lifting work, that the condition of their hearts didn't justify. They might drop dead. Others had a hernia that had been undiscovered by anybody but themselves and perhaps their own families, and they were doing things that they were totally unjustified in doing. Of course, that was an outgrowth of the employers' liability, but at the same time it resulted in more or less adjusting men to their work and giving them a longer lease of life than they possibly would have if they had gone on with the labors that physically they were quite unable to do. And of course there is a nervous condition and reaction to rapid running machines that requires tests to see whether the operator is tuned to that sort of work, not liable to get his hands or his feet or something else in the machines through lack of nervous and mental reaction to his peculiar line of work.

All of these things are in the line of safety. Now, there has been a gradually growing idea as to the sacredness of human life. It didn't exist when I first went into the business. I am frank to say there was a very strong feeling that labor was a commodity, that you could bargain for it as you could a ton of coal, and if one man got hurt and died or was killed, there were plenty more to take his place. I think we are all changing from that attitude of mind, that instead we believe we are all the same, of the same material, the same mental and spiritual make-up, no matter what our duties are; and that those that are in position to do it, must overlook, supervise, and help to prevent injury and loss of life. We must increase the average life of our people as a whole if we are to prosper.

We hear a good deal about the declining birth rate; but as against that there is the increase in life expectancy; and we can all contribute to that by various methods of safety—safety not alone as a mere machine operation, but safety as to disease, safety in the home, the use of the visiting nurses which are employed by many of the large corporations to follow up the sick, to go into the home and see what can be done, whether the sick one is getting the proper care, the right sort of nursing and food. All these things lead to this principle of safety, and we have got to consider it everywhere on a broad and humanitarian line.

I am glad in my business experience that this thing came right up to the employer. It was a very decided shock. He thought, "And now it is going to cost me a lot of money, and the thing to do is to prevent my paying out undue sums." But it did relieve him of a whole lot of shyster tricks and annoying demands for trumped up damages. As a rule, if a corporation or large employer was known to have money, it was the custom to give a very considerable verdict in favor of the plaintiff; and if unjust, it meant an appeal and carrying on; and then finally the nuisance got so bad that the employer would hunt up the fellow's lawyer and say, "What will you take to call it off? We are tired of it." That was the principle. Now we have a system that is just and fair, and we all must endeavor to find out the best practice, in the matter of injury and disease, among our body of employees wherever they are, and concentrate, constantly teach this practice. If you don't constantly press upon the point of carefulness, of consideration not only of themselves but others, they will fall down some time and then something will happen. I am sure none of us want accidents to happen. We look back upon accidents that have happened in our particular corporation or company with intense regret, knowing how easily they might have been prevented if we had only thought longer and further and been somewhat more careful.

In our company we are constantly preaching in every form, in our literature, in our works bulletins, in our instructions, this vital point of protection to the human element in every known way possible, not simply industry happenings, but from disease and from breakdown from work that they were not fitted for, giving them some other work that they are fitted for, trying to make them look forward to a happy and prosperous old age—not as we often see, broken-down,

crippled old men, who have served out their full years, thrown onto the cold world, with very little to take care of them. One of the things contributing to this spirit has been the pension systems which the various companies have organized, where a man can do his efficient labor to the end of his working capability, and then he feels he has a cushion that he can rest upon with comfort and satisfaction.

CHAIRMAN PRUSSING: Mr. Prizer, on behalf of the section may I thank you for the inspiration that you have given us? It must be a privilege to work for a company in which the guiding spirit is also an inspiration.

We are familiar with the work that the American Petroleum Institute has done, its leadership of the industry and its contact with our Government politically; but within the American Petroleum Institute, between company and company, there has been going on a technical work that does not get into the newspapers. Trade journals have carried some of it. That work has been the work of standardization.

I don't know what it is in the human mind that so violently rebels against waste, but there must be something there, because whenever waste is called to the attention of thinking men, they wallop it. There is no other expression for it. Apparently there is nothing that so arouses trained technical men as to find a leak. And when the industry got together in the American Petroleum Institute, almost the first thing to which attention was called was the tremendous loss which the industry suffered in the lack of standardization in its technical requirements, its machinery, equipment, methods. It wasn't merely that things were different, but it was the outstanding fact that as between different materials for the same identical use, there must always at any one time be a best. To discover that, to find the classifications into which materials and usages could be grouped, and then within each to find that best, is a very difficult job for even trained men. It is being very successfully met through the efforts of the American Petroleum Institute.

We had hoped today to have with us Mr. Carl Young, the Director of the Division of Standardization of the American Petroleum Institute, who has led this work for a number of years. Unfortunately it is impossible for Mr. Young to be present in person. He has, however, delegated one of the engineers of the Institute, Mr. D. V. Stroop, to take his place here before you and to present the paper which he had himself hoped to give you.

Standardization and Its Relation to Accident Prevention

By CARL A. YOUNG

**Director, Division of Standardization, American Petroleum Institute,
Dallas, Texas**

Accident prevention and standardization are intimately related. Materials manufactured in accordance with a carefully prepared standardization program bring to the user definite assurance that such materials comply with certain known and accepted specifications covering either dimensions or physical and chemical properties, and often covering both. Such a program should provide greater safety to the individual and a correspondingly greater increase in his personal efficiency.

A cardinal principle in any line of endeavor is to "start right" and a thorough knowledge of materials is of prime importance in oilfield work. Many preventable accidents in the oil fields are due to lack of knowledge of the materials with which the work is preformed. Some one "takes a chance" and then—something breaks and an accident often follows.

The present discussion is confined mainly to the oil business, and to the work of the American Petroleum Institute in standardizing drilling and producing equipment.

The Institute has established standards on the following materials: Belting, boilers, cable drilling tool joints, rigs and derricks, tubular goods, rig irons, rotary drilling equipment, wire lines and manila cordage, all classes of pumping equipment, and steel tanks for oil storage. Some of these standards are dimensional only; others are dimensional and include specifications on chemical and physical properties. In all but two of these standards, provision is made for special marking with the official monogram of the American Petroleum Institute. This mark, stamped on a piece of equipment, is visible evidence to the user that such equipment has been manufactured in accordance with A. P. I. Standards.

The relationship of standardization to accident prevention might be illustrated by all kinds of accidents which, for the present purpose, may be divided in two classes:

- (a) Those resulting in monetary losses only, or "material accidents."
- (b) Those resulting in monetary losses, including injury to life or limb, or "human accidents."

The oil derrick, which is the first structure erected when drilling for oil, is cited as an example covering both cases. Innumerable accidents, many fatal, have resulted when an overloaded derrick has been "pulled in." This was particularly true when wooden derricks were generally used. Individual companies and rig builders had their own designs and ideas as to strength; some designs were worked out with due attention to engineering principles, others were based only on a minimum cost. The class of lumber was often left to the discretion of the rig builder, who may or may not have furnished the best grade. The American Petroleum Institute has established standards on various types of derricks and has stipulated a minimum strength capacity, which must be stamped upon the derrick, and which must be guaranteed by the manufacturers. This gives the driller definite information as to the strength of the derrick with which he is working. Another important item is the derrick foundation. Faulty foundations permit the derrick to settle unevenly, resulting in collapse when the drilling strains are applied and have often been responsible for many fatal accidents. The Institute has formulated specifications for derrick foundations, which should do much to overcome this danger.

The same general condition applied to threaded connections, particularly on tubular goods and taper threaded joints used on drilling tools. Before the A. P. I. Standards were adopted, threads of similar pitch and diameter made by different manufacturers did not properly interchange, although visibly appearing to be identical. Such material parted when drilling strains were applied, often resulting in both material and human accidents. This situation has been corrected by the adoption of definite specifications on practically every threaded connection used in the drilling and producing of petroleum. These standards are maintained by the use of master gauges made in accordance with A. P. I. specifications and officially certified by the U. S. Bureau of Standards at Washington, D. C.

The exploding of oil field boilers, due sometimes to faulty material, but more often to careless supervision or firing, has been one of the most severe hazards in the oil fields. Cases are known where firemen have completely disappeared in an explosion. To assist in overcoming this condition, the Institute has adopted the A. S. M. E. Boiler Code, thereby obtaining minute physical and chemical specifications on the steel used in the construction of oil field boilers, and which also includes workmanship, finish and inspection. In addi-

tion to this, and of equal importance, the Institute has adopted a code on the proper care and use of boilers in the field, which, if followed, will reduce the probability of accidents to a minimum.

An accident that occurred in California several years ago on a rotary rig illustrates what may happen when some one "takes a chance." The drill pipe had twisted off in the hole and the crew was endeavoring to fish it out at the earliest possible moment, since the longer the drill stem remained in the hole without circulation the more liable it was to freeze and junk the hole or make a long side-tracking job necessary, either of which would be extremely expensive. In the course of the work it became necessary to change the engine sprocket and it was found that the keyways in the new sprocket did not match exactly the keyways in the shaft. The driller resolved to take a chance and endeavored to shim up the key to what he thought was a fairly tight fit. When the full power was applied the engine sprocket loosened up and moved out of line to such an extent that the chain broke and lashed out, severely injuring one of the crew. Of course, in these days, such accidents are prevented by building a frame work around the chain. Nevertheless, had the sprocket been the right fit so as to maintain alignment, it is safe to assume that the accident would not have occurred. The Institute has adopted uniform sizes of keys and keyways in relation to shaft sizes, and the observance of this standard would have eliminated this accident.

This accident also illustrates a characteristic mental attitude of the workman. If his tools do not properly fit, causing delays, etc., he often becomes impatient and, to make up time, will take chances, and whenever he takes a chance, he is inviting an accident. In contrast to this, he is not subject to harassing delays when using properly standardized equipment, but proceeds in his duties with assurance, content in the knowledge that as far as can be foreseen, precautions have been taken in advance to supply suitable material.

Accidents are often the result of ignorance of the materials themselves or the proper method for handling the materials, which can be overcome by proper education of the men in their prescribed line of work. Codes on the proper care and use of equipment should play a very important part in accident prevention. It is fair to assume that a man who has been trained in the care of equipment along certain prescribed lines, will suffer much less from accidents than one who has not been so trained.

The Institute has now, in various stages of completion, Codes on Recommended Field Practice covering the principal materials used in the drilling and producing of petroleum, which are being circulated throughout the entire United States and abroad. These codes should be studied by the men in the field. Supplemental to these codes, field posters have been printed giving condensed rules which are placed in conspicuous places in the warehouses and bunk houses, where field men generally congregate. Space is provided at the bottom of the poster for the company's signature under the words, "The Above Instructions Must Be Observed," and, in that way, the rules printed on these posters become mandatory orders. The sizes of these posters permit them to be tacked on "Safety Bulletin Boards," alongside the Safety bulletins.

Safety directors should insist on the use of standardized material whenever possible. This will tend to prevent accidents, and, at the same time, will be directly beneficial to their companies in the economies that naturally follow.

The national standardization of fire hose couplings is an outstanding example of the value of standardization in accident prevention. The great Baltimore fire of several years ago would not have attained such great extent but for the fact that fire fighting equipment sent in from neighboring cities could not be used because the hose connections used in the various cities were not interchangeable.

The bulletins of the Petroleum Section of the National Safety Council, explaining the correct method of handling or inspecting materials in the field, should prove of iestimable help in preventing accidents. The American Petroleum Institute is endeavoring to assist in this work with its codes on field practices and field posters. Also, through its standardization program, the underbrush of odd sizes of threads is being cleaned out and many extra sizes in various types of equipment are eliminated which will provide a safe and sound basis of selection. Education and knowledge of the proper methods of work are necessary to accident prevention and the establishing of proper standards and codes is a contribution toward that end. There is undoubtedly a limit in the effectiveness of mechanical safety devices. Beyond the point of adequate protective appliances, progress must be made in the mental training of the workers. The use of standardized material and the practice in standardized methods produce an orderliness of mind and habit which must result in more efficient and safer workmen.

The training of new recruits in the selection of proper materials and in the correct way to use these materials will react to their own and to their employer's advantage, and will establish a higher plane of general efficiency and safety. Intelligent standardization of materials and formulation of codes on the proper care and use of equipment are essential elements in such a program.

CHAIRMAN PRUSSING: I suppose that this section and its membership represents a pretty good slice of the American Petroleum Institute. I doubt if there is a company member of the petroleum section that is not likewise a member of the American Petroleum Institute. We therefore feel rather close to the Institute; and that the Institute has also recognized that closeness is borne out by the fact that the technical work done by this section has been supported not only morally but financially by the American Petroleum Institute.

In that technical work, we have sought to carry on the work which you have just described, carrying it perhaps beyond the point where the initial failure, which may cause loss of money and injury to persons, is mechanical, to the point where the initial failure is human. Certainly that work is no less valuable to the industry than the work of standardizing the mechanical elements of our industry; and that this has been recognized by the Institute is to me most gratifying.

Teaching men how to do their jobs successfully is, of course, a valuable part of every business; but to teach them how to do that job safely is just as important, because when a man does it safely, ninety-nine times out of a hundred he is doing it efficiently as well. The two things are inseparable. I think all of us know that the safety records established throughout the country in every industry have been established by companies that have been financially successful, and that means that their workers individually have been efficient.

Through the cooperation of the American Petroleum Institute, this section has had the benefit of a paid representative. He has been a member of the head office staff of the National Safety Council. Acting directly under the guidance of our Managing Director, Mr. Cameron, Mr. Blakeslee has been the means of coordinating that part of our work which comes down to the real brass tacks of the situation, the preparation of codes of instruction which makes it possible for certain hazardous occupations to be analyzed by the best minds in our industry and set forth in such a way that they may be used as simple guides for the instruction of new men and old throughout the United States. I mentioned that before, and I want to emphasize it again, as the most important part of the work we have been doing.

But more than that, more than the mere preparation of technical data, there is another element in education which cannot be overlooked no matter with what class of mind you are dealing, and that is the matter of inspiration, because unless

you can make a man want to learn, you can't put anything inside his head. The human mind is so constructed that it can close itself absolutely to the introduction of a novel idea. It is one of its peculiar characteristics. And to overcome that innate objection of the human mind to acquire anything new, requires inspiration.

During the past year we have attempted to set up a means of inciting interest in accident prevention right down to the last man on the job. That has been done through the inauguration of a competition. Competitions are not new; they are part of sport, part of life; and they are uniformly successful when they are well thought out. In the petroleum section during the past year we have had such a competition, and in that competition there have been entered literally scores of operating units of the larger oil companies of the United States. At the luncheon next Wednesday the results of that competition are to be announced. The real results of that competition will never be known except to the men out on the line—the safety men who have used it as a stimulus for accident prevention; and those men may never approximate the full benefit of it. It is there, nevertheless, because it has been the means in more cases than we can know, of making men willing to receive instruction, and that primarily is the purpose of such a competition. In the business session I hope somebody will bring forth a resolution suggesting that such competitions be made part of our regular work, that at least for six months during every year we compete, one with another, in a friendly way to see which of us can set up the best record in accident prevention.

I said that I was going to outline some suggestions that have been made to me for your consideration as a better means of carrying on the work of this section during next year.

We have been dividing the country heretofore into three very large sections. The entire petroleum industry in its producing, marketing and other aspects, divides itself rather naturally into six instead of three such geographical sections. It has been suggested, therefore, that because of the growth of our membership, which has more than doubled in the last five years, that we take cognizance of the natural divisions of this country and divide ourselves into six groups which we will call, if the scheme carries, the Atlantic, the Great Lakes, the Mid-Continent, the Gulf, the Rocky Mountain, and the Pacific Divisions. The particular advantage of such a realignment is that during the twelve months which elapse between these annual national meetings, more work can be done in smaller groups. The mileage is cut down, contacts made, and acquaintances are more easily maintained.

Another point, really a technical one, is that the petroleum representative be made the secretary of the organization. The National Safety Council headquarters in Chicago has the facilities for doing that work, which a secretary normally does in this sort of organization. Mr. Blakeslee, in his position as petroleum representative, being in Chicago from time to time in his travels throughout the country, can very well direct that work and in that way do officially what he has done more or less unofficially for the past year.

Another suggestion has been made, if the country is divided, as has been suggested, into six groups, each of these groups, through its chairman, be responsible once in six months for issuing to the rest of us and to themselves a *News Letter*, and in that way the burden will be lightened for each of them, yet so spread as to give representation and interest throughout the country.

It has also been suggested that following the same line of thought, each of these six groups be made responsible for providing the publication office of the National Safety Council with four posters each year. Posters are perhaps the hardest form of propaganda to develop in such form that it may be used nationwide. We all use posters; perhaps we all make them in rough form for our own local use within each refinery, or departments; but it shouldn't be difficult

within each of these six major divisions to select from such posters those that have a general appeal, and to send at least four of them to headquarters each year.

In the same way it has been suggested also that each of these six groups be responsible for providing at least one article for publication in trade journals during the course of the year; and that the position which was formerly known as chairman of the Publicity Committee, be eliminated, and in its stead that we appoint one man as publicity editor to co-ordinate the work of providing articles for release and to edit the stories as they are written. This will provide a channel for and supervision over the publicity work of the section.

If this reorganization scheme is agreeable to you, it will mean that our Executive Committee will be enlarged, obviously, by three additional division chairmen. It has therefore been suggested that the executive committeemen who have heretofore been elected at large be eliminated, and that the Executive Committee be composed merely of the officers of the section, the chairmen of the committees, and the past General Chairmen.

We have spoken of the work of our field representative. We all know him and of the work he has done. He has visited, I suppose, every member of the group, in his own bailiwick, and what he has learned of "Follies and Progress in the Petroleum Industry" should be of interest to us. Mr. Blakeslee, will you please tell us what you have seen, and if you call a spade a spade, I don't think anybody will worry about it.

Follies and Progress

By H. N. BLAKESLEE

Petroleum Representative, National Safety Council, Chicago

The National Safety Council is well pleased with the enthusiastic support that has been given the Petroleum Section by its members during the past year. The Council realizes that the circulation of the Petroleum Section Safe Practices Pamphlets has been so great and so satisfactory only because these pamphlets represent the work of the petroleum industry and the value of the pamphlets is known before their publication, hence the orders for the pamphlets follow.

In considering the follies in the usual sense we anticipate a lot before the show and get mighty little to take away with us after the show, but the Petroleum industry has never before been more interested in its follies or more intent upon the lessons learned than it has been in the past year.

Explosions in the manufacturing division have been an outstanding cause of fatal accidents. The failure of high pressure equipment has taken a toll of lives, but the most depressing accident of the year can be charged to the failure of a low pressure still. Information that was given to the press on this accident indicates that a still sprung a leak under extremely low pressure. It was pumped out, steamed out, and the man-heads were removed. A nearby still sprung a leak and caught fire. Evidently gas accumulated in the still with the open man-heads and was ignited. A tongue of flame flashed out of the end man-head burning 67 men that had responded to the fire call.

There may have been a small quantity of liquid left in the still after it was pumped out. The first lesson learned here is one of construction. Erect stills and attach pump-out lines so that all fluid will gravitate toward the pump-out line.

Our second lesson is that steaming a still out for a given length of time does not signify that it is gas free. Stills that have been steamed out should be tested by a reliable vapor indicator to determine if gas in a combustible quantity is present. The human nose is not a reliable vapor indicator.

The third lesson is that only the workmen necessary to combat a fire should be permitted in a fire zone in a refinery. Absolutely limit the number of men required on a fire hose and use no more. Keep others out of the area of possible explosions.

It seems that the failure of most high pressure equipment has come after a shut-down and water in the charging fluid has settled to the bottom of the chamber. Later on when operations have been resumed, this water becomes suddenly heated, flashes to steam and something must let go. If tests fail to show that such an accumulation of water does not exist the still should be pumped out, cleaned and recharged before starting up. It appears that most of the men losing their lives were not engaged in the operation of the stills that failed but were doing other work. Most of the fatalities were due to burns from the burning oil that was showered on workers in the vicinity. Consequently, it seems that work that could be done elsewhere should not be done in the immediate vicinity of a high pressure still in operation. If stills must be erected in a congested area, protect other workers with fire-walls.

The deaths of four tank car loaders have come to my attention. Two men were burned in an explosion and fire in a supposedly gas free tank car in which they were taking a smoke. First it is unreasonable to suppose that an empty tank car is gas-free. It should be treated as not gas-free unless determined gas-free by a vapor test. Second, workers should leave their matches and smokes outside the refinery limits and then a temptation to have a smoke can do no harm.

The death of one car loader has been attributed to the provision of inadequate walk-ways at the loading rack. Another report indicates that a car loader fell from the top of a tank car. These two cases raise the question of a platform alongside the dome on tank cars and walkways from loading racks to tank cars. American Railway Association specifications call for a platform and ladder on one side of the car dome only. Specifications do not require this platform to be a certain number of feet above the rails or a certain number of feet from the mid-line of the tank car. If these two measurements were made standard and a platform were provided on each side of the car dome, refiners would have no trouble in equipping their loading racks with practical, substantial, well protected walkways.

If you agree with me, I hope you will have your engineering department determine what these two measurements, distance of platform above the rails and distance of the outer edge of the platform from the midline of the tank car should be, and I will make an effort through the proper channels to get the car builders to adopt these measurements as standard. There are many unsafe walkway arrangements used at loading racks today that should be corrected, but the problem of building a walkway that will fit all tank cars has not been entirely solved.

A cable pulled out of a leaded joint and dropped a set of triple condensers, killing a mechanic. It may be proper to suggest that if you have not recently checked up on the method of fastening wire lines in sockets, you should do so. This applies to the producing operations as well as in manufacturing operations. The American Petroleum Institute has recently prepared a poster giving definite instructions on the proper procedure in socketing wire lines. Zinc is recommended in preference to babbitt or any other metal for socketing as it makes the strongest fastening. The National Safety Council Safe Practices, Pamphlet No. 26, Manila and Wire Rope, also gives definite instructions on this subject.

Marketing division reports tell of a truck salesman driving off a highway to his death, a salesman being killed by an automobile after stepping off a street car, and a service station salesman being killed by an automobile in crossing the street from the service station to get a package of cigarets. These fatalities are not peculiar to the petroleum industry and can only be prevented by constant alertness on the part of the workers and proper consideration of safety of others by the public.

However, one accident has occurred which should cause us to do real deep

thinking about the service station storage tanks and lines. Four men, excavating for a sewer were killed by an explosion of gasoline vapors in the excavation they were making. Evidence at the Coroner's inquest brought out the information that a nearby service station had suffered a large shortage in gallonage and shortly before the date of the explosion a leak in the pump line had been found and repaired. The gasoline percolating through sand had presumably formed an explosive mixture in the tunnel. Only pipe-fitters, skilled in the high class construction required on gasoline tank and pump equipment installation, should be employed for this work, making it possible to take every precaution to prevent leaks. Without a doubt many conscientious service station salesmen have been held accountable for shortages that were caused by leaks. Frequent tests for tank and line leaks should be made to prevent shortages and to prevent percolating gasoline from reaching a nearby well, basement or excavation where it may create a hazard.

Marketing organizations that are giving this situation consideration among their resale accounts are doing much to insure the permanency of these accounts and much in the protection of the consumers of petroleum products.

A guard improperly installed may become a hazard. A driller in the producing department misjudged the distance and rammed the traveling block into the crown block. Two cap screws that held a shield to prevent the traveling block from hooking on to the finger board were sheared, and the shield fell on the head of the driller standing in his position at the rotary draw works. The driller may have been guilty of crowding on too much steam but I understand the manufacturers of this device originally provided four cap screws to hold it to the block, but due to the time required in making changes on the traveling block the number of cap screws had been reduced to two. The company experiencing this accident has since provided a cable between the shield and the traveling block and is also studying ways of making it impossible for the traveling block to strike the crown.

We are told that much has been done in correcting vision of truck drivers to prevent accidents but the work of the driller demands even closer focal accuracy than that of the truck driver. Is the vision of the driller not worthy of more definite consideration than it has had?

Hydrogen sulphide gas still continues to take a number of lives. Dr. Lederer has told us of its hazards and its scientific control. The enormous production of the West Texas field is making it necessary for more and more refineries to handle sour crude as well as exposing more production men to the deadly gases. The realization of the danger of hydrogen sulphide gas is more widely known and greater precautions are being taken to keep it confined. Workers that are exposed are required to wear proper mask protection, medical men better understand the human defects that make workers more susceptible to the gas and have made progress in methods of treatments that is reducing time lost from this source.

Two lives were recently lost when a derrick caught fire, presumably from a spark from a hatchet that was being used by the deceased on the crown block of the derrick. One man jumped to his death and the other tried to climb down the derrick and was burned to death. The day was warm and still. The well was known to be making a large quantity of gas. Under those conditions, the first mistake was made in using tools that could create a spark. The derrick was provided with a crow's nest but no emergency exit. Had a cable exit been provided from the crown of this derrick, these men probably would have escaped unharmed.

Reports have been received telling of two fatalities from pipe rolling off a truck and trailer and killing men. In the first case a chain holding a bolster came unfastened letting the bolster tip and the pipe rolled off on the truck driver. More care in chaining the bolster down or a chock placed under the opposite end of the bolster probably would have saved this life. In the next case a trailer had been partly unloaded and the trailer was being moved. Two stakes had been put in place in the side of the trailer bed but binding chains had not been used. As

the trailer moved the load shifted with sufficient force to snap the stakes and a double of drill pipe rolled off on a workman. The precaution of putting binding chains in place or chocking this pipe so it could not move before starting to move the trailer would have saved this life.

A number of fires and explosions have occurred in the operation of natural gas gasoline plants and the presence of flame or a spark has caused them all. In handling this invisible high power explosive the utmost precautions should be taken:

- a. Care should be taken to keep all gas compressor packing glands adjusted to prevent leaks.
- b. Magneto wires should be securely fastened so they cannot jar loose and cause an ignition leak and create a spark.
- c. Magneto terminals should never be removed to stop an engine or while the engine is running. A spark of sufficient strength to ignite combustible vapors may result between the terminal and the spark plug or between the terminal and the base of the engine.
- d. The preceding instruction holds true in attaching magneto terminals to a gas engine in motion.
- e. Keep a constant check for gas leaks on all gates or valves, cylinder-gaskets, and line fittings.
- f. Where it is necessary to place boilers at all near gas compressors a fire wall should be built to divert away from the boiler fires any gas that might escape from the compressors.
- g. Use only vapor-proof electric lighting equipment such as vapor-proof globe covers, wiring in conduit, etc.
- h. Install all switches and fuse boxes, even though vapor-proof outside the compressor room.
- i. Provide ventilation that will remove the gases that may accumulate and especially the heavy gas from near the floor.

The problems of preventing fire and explosions in natural gasoline plants may be summarized as:

- 1—Preventing gas leaks.
- 2—Keeping sparks or flame out of the possible gassy area.
- 3—Proper ventilation to dissipate gas that may escape and otherwise form a combustible mixture.

A laborer was burned to death on a pipe line repair job when a lighted lantern ignited the gas accumulated in the excavation where the repairs were being made. This emphasizes the necessity of the use of vapor-proof flash lights only, on pipe line repair jobs. A roustabout attempted to thaw out a flow line at a tank with a blow torch. He killed himself and one other man. Two fatalities in producing operations have been reported as caused when petroleum vapors were ignited by sparks from non-vapor proof electric switches. These cases of ignited vapors can be prevented by safe practices in keeping open flames and sparks away from petroleum vapors by using only vapor-proof electric lights and switches, non-ferreous tools and also by using more care to prevent the accumulation of combustible mixtures. As such a small percentage of petroleum vapors mixed with air forms a combustible mixture it is best practice to assume that a dangerous mixture exists in the vicinity of petroleum leaks of any kind.

Among the most significant indications of progress in accident prevention is the interest of the petroleum trade publications. It is almost impossible to pick up an issue of any of them without finding an article dealing with accident prevention in the petroleum industry and the majority of these articles are written by operating executives.

Purchasing agents are specifying equipment, complete with all practical protective devices and manufacturers are making the safety of their equipment a sales feature. Most safety engineers have progressed beyond the problems of safe-

guarding and propaganda to interest the managers and workers and are now searching for the safest practices that can be used on the job and are thereby actually helping the workers protect themselves on their job. This is resulting in production being speeded up by getting work done in the proper and safe way

CHAIRMAN PRUSSING: I think you will see from Mr. Blakeslee's paper that he is in pretty close contact with what is going on around the country.

At the risk of talking too much, I'd like to mention just one serious accident, of which I have unfortunately very intimate knowledge. In the little desert town of Kingman, Arizona, hard by the main line of the Santa Fe transcontinental road, is the bulk marketing station for that district owned by our company.

The traveling mechanic whose business it was to go from station to station and to make such minor repairs as he found necessary wrote to the head office that at Kingman, Arizona, there was a valve on a gasoline tank which he had previously packed and which he again found to be leaking, and on his further examination he recommended that the valve be replaced because it was old and defective. There is nothing new in that. The technique for making that change is very well established. This tank was the central one of a group of five vertical tanks, 11 feet in diameter and approximately 30 feet high. The five tanks contained stove oil, kerosene, white gasoline, ethyl gasoline, and engine distillate, respectively. Instructions were sent to him (which as a matter of fact he did not receive) that two tank cars would be put at his disposal, that he was to empty the gasoline tank into the two cars by the usual facilities provided, that a Homestead valve or plug cock was being sent to him by express, and that he was to make this change in the usual manner. Records that I have dug up disclose that he had gone through that same routine many times in the previous five years. But on the particular morning in question, which was the day after he had written to the head office and told them of this valve, he ran out of work. In looking about the station he found a Homestead valve exactly like the one that he had sent for from Los Angeles. He therefore decided that he would save himself the burden of having to sit around under a temperature of one hundred and fifteen degrees, and he undertook to change that valve without waiting for the tank cars to arrive.

His first move was ingenious. He made a flapper of rubber and lead, attached it to the end of a forty foot piece of three-quarter inch pipe, and with the aid of a helper whom he had hired locally, he got up on the top of this tank, removed the upper manhole cover, and sought to place this flapper valve over the inside of the four-inch outlet nipple. He fished around for possibly an hour with that device trying to find the nipple, but he couldn't find it, the reason being that it wasn't there, which he did not know. This particular tank was old and the nipple did not project into the tank.

But he was a bright boy, and he had another idea, and that was to put water in the tank, raising the gasoline out of the danger zone, and providing enough leeway so that he could make that change with a wide-open outlet pipe before the gasoline got down to the outlet. He therefore took a garden hose and started running water into the tank; but unfortunately Kingman is a town where there is not very much water. The pressure was weak and he was only able to run in about two feet of water by four o'clock that afternoon. Not at all discouraged apparently, he decided to make the change with only two feet of water in the tank. He disconnected his pipe, started to rotate the valve off the nipple. But there again he ran into a mechanical difficulty. The valve was too big to pass around the full circle because the tank had been set on a concrete base. But, as I say, he was a bright boy, so he took the bonnet off the valve. That particular valve was not made in such a way that taking off the bonnet left the discs in place, and when the bonnet was removed immediately a geyser ap-

peared in front of him, a geyser that rose to a height of ten feet. There was seventeen feet of gasoline in the tank. Then he was in trouble. He called for help, having only one helper with him, and the agent in charge of the station and a truck man came to his assistance. They poked rags into this open bonnet, but the rags immediately went out through the outside opening. He then, as a last resort, attempted to spin the bonnet off and stab the Homestead cock in place. He got the bonnet off all right, but when he was going to stab the plug cock on, he found he had forgotten to open it.

It resulted in literally drenching those men to the skin in gasoline. The gasoline flowed across the yard—the stream of it was very clearly visible afterwards—went down the railroad track for several hundred feet, and finally crossed it. Way down there, hundreds of feet away from the source of all the trouble, it met the one thing that gasoline vapors seem to seek out every time—it met a lighted switch lantern. The fire actually started at that point, and raced up the stream of gasoline, and finally came to the tank.

It so happened that when the fire reached the tank, the mechanic and his three drenched helpers were separated; two were running toward the warehouse to get more rags. Two were immediately adjacent to the tank. Of course these two were at once enveloped in the flame. One ran one way and one another. The two men who had thus far escaped, saw them, and one of them ran toward his friend, who was coming out with his clothes on fire, and sought to save him. He, too, was added to the holocaust. The fourth man, seeing what had happened, ran in the other direction, tearing his clothes from his body until he was stark naked, and thereby escaped.

We didn't hear of the fire until some hours afterward, because all of our employees there were killed. I arrived on the scene before the fire was out, and was able to reconstruct the story from the one man who escaped and from the facts which we found on the ground.

Three men were burned to death. The station, of course, was largely destroyed. Two of the other four tanks failed, from internal pressure due to the surrounding lake of fire. The Santa Fe Railroad had been put out of business on its trans-continental line for some twelve hours. The town had been endangered. People had flocked from every part of the city, and when the tanks failed there was an immediate rush in every direction, due to the explosions, and people were hurt in the stampede. About everything that could possibly happen in a fire happened; and all because of the fact that a man had attempted something that he knew perfectly well was wrong.

I suppose that is an extreme example of what safety men have to provide against—absolute, almost insane, mental failure on the part of an employee who does know better. And yet when we look back over what has been accomplished, I don't think that we need be discouraged.

This is the last time that I am going to be on my feet to speak to you before I retire as chairman of the section. I want to thank you for the cooperation that you gentlemen have given me in the past year. It has been one of the greatest pleasures of my professional experience to have been chairman of this group. It has been exceedingly difficult to handle from the extreme other edge of this continent the work that the chairman of such a section must handle. Naturally everything had to be done by correspondence. But in spite of that difficulty there have been compensations which have been very real. It is a very great privilege to meet personally and by correspondence and through cooperative effort men who are doing the same sort of thing that you yourself are interested in. It has been a privilege and it has been very much of an inspiration, and for that, gentlemen, I thank you.

ADJOURNMENT

October 3, 1928

GEORGE F. PRUSSING, Chairman

Secretary, Safety Board, Union Oil Company of California
Los Angeles, Calif.

The second session was called to order at nine-thirty o'clock by the chairman, George F. Prussing.

CHAIRMAN PRUSSING: I want to repeat very briefly the scheme of reorganization I announced yesterday, so that there may be discussion of it from the floor. The first point was to divide the country into six instead of three districts. Those six districts would cover the entire country. The Atlantic Division would include Maine, Vermont, New Hampshire, Connecticut, Massachusetts, Rhode Island, New York, Pennsylvania, New Jersey, Maryland, West Virginia, Virginia, Kentucky, Tennessee, Georgia, North Carolina, South Carolina, Florida, Alabama, and Mississippi.

The Lakes Division would include Ohio, Indiana, Michigan, Wisconsin, Iowa, Illinois, Minnesota, North Dakota, South Dakota, and Nebraska.

The Mid-Continent Division would include Kansas, Missouri, Oklahoma, and Arkansas.

The Gulf Division would take the three states of New Mexico, Texas, and Louisiana.

The Rocky Mountain Division would include Montana, Wyoming, Utah, and Colorado.

The Pacific Division would include Idaho, Washington, Oregon, Nevada, California, and Arizona.

Now, that grouping is subject to your discussion and suggestion.

The next suggestion was to make our petroleum representative the secretary of the section.

The next one, to make the divisional chairmen each responsible for two issues of the *News Letter*, one each six months; also for four or more posters; also for at least one article for release through the *National Safety News* or the trade papers under the guidance of a publicity editor who would take the place, under this scheme, of the chairman of the Publicity Committee; and to have no members of the Executive Committee at large, but to include only the officers, chairmen of committees and the ex-general chairmen, thus solving the problem of what to do with ex-general chairmen.

Have you any discussion of this scheme? It has been worked out by a relatively few on your Executive Committee, but all have been apprised of it. There has been practically no objection on the part of your Executive Committee. The only questions that have been raised have been as to the allocation of these states, which is merely a matter of detail, but should be so worked out as to satisfy everybody. If there is no discussion or objection to this plan, I'd like to hear a motion for its adoption.

E. J. SENNE (Vacuum Oil Company, New York City): I move that this section adopt the new organization program as described; and I also move that the plan be submitted in full in the next *News Letter*, so that all members will have a general idea in writing of just what the change is.

(The motion was seconded and carried.)

CHAIRMAN PRUSSING: Mr. Myers, chairman of our Statistical Committee, has been very active in helping us get our form of report that we make to the National Safety Council and on which our contest has been largely based, into such shape as to be workable in our industry. I want at this time to ask Mr. Myers briefly to give us an outline of the work that the Statistical Committee has done in the past year.

Report of Statistical Committee

By J. W. MYERS

Standard Oil Company of New Jersey, New York City

There are two or three things that I thought would be of interest to the section as a whole, some of which constitute things we did not do.

On that latter, the first point was a request from the Committee on American Standards for Accident Statistics, which is attempting a thorough overhauling of the statistical methods now in use. I was asked to represent—I wasn't clear what—but apparently the National Safety Council, and attended one meeting. It was clear from the beginning that they were undertaking a very important and arduous task. I didn't feel that my knowledge of the accident problem in the petroleum business equipped me to speak for the other divisions, and in view of that and the amount of work involved, I finally decided to resign from the committee; so I do not know just what the progress of that job is, but it certainly is clear that they are undertaking quite a job. I had a word yesterday with Mr. Stewart, from Washington, and he said that they were making progress, but I didn't get a chance to go into details. At the first meeting the main dispute was on the schedule of time losses for permanent disability, particularly the six thousand day rule for fatalities. That seems to rub a good many people the wrong way, and I don't know what the outcome of it is.

Another point which was worrying them is the fact that the improvement in medical treatment, particularly where hospitals are available and fully equipped medical departments in large corporations, is enabling them to cut down the disability; and they think that that fact will require some alteration on the schedules.

The second point that I thought would interest the section is the proposed revision of Safe Practice Pamphlet No. 21. This pamphlet has been in effect for some years, and covers the entire National Safety Council methods. Some months ago a proposed draft of the revision was sent to us for comment and suggestions, and we went over that very carefully. I don't know what the status of it is, but there are two or three important things in there that I believe will affect the figures. In the first place it doesn't seem to us that they have satisfactorily defined the average number of employees. That figure under the proposed pamphlet is used in connection with the working schedule to arrive at hours of exposure, where you don't draw that figure directly from the pay roll. Of course, if you start out with the wrong definition of average number of employees, you can carry that error into the final figure on which your frequency and severity are found.

Second, the definition of a lost time accident. For years we have been working on the definition that it was a case which caused either death, permanent disability, or lost time beyond the date of injury. The last part of that definition is important, particularly when you get into the safety contests and the rate gets low, because it involves the line of demarcation between a no-lost time case and a lost time case. They are proposing to modify that definition so as to count only as lost time any disability which causes lost time beyond twelve o'clock noon of the following day. My own experience indicates that there is still a considerable lack of uniformity on the interpretation of that definition of a lost time accident, but undoubtedly as far as our industry is concerned, we have made considerable progress in clarifying that definition. I question the wisdom of changing that, when we are just getting well informed on the definition which has been used so many years. However, whether you want to take any official action on this, I leave to you to decide. I haven't seen anything in this program which indicates that the Chicago headquarters proposes to put this new

pamphlet to the sections generally for decision. Perhaps the thing isn't important; but you all know from practical experience that the question of the date of injury and the next day and what the effect is when they lose time, medical treatment, and all that, must make quite a difference in the handling of one day cases. And I would think that any substantial change in that definition will affect the comparability of our figures and just cause confusion at a time when we are sort of just getting out of the woods. They are also proposing some changes in the schedule of time losses.

The other point that I thought would be worth while mentioning would be the statistics covering the safety contest. I don't know what the plans are, but I would like to suggest that the figures be made public in the transactions of the petroleum section—not by name of company, but in the same manner as our accident statistics are published in the annual report, by code number; and I would suggest that the same data be given to all of us, the hours of exposure, the number of employees, the number of lost time accidents, divided in various classifications, and the frequency and severity rate. That will give us several things. First, it will tell us how many participated in this contest. Secondly, it will tell us the size and character of the companies who participated, thereby giving us some clue as to the significance of the rates which they were able to obtain. Naturally in a small outfit the rate isn't of as much value in comparing it with your own as if it were a large company.

CHAIRMAN PRUSSING: Thank you, Mr. Myers. I think that we might entertain from the floor at this time a motion to put into the *News Letter* for the section that form of report on our contest figures which Mr. Myers has suggested.

MR. SENNE: I make that motion.

(The motion was seconded and carried.)

MR. SENNE: Following up a thought of Mr. Myers' with reference to the matter of possible change in the plan of statistics, I believe that this section has gone into that matter quite thoroughly. Mr. Myers has spent a great deal of time for the benefit of this section. The plan was thoroughly understood, was accepted by the section at a previous congress; and I move that for the present we make no change in our method of statistical data. I move that we remain as is rather than reconsider the question.

R. S. BONSB (Standard Oil Company of New Jersey, New York City): I second that, because statistics are very confusing to the average man anyhow; and the more you change the methods, the more confusing it becomes.

MR. MYERS: Before the question is called I would like to say this: I don't want to leave any impression now that I am trying to lead the petroleum section away from Chicago. I want to make this point clear, that if the petroleum section decides to adhere to our regular rule, and the Safety Council as a whole makes that change regarding the next day, they will send their literature out generally, and you will find a great deal of confusion. Therefore, I thought possibly a better course would be to make some effort to have them urge the National Council to very carefully consider this matter before they change the rule, so that we could in the end follow them and follow all the other sections. I think it would be unfortunate if the petroleum section rule were different than the national rule, and that our first efforts should be, therefore, to urge the Council not to change the national rule, because they send out safety pamphlet 21 and they don't defer to decisions of individual sections. If one of our members sent to Chicago for the rules today, they would send out 21, and you would have greater confusion than if you followed any new ruling of the Council. It is unfortunate that the thing has gotten under way, but I would urge you to play ball with the National Council and try to keep the thing uniform.

C. L. SWIM (Skelly Oil Company, Tulsa, Oklahoma): I am inclined to agree.

with Mr. Myers, but I am wondering if there isn't another step that we might take to advantage. There are rumors around from time to time that we don't all count lost time accidents the same under the present rule. It seems to me there might be a clarifying of that proposition. I am not prepared at the moment to say in what way, but I am inclined to say it is worth our thought. For instance, it might be a fair definition of lost time accident, that when a man in addition to being unable to start the next shift or next day, as under the present rule, is unable to come back to the job at which he was working. In other words, if there is a shifting of a man to a job that is easily made, that he can do, and still draw a full day's pay, but isn't a job he was doing when he was hurt—it seems to me sometimes that maybe we are kidding ourselves. That is the last thing we ought to do. I just want to leave that with you. I am inclined to think, Mr. Chairman, that it would be well and proper for us to appoint a committee of one or more to work with the National Safety Council, and I think we should stay with them and possibly work along the line that I have suggested, of clarifying possibly as to what for statistic purposes shall be counted on a lost time accident.

CHAIRMAN PRUSSING: Mr. Myers has been very close to the National Safety Council Statistical Division, Mr. Swim, and I think that we can very well leave it to Mr. Myers to continue to keep that contact and as chairman of the Statistical Committee to work that out.

There is a motion before us. Is there any further discussion?

MR. MYERS: I wonder if I could propose an amendment to that resolution. That the Petroleum Section go on record as urging adherence to the present rule.

MR. SENNE: I withdraw my former motion and yield to Mr. Myers' new proposal.

(Amended motion was seconded and carried.)

CHAIRMAN PRUSSING: We come now to the matter of asking our Committee on Resolutions and Nominations for a report as to whether they have at this time to offer any resolutions. Mr. Senne is chairman of our committee.

Report of the Resolutions Committee

MR. SENNE: I offer the following resolution:

The Petroleum Section of the National Safety Council, in Congress assembled, reaffirms the policies which have guided it during the past years of service.

The progress of safety and accident prevention work, its highest purpose and aim, can only be maintained through coordinated effort combined with constant and systematic cooperation.

The petroleum industry as a whole has precedence in the council of this Section, which always has in mind its common interest.

The approval by the most important branches of the industry of the activities of the Petroleum Section and the universal recognition of its service, are significant of its value and permanency.

The many friends within the industry, especially those in active membership of the Petroleum Section, who have freely and unselfishly contributed in spirit and in accomplishment toward the success of safety work have earned an expression of thanks and an assurance of confidence which now is due; and

WHEREAS the broadening of the safety movement and its beneficial influence could not have succeeded, nor would the future of the Petroleum Section have so promising an outlook today, without the material aid and moral support which the American Petroleum Institute, through its generosity, has bestowed;

From a standpoint of constructive thought and of human endeavor, the welfare of the industry has been extended and enhanced; and

WHEREAS the Petroleum Section recognizes the necessity and importance of these requisites,

BE IT RESOLVED that its thanks for meritorious work by individuals be and are hereby expressed and recorded, and that a vote of thanks be extended to the American Petroleum Institute for its valued help; and further

BE IT RESOLVED that this memorial be adopted by this Congress and made

That the secretary be requested to forward a copy of same to the president of a part of its official minutes; and furthermore the American Petroleum Institute.

MR. BONSB: I move the adoption of the resolutions.

(The motion was seconded and carried.)

CHAIRMAN PRUSSING: I think it might be proper also to mention at least a few of the other organizations in the country who have given this section their fullest cooperation. The Bureau of Mines has stood with us shoulder to shoulder in our endeavors ever since this section was organized, and in fact they were doing safety work long before this section got under way. I think our thanks and our appreciation are due them. In the Mid-Continent field, the Mid-Continent Oil & Gas Association has been the leader in carrying forward constructive safety work. Their membership and ours overlaps to a large extent in that district, and I think that that organization should also have an expression of thanks and appreciation. And out on our own Pacific Coast, the Chamber of Mines and Oil, the local organization of oil men, has done everything to make it possible for us to function out there as a real live organization.

I would be glad to entertain a motion that at least the names of these three organizations be put into the record as deserving our special thanks at this time.

MR. BONSB: I make a motion that the names of these three organizations be put into the record as deserving our special thanks.

(The motion was seconded and carried.)

CHAIRMAN PRUSSING: I am going to call on Mr. Senne again at this time for a report of his committee on nominations for the coming year.

Report of Nominating Committee

E. J. SENNE (Vacuum Oil Company, New York City): As chairman of the Nominating Committee, I have the honor to submit the following names in nomination for offices of this section:

Chairman of the Atlantic Division: L. W. Evans, Atlantic Refining Company.

Chairman of the Lakes Division: J. P. Sutton, the Ohio Oil Company.

Chairman of the Mid-Continent Division: E. D. Murphey, Mid-Continent Petroleum Corporation.

Chairman of the Gulf Division: C. L. Hightower, Texas Pacific Coal & Oil Company.

Chairman of the Rocky Mountain Division: L. F. Howbert, Continental Oil Company.

Chairman of the Pacific Division: R. E. Donovan, Standard Oil Company of California.

General Chairman: C. W. Smith, Standard Oil Company of Indiana.

Vice-Chairman: R. S. Bonsib, Standard Oil Company of New Jersey.

Publicity Editor: T. N. Shaw, Midwest Refining Company.

Chairman of the Program Committee: S. W. Candee, Tide Water Oil Company.

Chairman of the Engineering Committee: J. C. Bernd, Sinclair Refining Company.

Chairman of the Statistics Committee: J. W. Myers, Standard Oil Company (New Jersey).

CHAIRMAN PRUSSING: You have heard the report of your Nominating Committee. Are there any further nominations from the floor? If not, it is in order to make a motion to close the nominations, and if you want to include in that a motion to ask the secretary to cast the unanimous ballot of this section, I think that can be done.

V. R. CURRIE (The Texas Company, Houston, Texas): Mr. Chairman, I move that the nominations be closed, and that the secretary be requested to cast the unanimous ballot of the Petroleum Section for the nominees.

(The motion was seconded and carried.)

CHAIRMAN PRUSSING: Mr. Smith would normally at this time take the chair and the present incumbent would retire; but for reasons which are obvious, inasmuch as Mr. Smith is on our program this morning, I am going to take the liberty of continuing to serve you at least until luncheon.

We are fortunate in being able in this organization to call on men who know safety from the standpoint of operation. With all due respect to the professional safety man, in an organization of this sort I think the less that we hear from each other, the more time we have to learn from some people who are in the organization from the operating end. I'd like at this time to introduce to you Dr. E. R. Lederer, Vice-President of the Texas Pacific Coal & Oil Company, who will speak on "Corrosion Hazards in Refineries."

Corrosion Hazards in Refineries

By E. R. LEDERER

Texas Pacific Coal and Oil Company, Fort Worth, Texas

Before I go into my paper I feel that it isn't out of place, inasmuch as I am called to appear before you as a member of the refinery operating division of the petroleum industry, to say a few words of appreciation of the work the safety engineer has done for us. I remember the time, ten or fifteen years ago, when the word "safety" was more or less ridiculed among the refiners and also in the production division. Executives, especially the ones in the financial end, who were not in the safety end, were inclined to look upon safety work as more or less of a nuisance, and the men employed at that time to do this work were mostly inexperienced men, who tried their best, but they were nothing else than clerks who figured the accidents and made accident reports.

When I consider what the safety engineer is today, I can only congratulate you upon your work. It was an uphill fight. You knew in your heart that you did the right thing, the good thing, that you did the necessary thing for the petroleum industry, and just the same you had to fight for recognition. You know as well as I do that today you have this recognition, and you have the full appreciation and cooperation of every executive in the oil industry. I believe the smaller companies feel today, more than the big ones, what good you have done to the industry, not only in dollars and cents, but from a humanitarian point of view, and from the point of view of efficiency and loyalty which you create among the employees in their relations to their employers. We all are employed to give service to our companies; and that this service today is safe and given in a joyful manner, the industry certainly owes a great deal to your good work.

In presenting this paper to you I do not make any claim for new discoveries or original ideas. I have to confine myself to a summary of the corrosion problem as it confronts the refinery executive today. It has become a major problem with the rapid expansion of the refining industry and the consequent development of new oil fields, to take care of the continually growing demand for raw material, i.e., crude oil.

In very few cases the refiner of today is in a fortunate enough position, so he can select his crude. Most refineries with an appreciably large capacity have to draw on several sources of supply, of varying quality and characteristics. Some of the large new pools developed during the last few years, especially in Texas and Arkansas (like Mexia, Luling, Smackover, Panhandle, and the latest West Texas fields) produce oils which have aggravated the corrosion problem inasmuch as the distribution of the corrosive agents in the products manufactured from these crudes has been quite different from the previously known and refined sulphur crudes, like the old Lima, Mexican, and Californian oils. This evil confronts the production man, pipeline executive and, in a much more diversified and extreme degree, the refinery manager.

Corrosion in refineries is a combination of all the possible corrosion problems, aggravated and intensified by special problems, due to individual operating conditions. We knew in years gone by that certain chemicals and compounds had corrosive action on metals which we had to use in our refinery equipment; with a normal amount of vigilance, maintenance and repair, and counteraction by the use of some chemicals, we were able to operate our refineries (as old fashioned as they might seem to us today) at a fair efficiency and safety from unexpected break-downs. When Lima, and later on Kansas and Illinois, crude first offered a sulphur problem, it was rather easily overcome by the Herman Frasch copper oxide method. Today this method would not be effective on all crudes, besides being uneconomical, due to the enormous amounts we would have to use on the thousands of barrels of sulphur crudes charged to stills every day.

Today our situation is much more complicated and difficult because the necessary use of certain chemicals (like sulphuric acids and strong alkalines) for the elimination of sulphur and its compounds, is apt to introduce additional corrosive agents into our operation. With the depletion of some of the older pools, the crude produced shows an increased percentage of "salt-water," containing calcium and magnesium chlorides, which are hydrolyzed and form hydrochloric acid, often concentrated to a considerable degree during the process of distillation; this represents another menace which attacks refining equipment on another front and necessitates continuous prophylactic measures.

Commercial perfection of several cracking processes, and their increasing use in order to produce sufficient motor fuel for the rapidly growing demand, added additional hazards to refinery operation through corrosion. Sulphur compounds show increased corrosive action at high pressures and temperatures and desulphurization of stocks, which is quite helpful in the distillation process at atmospheric pressure, is insufficient at the high pressures and temperatures applied in cracking; in spite of such pretreatment sulphur is formed in various stages and corrodes different parts of the cracking equipment, presenting a perpetual hazard and source of expense. Revivification and new applications of vacuum distillation of corrosive stocks will, I am sure, present new corrosion problems to us. Recently developed contact filtration of acid treated stocks, in the presence of fine clay and steam, intensifies corrosion by erosion or abrasion; material which might be sufficiently corrosion-resisting, cannot withstand the ever-wearing action of this combined attack. It seems, therefore, that every new effort toward increased efficiency of operations, larger yield, new and improved products of better quality, is

confronted with new handicaps of a chemical and mechanical nature, which demand just as much attention and study as the development work itself—and all this mostly due to corrosion.

Economists have stated that corrosion destroys annually from one hundred and fifty million to two hundred million dollars worth of refinery equipment in the United States, equivalent to about 15 cents per barrel of crude produced; we know from experience that in spite of all the highly developed equipment manufactured from corrosion-resisting alloys, it costs from 20 to 30 cents a barrel more to refine "corrosive" crudes, due to increased repair and replacement costs and higher depreciation of the equipment. This is the economic side of the problem. Very serious is the human phase of all these hazards, involving health and life of our employees. Before we were fully aware of the danger lurking in the poisonous and destructive vapors evaporating from such crudes in storage or produced during distillation, we had to experience serious damage to the health of a good many of our employees and lament even the death of a number of them in the fulfillment of their duties. Naturally, these human and economic phases quickly made us realize the importance of this problem and to strain and combine every possible effort to combat it and solve it. And today we find a great deal of talent, energy and time of executives, chemists, engineers, and metallurgists, of all the industries concerned and connected with the oil industry, cooperating to overcome corrosion and its hazards.

A great deal of research work has been done and vast sums expended by these industries to overcome these difficulties. Corrosion problems have formed in recent years an important part of the programs of the meetings of all the associations, and scientific societies connected with these industries. Very valuable contributions to our literature have been made along these lines by the scientific staff of these companies. The Government has contributed some very interesting data in a number of circulars and pamphlets; all these publications, including articles in our current trade magazines, really form a text book on corrosion, which ought to be studied and kept up to date by every refiner. In order to better appreciate the hazards of corrosion, it seems advisable to analyze briefly the character and causes of this evil, which gnaws on our equipment and our constitution, day and night, year in and year out.

Corrosion has been explained as the inclination of metals to return to the original ore, forming soft, soluble compounds. This softening or dissolving status is also known as "corrosion fatigue." We distinguish:

Atmospheric Corrosion, due to the presence of carbonic acid, hydrogen sulphide, sulphur dioxide, and hydrochloric acid in the air. The moisture in the atmosphere containing these corrosive chemicals—often in large quantities—attacks exposed metals and weakens them often to a point beyond safety; deteriorates woodwork and electric insulation, causing short-circuits, burned-out motors and even explosions. Selective painting and coating of metals with corrosion-resisting paints, treating of woodwork with creosote, regular testing and careful examination of electric wiring, conduits, and motors will reduce the hazards from this type of corrosion.

Corrosion by Water: As you know, water is needed in refinery operation to produce steam and for cooling purposes. Water containing a high percentage of organic or inorganic acids or their salts, or an excessive amount of alkali or solids, will produce poor steam; and such steam will have corrosive action on valves and lines, will cause valves and steamlines to leak or even to give way very unexpectedly. It will pit and weaken fluesheets and firebox sheets by electrolytic action, with consequent damage to operation and hazard for life. A good many boiler explosions have been traced to such corroded sheets and many a man has been painfully scalded due to corroded valves or steamlines. Engines are often

put out of commission due to corrosive action of water on water jackets. Condenser coils or cooling coils submerged under water, tubular condensers or dephlegmators, through which water passes, show accelerated deterioration due to corrosion on the inner and outer walls. In cases where saltwater is used as cooling water, corrosion is increased by electrolytic action; the difference of temperature inside and outside the pipe or tubes plays an important factor in the speed of destruction.

Frequent and careful chemical analysis of refinery water, proper treatment of water, wherever possible *before* it is used for boiler feed water or cooling purposes, selection of the right metal for coils and tubes, are recommended. It is cheaper and safer to invest the necessary capital for a good efficient water treating or evaporating plant, than to fight continually destruction of material by replacement at a high cost for lost time in operation.

Soil Corrosion: A great portion of refinery piping is under ground; it is subjected to corrosion by acids or alkalis of the soil proper or contained therein by seepage. The soil might contain strata of alkali or salts, which dissolve in the moisture of the ground, especially after heavy rains; it might contain ashes from fills; seepage of saltwater, caustic, or acid washwater, or weak sulphuric acid from an acid sludge pit in a distant corner of the refinery site, will contaminate the soil until underground pipe, concrete foundations, or tankbottoms resting on such soil, gradually corrode and give away.

Analysis of the soil for acids or alkali will determine the grade of protection piping should receive. Protective coating and wrapping of varying thickness, in extreme conduits, are recommended. Special care must be applied by the operators not to dump acid or alkali on the ground, but catch it in specially provided catch-basins, or in case of a leak in acid lines, the contaminated soil should be replaced by fresh, clean dirt; if any metal is attacked through such seepage, it should be cleaned promptly and recoated or repainted. Dumping of acid sludges within a short distance from any metal equipment should be avoided. These sludges are a recognized nuisance and source of danger. They can be converted into useful fuel or should be removed to a safe distance.

Corrosion Due to Chemicals: This is the type of corrosion the refiner is mostly concerned with. It is mostly caused by the sulphur contents of crude oil and subsequent formation of hydrogen sulphide and sulphurous acids, due to the presence of water in the oil and condensation of water during refinery operation, which absorbs sulphur and forms sulphuric acids of varying strength. Sulphur is also introduced into refining operations (as previously mentioned) during the treating process of either topped crude, or distillates of gasoline, naphtha, kerosene, and lubricating oils, or heavy cylinder stocks with sulphuric acids to remove sulphur, asphaltic compounds and other decolorizing impurities. The percentage of sulphur determined by analysis of crude oils, cannot be considered as a criterion of its corrosive action; it is rather the chemical composition of the organic sulphur compounds and the distribution of sulphur in the different cuts obtained during the process of distillation, temperature and pressure conditions of the distillation, which seems to influence this type of corrosive destruction.

The storage problem of sulphur crudes in refinery tanks is really identical with tank farm storage; the turnover is generally much quicker in a refinery than on a tank farm. This, however, does not prevent sufficient corrosive action on refinery tanks, which has to be considered seriously. Right here we have to mention again the destructive action of "salt water" mixed with the incoming crude, containing calcium and magnesium chlorides, which are hydrolyzed to hydrochloric acid. Steel roofs exposed to the combined action of sulphur vapors and acidulated moisture in the vapor space above the oil level, deteriorate rapidly. Iron-sulphide scale is formed, the roof becomes pitted, full of pinholes or even large holes and is ready to collapse. The iron-sulphide scale drops to the bottom of the tank where the

saltwater is settled out and, being of different chemical composition than the steel of the tank bottoms or the first ring, we have two different metals in an acidulated solution, which promptly starts galvanic action and decomposes the metal of bottoms and shell. An added hazard is the spontaneous oxidation of the rust scale on the inside of the roof, where often, also, free sulphur is accumulated, which creates enough heat to glow and cause an explosion of the oil vapors in this space. Quite a number of such deteriorated and dangerous steel roofs have been replaced by wooden roofs covered with Johns-Manville patented insulation; however, the wood deteriorates rapidly when exposed to hydrogen-sulphide gas and must be well protected by heavy coatings of paint and should be grounded carefully. The bottoms and the first ring of such storage tanks should be protected with asphalt or cement, special non-conductive paints with sufficient elasticity so as not to crack and insoluble in oil and water. I believe the time will come soon when bottoms, first rings, and possibly roofs, will be protected and saved by electro-plating or gunspraying of protective coatings.

During the distillation process heat is applied in an increasing degree; dissolved hydrogen-sulphide will distill over first, then the saltwater will be concentrated, magnesium and calcium chloride decomposed, hydrochloric acid gas formed and distilled over; sulphur compounds will be broken up and new ones formed at different temperatures; they can be found in every fraction of the oil and in a large percentage in the residue left in the still or separator. Corrosive action by these newly formed acids on the equipment is very effective. Shell stills are more subjected to it than pipe stills, where the velocity of the oil through the tubes is generally too high to permit much corrosion, except in return bends, where the natural friction of the flow weakens the metal and corrosion accelerates deterioration. In shell stills special attention must be given to rivets in the vapor space, which are subjected to more rapid corrosion than the submerged parts. Treatment of crude with ammonia, injection of anhydrous ammonia in the vapor phase, neutralization of crude or cracking stocks with lime or soda, separation of saltwater and salt under pressure in specially constructed vessels; heavier walls on tubes of pipe stills and on the pipe for vapor lines, cast steel return bends, are some of the protective measures taken to retard corrosion. For condenser coils, heavy cast iron or special alloy pipe is used; tubular condensers, heat-exchangers and coolers are constructed from special alloys; very often excess ammonia vapors entering such condensers with the oil vapors will attack these alloys and such action has to be offset by circulating plenty of clean water to dilute the ammonia sufficiently.

In cracking operation the hazards of corrosion are greatly augmented by high temperatures and pressures. There is very little action by hydrochloric acid, as cracking stocks must be dried carefully; even a small amount of water will cause a serious explosion due to the extreme force of suddenly formed steam in a closed pressure system. In this case the refinery superintendent has to be his own safety engineer, or his equipment and operators are in imminent danger of annihilation. Weakening of the equipment of sulphur corrosion, however, is a continual source of danger. Corrosive action is different in the liquid and in the vapor zone, increasing the hazard. The slightest crack in a valvebody, return bend, tube, vapor line or expansion chamber, not caught in time, can cause terrible destruction and loss of life.

The most rigid material inspection of the entire equipment at certain intervals, regulated by the age of the installation, by experienced and trained inspectors, is advisable. Careful examination of the most exposed parts during each shut-down and extreme vigilance of operators during runs, directed and checked by foreman, plant engineer and superintendent, are necessary. Records should be kept of the life and condition after each run, of each tube, return bend, plugs, certain parts of the vapor lines, valves, fittings, hot oil pumps, pyrometer wells, etc. Replace-

ment of these parts at regular intervals which, based on experience, will assure a sufficient safety factor, is advisable.

Special care and attention must be given to installations, where large vessels are used for expansion chambers—riveted, welded or both methods combined. We have records that the walls of these vessels have corroded as much as one-sixteenth of an inch per month; these chambers are heavily insulated and inside inspection alone will not disclose corrosion beyond the danger point. A piece of test-steel of the same thickness and grade the vessel is constructed of, suspended in the vessel and carefully weighed and inspected under the magnifying glass after each run, will be a fair indication of the progress of corrosion on the vessel itself. Coating, lining, and electro-plating of the vessels are not very satisfactory; so far, it is not practical to build them out of corrosion-resisting material containing special alloys.

During distillation and treating operations, and much more so during cracking operations of sulphur crudes, considerable volumes of hydrogen-sulphide vapors escape, which are extremely poisonous, quickly cause unconsciousness and death because of the paralytic action on nerve centers, controlling respiration and heart action. The United States Health Department has found that as low as 100 to 150 parts per million affect people; 1,000 to 2,400 parts are fatal. Presence in a hydrogen-sulphide atmosphere deadens the sense of smell, reduces the ability to sense danger and so increases the hazard for the employee. These gases also affect the eyesight and handicap clear view for observation necessary to perform his precise duties.

To minimize these hazards, it is advisable to use closed gas-tight look-boxes, if possible in the open and not in a building, remote valve control on all lines, collect all vapors and gases in a tight recovery system, scrub them through alkali solutions or in purification plants. There are low places in refineries, like pump and manifold pits, inside of tank dikes or firewalls, where these heavy gases collect; they escape from leaky pumps, valves or pipe connections which must be repaired. It is very hazardous to approach these places and work on such equipment unless properly protected and guarded. The same danger exists when cleaning stills, tanks, or tank cars, which contained such crudes or untreated intermediate products. It is advisable to wash out and steam for a considerable time, test the atmosphere first before men are allowed to enter, use perfect electric safety lamps and keep equipment well ventilated during cleaning operation.

Sulphur corrosion is also encountered in treating plants, acid and acid recovery plants, and acid sludge fuel systems. As stated before, sulphuric acid is in general use for treating of light oils and lubricating oils for the removal of sulphur, asphalt, and to obtain better colors. Light oils, like gasoline, kerosene, absorption oils, and light viscous neutrals, can be treated with much less acid per barrel than heavy lubricating oils. Corrosion by strong acid, that is concentrated acid of 66 degrees Baume, or 93 per cent acid contents, is not a serious problem. By using the right material for lines, tanks, pumps, or blow cases, this grade is practically harmless. The danger of corrosion comes from weaker or diluted acids, as are formed in the separation of the heavy sludges, cooking with water and before concentration. Cast iron lines, pans, and concentrators corrode gradually, become soft and break, if the castings are not made from carefully prepared raw material and free of sand-holes and defects. They become soft and brittle and give away without hardly any notice. Special acid resisting alloys are on the market for the different stages of concentration; lead-lining and lead-lines are in general use in such plants, but special care has to be paid to the temperature of the acid in such containers and lines, and the lead has to be analyzed for impurities which might make it unsuitable for the purpose.

It is most important to keep a treating plant and acid plant free from leaks, even small acid leaks, when permitted to continue, have been known to be the cause of serious accidents and damage to life and property. In blow-case pits or

manifold pits, where such acid accumulates and becomes diluted with the water in the soil or by rain, immediate corrosion sets in, destroys concrete work and metal, seeps into the ground and corrodes lines even at great distances from the original leak. Men working in such pits or on such lines become acid burned, tank bottoms suddenly give away. Acid vapors from concentrating towers dissolved in steam are harmful to men and animals, deteriorate insulation on wires and electric equipment, cause short circuits and fires. Careful inspection and testing of such equipment by plant and safety engineer, strenuous efforts to maintain the equipment in absolute tight shape, combined with cleanliness, will reduce the hazards in such plants.

Alkali corrosion is noticeable when acid sludges are neutralized with alkali and used as plant fuel. It causes fire brick and cement foundations to crumble and to deteriorate rapidly; boilers and stills settle and sag and form a serious hazard. Special brick containing alumina or chromium should be used in such settings. A far better way is not to neutralize the sludge, but separate the weak acid as far as possible and burn the sludge mixed with fuel oil, using lines, fittings, and pumps made of brass or other acid-resisting metals.

We should not overlook corrosion in the refrigerating plant. Sodium chloride or calcium chloride brine of various concentrations pit lines and valves from the inside and outside, causing failure. Frequently such leaks or breaks cause the brine to become saturated with ammonia, and the latter, escaping as gas, often causes serious accidents. If the brine is not kept clean and slightly alkaline it will attack metal and form rust which will corrode bolts, coils, pipe, and other parts of the equipment.

The men responsible for refinery operation are aware of the serious hazards of corrosion; chemistry and metallurgy give us the causes for this destructive action and combine their efforts to combat and overcome it. So far, this has been only partly accomplished in a commercial, practical way. Visualizing clearly the danger for life and equipment, until we are sure of victory over this enemy, we welcome and appreciate every possible advice and assistance the safety engineer can give us.

CHAIRMAN PRUSSING: Thank you, Dr. Lederer. I don't need to tell you, gentlemen, that you have an opportunity here to ask questions of a man that undoubtedly can answer them.

H. E. DISCHINGER (Roxanna Petroleum Corporation, Wood River, Ill.): May I ask you, Dr. Lederer, what, if any, paint you have adopted for storage and tanks where hydrogen sulphide oil is stored?

DR. LEDERER: We have experimented a lot with Rub-shell No. 2 and No. 5. We use both. I wouldn't say that we have come to a conclusive result yet. We have used it even in tanks, cone bottoms, where we get out acid sludges, and it has actually lengthened the life, using No. 2, about thirty per cent. We have also used the paint on lines which go through fills or soil which is either filled by dredging or has been used previously, and we have had very good results.

We have found, however, that ordinary coal tar paint has not given us very satisfactory service, but I attribute this mostly to the fact that the pipe was not cleaned properly. Just brushing a pipe with a steel brush is not sufficient. A company whose products are in use in Texas, which advertises in the trade journals, the W. K. M. Company, has put on the market now a machine which cleans the pipe inside and outside so thoroughly that you can take a magnifying glass and not find dirt. We have made tests with this cleaned pipe, and have found that when this pipe is covered either with Rub-shell or some of the other paints, the life has been extended. You understand I am not advertising this paint. I am just speaking from our experience, and I am satisfied that there are other products on the market which are probably just as good.

MR. DISCHINGER: Have you found during your investigation that the use of

No. 2 Rub-shell contributes to the fire hazard as oxidation takes place, if the atmosphere is permitted to attack or if the paint is scratched in any way?

DR. LEDERER: Personally I don't think we have had any experience like that. I am glad you mention it.

DR. LEDERER: It is a problem to get a paint to protect the iron oxide from attacking, and also get a paint which is fire resisting.

COMMANDER ELLSBERG (Chief Engineer, Tide Water Oil Company, New York City): Dr. Lederer, would you consider a tank with a floating roof as being a safer proposition and one likely to last longer than an ordinary tank for West Texas crude?

DR. LEDERER: We have experimented on this and haven't found any advantage in the floating roof on gasoline or crude.

COMMANDER ELLSBERG: It rusts out just as fast?

DR. LEDERER: Absolutely.

COMMANDER ELLSBERG: How about the reduction in explosion hazard?

Explosion is Caused by an Explosive Mixture

DR. LEDERER: Well, you have a certain reduction in explosion hazard, because an explosion in a tank is caused when you form an explosive mixture. You have to have a certain amount of flammable vapors and a certain amount of oxygen, and then for some reason, galvanic action or static electricity will cause an explosion. Of course, by keeping your floating roof down to the level of the liquid or as nearly as possible to the level, you have not the dangerous vapor space, which the dome or cone-shaped roofs have, and you avoid the danger of forming vapors and having an explosion. But as far as corrosion is concerned, you have still the corrosive action.

COMMANDER ELLSBERG: How about the gas seal around the edge of the roof, between the floating roof and the side of the tank, as the roof goes up and down? Does that last well enough to allow a decent seal?

DR. LEDERER: Yes, if you have a good turnover in your tanks and don't expect to store your gasoline or your crude over a year, you have a very good service with that. But if you expect to store gasoline or kerosene or gas oil or fuel oil or especially crude oil—crude oil is the worst, naturally—for any length of time, you will find corrosive action on the shell at the upper level of the liquid. Of course the galvanic action and the possibility of forming rust, if the bottom of the steel roof is submerged in liquid, is very slight, much slighter than in another shaped roof; but there is corrosive action. I know of floating roofs which have been removed because they were corroded. But if the roof rusts out, you can replace that. If you have a fire or explosion, it may cost you a great deal more.

COMMANDER ELLSBERG: Would you say it is possible on a running tank for gas oil or gasoline of this West Texas crude, to use with reasonable certainty a gas recovery system so as to prevent any air from getting in the tank at all, and preventing spontaneous combustion? Are the diaphragm valves that you would need for that sufficiently reliable on such a case, or will they clog up very quickly?

DR. LEDERER: They are not very reliable. They have to be carefully watched and replaced very often. We all know that there is not such a thing as an absolute gas tight tank. The tank breathes. It is bound to expand and contract with the different temperatures. That is the reason why the Standard Oil Company of Indiana resorted to the very wonderful idea of using big gas bags. They

take the same gas in and out. There is no fresh air coming in, and in the fresh air there is the danger.

COMMANDER ELLSBERG: What type of tank would you recommend, from your experience, as being the safest—not the one that will last the longest, but which while it lasts will give you the least explosive and fire danger?

DR. LEDERER: I wouldn't use anything else but steel roof covered with say Johns-Manville cover.

COMMANDER ELLSBERG: You wouldn't use a floating roof there?

DR. LEDERER: You can use it, but I know that most tank roofs will deteriorate, and it has been found by actual experience that floating roofs don't last much longer than the ordinary gas tight steel roof. You know you have to replace, so naturally you use the cheapest and not the most expensive. And even on the steel roof I wouldn't take the heavy standard specification steel roof. I would take the lightest steel which will stand the weight, and then cover it first with practically gas tight asbestos roof, and watch them very carefully from the inside. We tried to paint gasoline tanks inside, but without very satisfactory results. The paint scaled, why, I don't know. Probably we were not careful enough in the beginning to get clean sheets; the shop coat wasn't done right. However, we tried spraying chromium and nickel metals just for tests. (It is very expensive, by the way.) But just for tests on certain surfaces, and we found out it has a very wonderful effect and really protected, and it is not soluble in gasoline.

COMMANDER ELLSBERG: One company at least is putting steam in some of its run-down tanks for gas oil and a cut between gasoline and gas oil, to try to keep them from blowing up due to spontaneous combustion. Would you recommend that?

DR. LEDERER: No. Keep away from moisture. The dryer you keep your stuff, the better you are off, absolutely.

J. McCOLLUM (Standard Oil Company of New Jersey, Bayway Refinery): I was interested in the question asked by Commander Ellsberg about floating roofs. We have had considerable experience with floating roofs with very bad results, originally because the stocks very rapidly corroded the springs and the secondary sealing material. We therefore worked with the manufacturers of the roofs, and they developed an outside spring, of which we have two at the present time, and which we are so far getting good results from. They have been on only six or eight months, but to date they look good. We are also experimenting with a floating roof brought much closer to the shell of the tank, within three or four inches, and using granulated cork to make the seal, coating the cork either with shellac or Rub-shell paint referred to. We think that holds considerable promise.

We have been so much concerned with the explosion hazard that we have about come to the conclusion that our greatest possibilities of reducing that lie in the direction of floating roofs. As far as metal spraying is concerned, that, as Dr. Lederer said, seems to be prohibited because expensive. We found the cost runs close to a dollar a square foot. Another thing that I think has had some effect was using a copper content in our steel. We found an affinity of copper for the sulphur, accelerating rather than retarding corrosion, and we get better results from the straight steel. So far as the Rub-shell paint goes, we have been using considerable of it and getting very good results from the No. 5 for the roof coatings and No. 1 for bodies.

In the direction of reducing corrosion on pipe lines, although we haven't used it long enough as yet to make a definite recommendation one way or the other, we think that the sand-spun centrifugal cast iron pipe, which several manufacturers are manufacturing at the present time, made of a beautiful homogeneous metal, hardly any thicker than ordinary steel line pipe, and at a cost per foot no greater, holds considerable possibilities for reducing corrosion there. For

ordinary line work throughout the refinery, for condenser coils, we haven't used it as yet.

CHAIRMAN PRUSSING: Is that a pressure pipe?

MR. MCCOLLUM: Yes, they make it in one hundred and fifty and two hundred and fifty pound class and up.

As to the corrosion mentioned about soaking drums, for example, we have gotten remarkably good results from simply lining them with cement, sprayed on with a cement gun. Also, I found that in lead lining vessels, if one per cent antimony is used, it seems to reduce the wear and maintenance on them very much indeed.

Ventilating receiving houses was also mentioned. I might mention that our method consists of running an inlet pipe up sufficiently high to insure getting clean atmosphere, and using wing blowers and maintaining a slight pressure on the house, with the outlet near the floor of the house.

F. L. NEWCOMB (Standard Oil Development Co., Elizabeth, New Jersey): I listened with a great deal of interest to Dr. Lederer's paper, since I have been intimately connected with corrosion work since November, 1920, when I was in charge of inspection of cracking equipment. It has been my big job to read everything I can find on corrosion. I feel Dr. Lederer's paper very adequately covers the subject, and in the entire paper I found but one thing with which I would like to take a little exception. He stated that hanging a plate in your apparatus would be a good indication of the corrosion which you were getting on that particular part of the apparatus. I don't agree with him. It is a well known fact that any metal under stress will corrode much more rapidly than a piece of metal that is not under stress. It is impossible from hanging a plate in a vessel to put the same stress on that plate that you have in the walls of the drum. We tried that stunt and found we had been considerably fooled. Some of our vessels got in a very dangerous condition before the plate showed sufficient corrosion to indicate that the vessel was in bad shape. I would just like to issue a warning not to rely too much upon that plate. I would advise you to drill holes into your vessel and then plug them up, so that you would know exactly where the walls stand.

WILLIAM JONES (Standard Oil Company of New Jersey, Bayway Refinery): Has it been your experience, Dr. Lederer, that the iron sulphide on the roof gets built up so strongly that it breaks down and falls to the bottom of the tank?

DR. LEDERER: Yes, we have found that. In connection with this, it brought us to investigate a very funny incident in one of our gasoline tanks. We had some old fashioned absorbers there, that were built out of twelve-inch diameter shells, and we had used one of these absorbers as a scrubber for sour gas. One day we decided to discard this scrubber absorber. We disconnected the pipe and threw the things down, and when we let it down on the ground opened the top manhole plate, a big flame shot out—and a big flame in a gasoline plant is a pretty dangerous proposition. We finally got the fire out. But we couldn't understand how an absorber pipe of twelve inch diameter, which had never been exposed to water or anything could burn. Finally we cleaned it out, and we found that not only all the shavings inside, but also part of the wall, had been converted into iron oxide and iron sulphide, and when these were exposed to air, there was enough oxygen there to burn. That led us to investigate some of the tank groups on tank farms where we had quite a bit of Texas sour crude. We found on the bottom, pieces of iron oxide which did not come from the bottom, because the bottom did not show large enough pitting to show a big piece of scale, while the roof did show it.

MR. JONES: (Showing Dr. Lederer a piece of metal.) I took that piece off

of the roof last night. I had to break that off with a hammer. It didn't fall in. This is a sixty day accumulation.

DR. LEDERER: But if you leave the same tank for six or eight months, the thing will gradually fall down. There is another thing. I believe that through the deterioration of the steel under it, the close contact of the steel linings from pittings is destroyed, and the steel is not as homogeneous as it was before.

MR. JONES: The gauge blowers on the tank didn't get this.

DR. LEDERER: There is a certain vibration in the roof, which might break this loose and cause it to fall to the bottom.

MR. JONES: Do you consider that hydrogen sulphide itself is poisonous?

DR. LEDERER: If dry it is more poisonous than corrosive, but if absorbed by moisture, it forms weak acid and becomes corrosive. Dry hydrogen sulphide gas is only poisonous and not corrosive.

MR. JONES: Wouldn't its affinity for oxygen in the atmosphere tend to accelerate corrosion?

DR. LEDERER: No. If you oxidize it while it is in the dry state, you will probably form sulphur dioxide. But if it is moist and then the oxygen comes to it, then naturally the corrosion is accelerated.

R. H. MENKIE (Tide Water Oil Company, New York City): Dr. Lederer, in getting a maximum effectiveness against corrosion by the use of Rub-shell paint on flat surfaces, did you find it necessary to sand blast the surface before applying paint?

DR. LEDERER: We found that the cleaner and smoother the surface, the closer the contact of the paint and the steel or the iron or whatever, will be. As I said before, when we cleaned with steel brushes alone, we didn't get good results, but after we cleaned it by machine, we got excellent results, and the cleanness and smoothness of the surface had apparently some effect.

MR. MENKIE: You would consider sand blasting advisable?

DR. LEDERER: In every case. When we take a tank down and built it up again, we don't use any more steel brushes. We sand blast it. It is cleaner, quicker, and we know we make a good job.

CHAIRMAN PRUSSING: I want to thank you again, Dr. Lederer, for your kindness in addressing us and for the answers that you have given to all these questions.

I would like at this time to introduce to you your next General Chairman, Mr. C. W. Smith, Director of Safety and Assistant Manager of Industrial Relations of the Standard Oil Company of Indiana, who will speak on the work of the Engineering Committee.

The Engineering Committee and Its Work in the Petroleum Industry

By C. W. SMITH

Safety Director of Standard Oil Co., (Indiana), Chicago

When asked to address you on this subject, I guaranteed that a report of this committee's activities would be given at this Seventeenth Annual Safety Congress. I realized that it could not be a subject merely discussed by one man, but must be a report of the committee as a whole. So I will state at the very beginning that I am voicing the sentiments of the committee and I (quite accidentally having been chosen as its chairman) am merely acting as its mouthpiece.

You all realize that in the line of our regular duties in our separate companies, we have too small an amount of time to do justice to a committee of this kind but such work has been made possible the past year by the generous action of a

large percentage of the members. However, in spite of the generous action in the giving of time on the part of the section and committee members, I fear that little would have been accomplished if it had not been for the untiring efforts of our representative, H. N. Blakeslee. Much credit is due him for his help.

As the time drew near for me to review the activities of this committee, I found it more and more difficult to describe them. This was brought about by the fact that the work of the Engineering Committee during the past year has been mainly the work of gathering together the material for the publishing of four Safe Practices Pamphlets, and this work was not so much the work of the committee as it was the work of the Petroleum Industry itself. I do not know that I can describe another work which has so effectively used the resources of the entire organization.



Open Doors When Filling Tank Inside Car

The committee, before each pamphlet was published, searched carefully and industriously for the experiences of the entire industry on the subject. How well these resources have been utilized is perhaps best emphasized by the fact that up to the present time only one criticism has been made on these Safe Practices Pamphlets after publication and that one not of a serious nature. We doubt if other publications have a better record.

We have found that there is one great value in the mere preparation of the safe practice pamphlet. We have received many letters from safety engineers who worked up the material for these pamphlets and many more who helped criticize this material before publication. Nearly all these letters testify to the effect that these men have received a liberal education on the subject itself through their endeavors to submit material. Many also state that they have been enlightened on existing unsafe conditions of which they were previously unaware. I could write a letter like that myself. But the real and greater value of the safe practice pamphlet, we believe to be the fact that, it is possible through this medium to place in the



Request the Customer to Stop His Motor



Salesman "Alert—Eyes" on the Fill Spout

hands of the man on the job, direct educational material;—educational material which is specific, applicable, and which he can readily understand. It has been the aim of this Committee to have these pamphlets full of material of just that kind.

We believe, of course, that a large percentage of the Petroleum Section safety engineers have broad knowledge on these subjects. But few of us have it readily at hand, summed up in concrete form, and handled in such a simplified way as to be suitable to hand to the man on the job.



This Overflow Usually Happens

One safety engineer has expressed himself in the following manner: "I am interested in everything that is written about my job and believe that most normal men are. By tying the story of the job up with the way to avoid injuries, we are offering those actually engaged in operation, information that will be of interest to them. If the information is of interest to them, it will be useful." He goes on further to state that he has purposely attempted to get criticism on this particular pamphlet (No. 1) and has failed to find a single workman who would criticize the idea but every workman interviewed—showed considerable interest in the subject matter.

In the case of another pamphlet (No. 2), a safety engineer informs me that he distributed personally a copy to each of his service station men. Two weeks later he went back over part of his route and in most cases the service station salesman

began his conversation by words of praise for the interesting and valuable information he had received in reading the pamphlet.

These illustrations have been so numerous that the Committee is considerably encouraged in believing that the methods used in combining the story of the job with the ways to avoid accidents in a practical and simple way have hit the mark.

Few of our oil workers have a college education and many have even less than a high school education. By making our Safe Practice Pamphlets of an elementary



Getting Ready for a Pinch or a Tumble

nature and including the story of the job, we are making them of greatest value to the man that we most desire to reach—the man on the job.

In summing up the advantages of this material, one would, therefore, include the following:

1. Its value to the Safety Engineer who is not familiar with the particular operation. Few of our safety engineers have had the advantage of working on the many jobs in the petroleum industry and lack information for the details of the job.
2. It is a source of information for the new foreman who is learning his job as foreman. It provides him with specific information regarding situations to avoid and how to avoid them.

3. It provides the superintendent with information whereby he can give his foremen specific instructions regarding accident prevention on the specific job.

4. Reading the pamphlet will more definitely clarify the mind of the experienced worker as to the things to do to prevent accidents.

5. It will furnish the new man with information regarding self protection and the protection of his fellow workers that in the past has sometimes been gained only through costly experience.



This Man Knows How

6. The information should be of interest and of value to clerical help in conducting cause classification of accidents and statistical work.

Due to the fact that the committee feels that its efforts have to-date been a success, though the amount of material has been limited, it is looking forward to another year which it believes will be much more productive of valuable work.

It is the hope of the committee to have its membership increased and thereby get more shoulders to the wheel. It is their idea to cover every subject of major interest to safety engineers in the oil industry. Our pamphlets this year cover one subject in each division of the industry. It has also been suggested that the Committee could well spend some of its time on suggestions for the much needed solution of our standardization problem. It is highly probable that this phase of



Exhaust Fumes Cause Headaches



Mighty Little Exposed to a Blow-out



Protect Your Hands and Face from Steam and Hot Water

he work will be considered. It has also been suggested that if the Committee is enlarged, it can in various ways be of great help to the Committee which is publishing our news letter. It can possibly be of worth while service by contributing to the monthly news letter, the solution of certain engineering problems that have come before them, and the reporting of unusual operating hazards and how they are overcome.

The committee has done one thing which has not yet been presented for your criticism. It is their idea that this vast amount of valuable material which has



See that Shift Is in Neutral or Motor Stopped

been collected from all companies within the industry can become more valuable if also presented in picture form. When the idea was first presented to me, I confess I had many misgivings. I thought it to be an endless task which might result in a mass of material which would rarely be used. I was persuaded, however, that my first thought on the matter was wrong. We have since had the pleasure of helping to produce in picture form the story of pamphlet (No. 2), "Safety in



Gasoline Vapor Is Heavier than Air

Gasoline Service Station Operation." It is my opinion now that none of these pamphlets will be complete until the story is told in pictures also.

Although it is impossible for me to take the time of this meeting to review all or even one of these pamphlets, I am going to ask for just enough of your time to present to you these 57 views that tell the story in pictures of safety in gasoline service station operation.

It is the belief of this committee that these pictures have a valuable place in the education of the workman. It is really the same story that is told in the pamphlet. We realize their use will be limited to group meetings, but such meetings are held everywhere. One safety engineer who has found us out and knows the committee is working on this scheme, is already knocking at our gates for the first film and he shall have it as soon as possible. He is having group

meetings of service station men and it is the kind of material he wants. These films will be available to the industry and held at the National Safety Council headquarters at Chicago.

In closing, we wish to say that we thank the whole petroleum industry for the wonderful help they gave us the past year. Such cooperation as we have received is bound to bring forth the best safety work possible for any industry.

These pictures, as you will understand, are really prepared to show to service station salesmen. Therefore I will not go through them in the manner I would if I were talking to service station salesmen. But perhaps with every one of these pictures you men will say, "I have had an experience like that."



Attention to Business Prevents Accidents

The safety supervisor can take these pictures and the pamphlets out to the men directly on the job and show them these things. We took this film and showed it to a group of service station supervisors. They had already received the pamphlets and supposedly had read the pamphlets, and besides that there isn't a question there about which we hadn't talked to them before. When we talked about the pictures, they sat there and made notes about various problems. I believe that was their first real knowledge of many of them, no matter how much we had talked before.

ADJOURNMENT

October 3, 1928

Luncheon Session

C. W. SMITH, Chairman

Director of Safety and Assistant Manager Industrial Relations, Standard Oil Company of Indiana, Chicago

The luncheon session was called to order at one-fifteen o'clock by the chairman, C. W. Smith, director of safety and assistant manager of industrial relations, Standard Oil Company of Indiana, Chicago, Illinois.

CHAIRMAN SMITH: Fellow members, we are met here today to do something which has never been done before in the Petroleum Section. I take great pleasure in introducing Mr. C. J. Hicks, executive assistant to the president, Standard Oil Company (New Jersey) who will present to us the trophies which have been contested for during the past year.

Presentation of Petroleum Section Safety Contest Trophies

By C. J. HICKS

**Executive Assistant to the President, Standard Oil Company (N. J.),
New York City**

I am reminded of a gathering that I attended fully thirty years ago, in New York City, where we were met to do honor to a man who had done great public service, Dr. Theodore Cuyler, whom many of you have known. He was a very short man, but he rose up and seemed six feet high, and he said, "Crowns for those who win them." I will never forget how he started that speech.

We are met here today to award trophies on behalf of the National Safety Council to those who won them. It is the sort of crowns we believe in in this country. I have some facts about this contest. It was inaugurated February first for a period of six months, and the petroleum industry was divided into seven sections, manufacturing, marketing, producing, natural gasoline, pipe line, marine, and construction. Each division entered as many units as they wished, and a unit was interpreted to mean a subsidiary company, a division, or a refinery. You get the conditions of the contest from that.

The National Safety Council has prepared these beautiful plaques or trophies. I think they are works of art. We are going to have some photographs ready later. There are seven of these trophies to award today to the divisions or units that have won them.

First we come to the manufacturing division. In this division there were twenty-eight units; and as I look over these statistics, I am reminded that this was a real contest, because there are 98 units represented in the winning of these seven trophies, and those 98 units reported a total of 2,930 lost-time accidents; so there was some real competition.

The manufacturing division trophy has been awarded to the Bayonne Works of the Vacuum Oil Company. If there is some one here representing the Vacuum Oil Company, who will receive this trophy, he may come forward, please. May I say this additional word? The frequency record at the Bayonne Works is the remarkable frequency record of 2.63, and you get the significance of that when I tell you that the average for the entire manufacturing division was more than

15.00. The Bayonne record of 2.63 compared with 15.00 is a very remarkable record; and on behalf of the Council I am very glad to award this trophy to the Bayonne Works of the Vacuum Oil Company.

MR. REED (Superintendent of Bayonne Works, Vacuum Oil Company): I feel very proud in accepting this beautiful trophy on behalf of the employees. They are the ones that are directly responsible for it. In winning this we didn't establish any new record. The 2.63 accidents per million hours represents one accident per 38,000 hours. Our best record was a period of 236 days, which represented 980,000 hours. That went seven months and twenty-one days. During the past forty-four months we have had thirty months without accidents during those particular periods. That represents 70 per cent of the time.

Another thing we feel very proud of. We have three small departments. They have 45 men, and we didn't go back any further than when we were keeping records, which is for a period of seven years; and during that time with these 45 men there hasn't been a single lost-time accident. It seems like a long time to go. In promoting safety I think everybody realizes it is a hard thing to sell. I think the principal drawback has been among the foremen and sub-foremen. The management would suggest safety devices, methods, and I think in most cases the foremen and sub-foremen would feel they would interfere with their production, and it took a long time to educate them that the management was thoroughly back of it, and were willing possibly to sacrifice a little production in order to get better safety records. I think it usually happens that when anybody stands up well in safety records, often people, who are possibly not so good, accuse you of bringing the men in on a stretcher in case you have an accident; but I want to assure you that we have not done that in this case.

MR. HICKS: I note here that the Brunswick, Pennsylvania, plant of the Atlantic Refining Company came in second, with an accident frequency record of 3.54 compared with the Bayonne Plant record of 2.63.

Now, in the marketing division, the trophy is awarded to the Associated Oil Company of California. They have a record of 10.20, covering the experience of over 1,300 employees. That is compared with a record of over 17.00 average of the entire marketing division.

S. W. CANDEE (Tide Water Oil Company, New York City): I do not belong to the Associated proper, but because of the close affiliation between Tide Water and Associated, and the fact that an Associated man could not be here from the Pacific Coast today, they have asked me to accept this trophy on behalf of the Associated Oil Company. They further wish me to state that this contest has had a decided effect on reducing the accident record in the marketing division of the Associated Oil Company, which operates, as you likely know, on the Pacific Coast. They said, although their record has not been bad for other years, the report of this contest and the contest itself has been spread through the entire organization and has had a decided effect on reducing accidents throughout the Associated Oil.

MR. HICKS: In the marketing division it has been a real contest. There were 13 units entered and until the final month there was seesawing between the Skelly Oil Company, the Freedom Oil Works Company, and the Associated of California. So it has been a very close contest.

In the producing division, the trophy is awarded to the Illinois Division of the Pure Oil Company. This isn't a record of three point something, but it is a record of no lost-time accidents during the six months of the contest. That is during a period when the average in this producing division was 40.19. That gives you the significance of what has been done in this particular case. I am very happy on behalf of the Council to award this trophy.

W. L. ARNDOR (Superintendent of Illinois Producing Division, Pure Oil Co.): We have been about eighteen months during which we have had only one slight accident. Through our foremen we go around to our men at all times and instruct

them. We have had a little experience which helped us in getting them to be careful of accidents.

MR. HICKS: You had some real competition from the Midwest Refining Company. For five months, with 800 men, they didn't have a lost-time accident; but during the last month they had six.

We will pass on to the natural gasoline division. That trophy has been won by the Dawes, West Virginia, Division of the Pure Oil Company, with a no lost-time record for sixty-five men as compared with an average record of 14.00 in that division.

G. W. HOFFMAN (Superintendent, Pure Oil Company, Dawes, West Virginia): I am very happy to accept this trophy on behalf of the company and the men of my division. Mere words will not express our happiness in winning this trophy. We consider it very much of an honor, and wish to extend our thanks to the National Safety Council and the men of the petroleum section who have conducted this contest and made it possible for us to win this prize.

MR. HICKS: In the natural gasoline division, the Council has felt that special recognition is due to the Wentz Oil Division, Ponca City, Oklahoma. They went through the period of the contest without an accident to natural gasoline employees. A certificate has been provided for them and signed by the president and national officers. We will be very glad to award this special certificate which has been prepared and signed. They have had it beautifully photographed, so that the company can use a photograph with their employees in promoting the safety work.

The pipe line division trophy we will award to the Midwest Refining Company, Midwest, Wyoming. The record of the Midwest Company is a record of no lost-time accidents to one hundred pipe line employees, and this is in the face of a record of more than 47.00 the average in that entire division. We are very glad to have the opportunity to award this.

T. N. SHAW (Midwest Refining Company, Casper, Wyoming): On behalf of the employees of our pipe line department, I am very proud to accept this trophy. This represents, however, only a third of their time with no lost-time accidents. They haven't had one in that department since May, 1927; and this splendid record was accomplished with what we believe to be the keynote of safety work, and that is holding the foreman directly responsible for the safety of his men. When we got through playing with safety and made it a business proposition, we began to accomplish results, through the foremen to the men with their educational work.

MR. HICKS: In the pipe line division, as in the case of the natural gasoline division, the Skelly Oil Company, of Tulsa, Oklahoma, has passed through this same period with no lost time, with a force of slightly less than one hundred men. Therefore, the Council has prepared this special certificate for the Skelly Oil Company.

C. L. SWIM (Skelly Oil Company, Tulsa, Oklahoma): I might mention that, like Mr. Shaw, we have run up to the time I left, ten months, without a lost-time accident, and they had a record of almost that good for the last two or three years. The same thing was done that Mr. Shaw has been talking about.

MR. HICKS: Now, there are two additional divisions, the marine division and the construction division; and the honors have been carried off in both of these divisions by the General Petroleum Corporation of California—in the marine division with an accident frequency record of 10.70 compared with an average of 19.00 for the division and a force of about 275 men; and in the case of the construction division, with an average of 15.85 as compared with an average of 59, with a force of 300 construction workers. I understand Dr. Jewett is here, and we will be very glad to award these to him on behalf of these two divisions.

DR. JEWETT (General Petroleum Corporation of California, Los Angeles, California): In behalf of the management and of the employees of the General

Petroleum Corporation, it gives me pleasure to accept these beautiful trophies. The fact that the medical director is here would indicate that the medical service plays at least a part in the safety work. The medical service is a part of our rounded out personal program, which includes employment, proper placement, proper promotion; it includes medical service for keeping a man physically fit and on the job; it includes the safety work under the safety committee and the safety inspectors, one in each department. And back of all this firmly stands the management. We have contented employees, which I think is a big factor in it. The management, working with the employees, with the proper organization, gives us the team-work which is necessary to win such trophies.

MR. HICKS: Just this word in conclusion. I have some figures here. I will not attempt to read many of them; but these 22 companies, from which these 98 units come, are practically the same as those that entered the contest a year ago, and therefore the comparative figures are rather interesting. In the marketing and construction divisions, there has been an increase, a slight per cent of increase, in the frequency record. In the other divisions there has been a decrease; but there are so many men in the marketing and the construction divisions that the average decrease for the year is only 1.31. There has been an average decrease of that much in the frequency of accidents during this period as compared with the same group a year ago.

CHAIRMAN SMITH: It is highly probable that these contests will go on another year; at least they will if you want them. And if they do continue another year, we of course hope that instead of this number of units entering, that there will be twice as many. You all must admit, while we honor these people so highly for being able to win these trophies, we mustn't let them do it again.

ADJOURNMENT

October 4, 1928

C. W. SMITH, Chairman

Director of Safety and Assistant Manager Industrial Relations, Standard Oil Company of Indiana, Chicago

The Thursday morning session of the Petroleum Section was called to order at nine-fifty o'clock by the chairman, C. W. Smith, director of safety and assistant manager of industrial relations, Standard Oil Company, Chicago, Illinois.

CHAIRMAN SMITH: Yesterday, we were very sadly disappointed not to have with us Mr. D. J. Wallace. We were all positive that we would hear from Mr. Wallace and I now wish to state that his telegram came in a bit too late yesterday to announce it during the meeting. However, I wish to take the opportunity this morning to read his message to us.

"While last minute developments make it impossible for me to attend the Congress my best wishes are with you. The Industry in the Mid-Continent area has intense and sincere interest in the activities of the Petroleum Section and wish you every success in your efforts to better the accident risks of the Industry.

D. J. WALLACE."

I am sure we all appreciate this message from Mr. Wallace whom we all know so well and who has done so many things toward the success of this Section during the past years.

Our first talk this morning was to be one by Mr. W. H. Boggess, Superintendent of Safety, Sinclair Oil & Gas Company, Tulsa, Oklahoma. We also greatly regret that Mr. Boggess will not be with us. I have Mr. Boggess' paper here and I am going to hand the paper to the Secretary to be read into the minutes.

Safety Organization in Producing Fields

By HENRY W. BOGGESS

Superintendent of Safety, Sinclair Oil and Gas Company, Tulsa, Okla.

The subject assigned to me would lead one to think that such organizations differ from those in other branches of industrial activities. I am of the belief that the kind of organization and the method of procedure necessary to keep it alive is much the same in a producing field as it is in any other industrial work.

There may be one reason why organizations in producing fields cannot function as they do in refineries or other places where work is centered at one point. Obviously, that reason is the scattered operation. However, in these modern times, when the automobile is as generally used and roads are superior to what were a few years ago, even this thread worn objection, on analysis, becomes unsound.

At the outset, let us say that all Safety Activities may be well grouped under two general headings:

1. Education of employees,
2. Safeguarding of equipment.

It should be manifest that the more important of these two is the former, education of employees. On this point, however, there are those who hold that safeguarding of equipment is of prime importance. I base my opinion that education is more important than safeguarding purely upon the experiences I have had in my own organization. I do not wish to infer that safeguarding is not important, I merely want to clearly state that I believe that education is the prime endeavor.

It has long been contended that eighty per cent of industrial accidents arise as the result of the human element. In the company I have the honor to repre-

sent, the number of accidents that may be charged to acts of commission and omission on the part of the human element rises to ninety per cent and slightly more. Education is the only known and developed instrument with which to combat the various causes that link to comprise what we term the human element.

Human nature is a queer thing. The human baby is about the only animal which, at birth, is void of knowledge or instinct. Yet it has latent within its brain untold powers of developing knowledge. Whether or not these powers are ever brought into existence depends largely upon environment and circumstance. Safety education can be both environment and circumstance. It is certain that this latent knowledge must be developed. The baby must be trained. So it is with man.

When man starts on a job he is susceptible to training but not necessarily trained. Especially as relates to Safety, employees of the petroleum industry must be trained. Safety is new in the oil business and its economies must be instilled into the hearts and minds of men before they can fully appreciate and understand its monetary and humanitarian laws.

Most people have to learn that a bargain isn't a bargain unless it is usable and needed. Most of all, a bargain isn't a bargain if it cannot be afforded. Short cuts, undue haste and many other similar acts that involve chance taking are not bargains and their inevitable costs, accidents, cannot be afforded.

There is one by-product of our industry which no chemist has ever yet found a way to use, and that is an accident.

With the incessant milling of labor turnover and the shifting of men from one type of work to another there is much need for Safety education. It is imperative, if accident prevention work is to become fully efficient, that employees be taught the value of working with a proper regard for order. Men must come to learn that chaos of thought or action is an outstanding enemy of Safety.

I believe that all Safety men will agree that safeguards and safety appliances are best used and most effective only after the men who use and operate them have been taught the fundamentals of Safety. It is recognized that no place of work can be made fool proof, and that no machine nor appliance is ever more safe than the mind of the man who operates it. Without doubt, the effectiveness of safeguarding of equipment will depend largely upon the success of educating employees. Granting then, that education of employees is of prime importance, we arrive at the problem of how we can best educate them.

It is next to impossible to individually reach each employee on the job, hence the necessity of grouping them together is apparent. Chaotic grouping of men may be somewhat effective, at least they can be lectured to, but seldom if ever can such unorganized meetings reach the active interest of men sufficient to arouse definite, purposeful action.

An old maxim: "what is everybody's business is usually nobody's business" lucidly explains why it is necessary to organize and delegate duties. Safety is everybody's business, but without proper organization, the responsibility of furthering its cause cannot be placed on each employee's shoulders. Education is indispensable to desired results in Safety, likewise proper organization is indispensable to education.

I have had the argument presented to me that there are *some* men who cannot be taught. If such men do exist who cannot be taught, it should be plain that these men have no business in the world's greatest industry. To the argument that some men are not teachable, there is but one reply: the art of education depends more upon the teacher than upon the pupil. All normal men, and certainly none of us hire other than normal men, can be taught and are receptive to learning if they are rightly approached. The teacher holds in the hollow his hand whatever method of approach he chooses to employ.

It appears clear and reasonable to me that a man can be taught more readily than he can be forced. The day of handling men like they were handled by the *old school* is past. We are living in 1928 and we are working men in 1928, most of whom are twentieth century products. They will not respond to 1890 tactics. Men can no longer be driven and that is right. A little of the milk of human kindness dispensed with the forethought of a modern leader will do much to soften the hardest of hearts and bend the most stubborn of wills. Canning and hell-raising and firing won't do it.

Any boss can fire a man. Firing is no particular indication of ability. It is the duty of the leaders of men to lead in the true sense of the word and not depend so much upon their obscene vocabularies to accomplish their tasks. Leading the strayed from the thorn strewn byways on to the rosy highways of life is eminently more worth while than kicking them into the ditch.

After all, what do we live for if not to make life less difficult for one another? Whether you think so or not, that is what the efforts and labors of each of us really amount to. This is truly the unseen and the unintentional objective of life. A thorough analysis of any man's work will bring you to this conclusion.

I have tried to put this one thought over to our field superintendents and foremen: make a man afraid of you and you will never know the secrets of his heart. An employee must be on sympathetic and friendly terms to produce his utmost and to cooperate fully on all mutual undertakings. Safety is, of course, a mutual undertaking. Furthermore, efficiency is purely and simply an off-shoot of fraternal relations. Safety thrives best where efficiency dwells supreme.

Here we have another reason for the existence of a Safety organization. First for the purpose of education and then for the purpose of building and cementing mutual understandings and friendships which are so essential to efficiency and Safety. The Safety Engineer who thinks that a meeting of employees is a place to impose his own ideas makes a great mistake. His ideas may be excellent, but field men do not like things crammed down their necks. They resent, as you would if you were in one of their places, being told the particulars of their jobs by men who are presumed to have little or no practical experience. *A field organization should be mostly a medium through which the ideas of experienced workmen can be gleaned in order that these ideas may be put into effect and passed on to others who do not know.*

If I am expected to outline to you something new in the way of Safety organizations, then I am expected to do more than will be possible for me to do. Most Safety organizations, in essentials, are alike. Almost every conceivable plan has been tried and practically all engineers are agreed upon a standard. The National Safety Council recommends that standard. I have no thought of recommending anything other, but merely to briefly tell you how Sinclair Oil and Gas Company makes this standard workable in producing fields.

Sinclair Oil and Gas Company establishes and maintains Safety organizations known as Safety chapters in each and every producing field where twenty or more men may be congregated. All departments are represented. Our first Safety Chapter was organized June 9, 1925. That Chapter, as well as all others that have been subsequently organized, are still in existence and have regularly an average attendance of over eighty per cent of all employees not on duty at each monthly meeting. It is not now, nor has it ever been our policy, to make it mandatory that any employee attend these meetings. There is no penalty imposed upon an absentee whether he miss one or twelve meetings. All Safety Chapter meetings are held at night on employee's time.

Several of these Chapters represent a large territory, and in some cases employees drive twenty-five to thirty miles on their own time in their own conveyances at their own expense. This arrangement does not seem to dampen their ardor; quite contrarily does it seem to stimulate interest in accidental prevention work.

Interest is aroused by reason of allowing employees to run their Safety organizations without interference from the management. The management's part in these organizations is merely to keep sufficient information and data before them so that no meeting can be dry and uninteresting. It is our belief that the key to a successful Safety organization lies in giving employees an active part in the running of that organization. Their subsequent interest and participation is a natural sequence.

Each Sinclair Oil and Gas Company Safety Chapter operates under a constitution chartered by the Safety Department. This constitution sets out the ideals and purposes of the organization; allows for a rotating Safety committee of three members, each one of which serves a term of three months and no one of which can serve more than three consecutive terms. A secretary-treasurer is also provided. In no case can the superintendent in charge of the operation be chairman of the Safety committee. Under the constitution, the superintendent in charge can only be an honorary member of the committee.

The constitution also provides for a regular order of business to be followed at each meeting. This order of business does not permit the discussion of labor questions. Copies of this constitution embodying this order of business will be readily forwarded anyone desiring same.

In conclusion, I want to add that Sinclair Oil and Gas Company believes in the effectiveness of its Safety organizations. After three years continuous existence, all of our Safety chapters are still functioning, not with a lesser degree of earnestness and zeal, but with increased faith in their propriety founded upon the knowledge that since the institution of these chapters, accidents have steadily and consistently declined in number. There has been no great momentary decline in our frequency curve, for which we are thankful, but, rather, our decline curve has been gradual. That decline curve has never yet shown an upward average trend but has consistently pointed downward. This, we think, indicates that our Safety policies are built on firm foundations.

When our chapters were first organized, in 1925, our frequency rate stood at 81.3 per million hours. During 1926, that frequency rate was brought down to 70.9 per million hours, and during the year 1927 it was brought down to 51.2 per million hours. For the first six months of this year, 1928, our frequency rate is 33.8. From present indications, the close of the year 1928 should find us with an average frequency of not more than 30.0. To those of you whose work is confined to refineries where hazards are mostly specific and where labor turnover can be more or less controlled, this frequency may seem high, but for a producing company working more than six million hours per year and engaging in large development projects under very trying conditions, we feel that a frequency rate of not more than 33.8 is fairly good.

Finally, may I offer you one more thought. We believe that our Safety chapters dispense with the necessity of Safety inspectors. From a monetary viewpoint in a large organization, the items of salary and expenses constitute no small amount. Through the medium of our chapters, we have tried to get our employees to appreciate that inspectors are mostly nonessential and duplications and that the job of inspecting and reporting is specifically the job of each and every employee. We have tried to place the responsibility of Safety on the shoulders of each individual on the pay roll, where, if you will admit as we believe—that Safety is primarily an educational endeavor, it most assuredly belongs.

CHAIRMAN SMITH: We have with us this morning a man representing an institution which has given this section a great deal of help, in fact they have given the petroleum industry a great deal of beneficial help for many years. The Bureau of Mines of the United States Department of Commerce is the organization of which I am speaking and we have with us Mr. H. C. Fowler of Washington,

D. C., who is representing that organization. Mr. Fowler has spent a great deal of time with the Petroleum Industry, giving us valuable aid, searching out for us and reporting the information regarding Hydrogen Sulphide gas. I do not know of anyone whom I would be more pleased to introduce than Mr. H. C. Fowler.

Safety Activities of the U. S. Bureau of Mines in the Petroleum Industry

By H. C. FOWLER

Petroleum Engineer, U. S. Bureau of Mines, Washington, D. C.

The safety activities of any organization are proportional to the experience, opportunity for service, and adequacy of that organization. This statement applies equally to the individual and to the group. Effective safety work is accomplished by carefully reviewing the past in the light of the present and by judiciously applying the findings of experience in future developments.

The prevention of accidents is approaching a stage of development where the subject can be treated as a science, not an exact science where mathematical calculation always can be applied, because safety deals with human beings whose actions and reactions are not subject to finite determination, but a science, nevertheless, based upon fundamental laws.

If safety is accepted and treated as a science, then two interrelated principles must be considered, namely, "factors of safety" and "safety factors." Factors of safety have been applied to the stresses in materials since the first artisans began to fashion their crude structures and devices. In modern industry the designing and construction engineers provide factors of safety to cover contingencies which may be brought about by stresses induced by any of the known forms of overload and by deterioration; but the "safety factor" rests largely with the men who use the equipment. The "safety factor" is the human equation which precludes accident prevention from becoming an exact science.

The Bureau of Mines in its studies of accident prevention in the petroleum industry has recognized the importance of these two interrelated principles. They in turn have a definite relationship to the safety activities of the bureau. Safeguarding, in the broader sense, is a matter of good judgment based upon experience and training and good engineering practice.

The Relation of the Bureau of Mines to the Petroleum Industry in Accident Prevention Work

At the present time there are only two engineers of the Bureau of Mines working directly on petroleum safety problems. At first glance, this number may seem to represent a very limited personnel for the study of such an important problem. However, these two men do not stand alone in their efforts to reduce accidents. Back of them is the whole organization of the Bureau of Mines with a broad experience in accident prevention work; this background includes the constructive ideas of men who are known nationally and internationally as leaders in the science of preventing accidents. It is only right that the petroleum industry should have the full benefit of the experience of an organization that was established primarily to promote safety in the mineral industries.

In many ways the Bureau of Mines holds a peculiar position in its relation to accident prevention in the petroleum industry. The bureau employs no labor

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in the same sense that an oil company employs drillers, gasoline-plant operators, stillmen, service-station attendants, and the other 43 or more groups of labor required in the petroleum industry. For this reason, the contact of bureau engineers with workmen is less direct than the contact between company representatives and employees of a company. In general, the bureau must deal with the composite group rather than with the individual.

The Bureau of Mines has no regulative jurisdiction in matters of petroleum safety. Whenever suggestions are given, they are offered on the basis of fact after careful study of the available data on any subject. The acceptance or rejection of these suggestions is entirely within the power of the recipient.

The problems of the petroleum industry are the problems of the Bureau of Mines, but because it is not a producing, transporting, manufacturing, or marketing organization, the bureau has directed its petroleum-safety activities toward the major problems confronting the industry rather than toward the problems of the individual. The impetus for detailed studies should come directly from the managements of the companies.

Early Work of the Bureau of Mines in Petroleum Safety

Safety in the petroleum industry was in its infancy at the time the Bureau of Mines started its safety work. As early as 1913 a number of publications dealing with various problems of accident prevention in the petroleum industry were made available to those who desired the information. Outstanding among the earlier publications, are the papers by Burrell and others which deal with the inflammability and explosibility of gasoline and other hydrocarbon vapors and air. (Bureau of Mines Technical Papers 115, 117, 119, 121, and 127.) The original findings of those investigators are a present-day source of valuable information.

The first active safety work in the petroleum industry on the part of the Bureau of Mines began in 1920, when first-aid training was given to refinery employees in California. In 1922, under the supervision of the Petroleum Experiment Station at Bartlesville, Oklahoma, a first-aid trainer gave instruction to refinery and oil-field employees in Kansas and Oklahoma. In June, 1923, a petroleum engineer was assigned to the San Francisco office to study safety conditions in the petroleum industry, and in December, 1923, another engineer was assigned to the Bartlesville station to work on similar problems.

At the time these two engineers began a definite study of petroleum safety problems, some of the larger companies already had established safety departments or were feeling their individual ways by using their insurance departments as a means of safety contact with the men.

Methods of Contact and Means of Disseminating Information

Upon definitely entering the field of scientific investigation of the problems of petroleum safety, the bureau found it necessary to outline a program in order that the work might progress systematically. The following tentative program for petroleum-safety work was drafted in 1923 by H. C. Miller, the first engineer of the Bureau of Mines to make a detailed study of petroleum safety. This outline has continued to be the working plan of the engineers who later have made similar studies.

"1. Visit the safety organizations and representatives of the oil companies and acquaint them with the scope of the technical safety work which the Bureau of Mines is entering.

"2. Obtain from the various companies and other available sources accident statistics for the past several years, from which can be obtained the cause, relative importance, frequency, and severity of various accidents.

"3. Familiarize ourselves with the best methods of preventing accidents, as demonstrated by the oil companies who are most advanced in this respect.

"4. Establish cordial relations with the safety organizations and representatives, superintendents, and foremen at the operations we visit, and as occasion permits disseminate suggestions for improved practices which shall be free from the objections of the practices we find.

"5. Collect photographs, blue prints, sketches, and other information suitable for use in the preparation of safety bulletins and technical papers and other safety publications of the Bureau of Mines.

"6. Coordinate and develop safety work at the request of the companies.

"7. Disseminate among the operators, foremen, and workmen (through the safety organizations of the companies that maintain these departments) * * * the arguments in favor of new or increased activities along any lines of endeavor or research that will increase safety in the petroleum industry; and of equal importance, point out potential hazards that change of methods may cause to become actual hazards unless adequate safeguards are provided."

Much of the contact work has been done by personal interview. However, where personal visits have not been feasible, correspondence has often obtained favorable results. It has been gratifying to note the increasing number of inquiries on safety problems; especially those questions coming directly from workmen—proof of a growing interest in accident prevention by the men who are exposed to the hazards.

Another method by which bureau engineers make available the information which they have gathered is by serving on the committees of various safety organizations. Informal talks at field safety meetings for foremen and workmen, and prepared lectures before petroleum-engineering students at universities are also a part of the work of these men to help reduce the number of accidents. Upon several occasions where immediate action has been necessary to meet an emergency, engineers have been sent to confer with officials of oil companies and to assist in coping with the emergency.

The permanent records of the safety studies of the Bureau of Mines are found in its publications. Exclusive of special articles printed in trade journals and other periodicals, 60 reports dealing with petroleum safety and health (including fires and explosions) have been published. These 60 publications—and several others in the course of preparation—cover many phases of the petroleum-safety problem. It would not be feasible in this paper to enumerate all of the subjects, but a complete list may be obtained from the petroleum division, Bureau of Mines, Washington, D. C.

Accident Statistics

At the beginning of its active petroleum-safety work, the Bureau of Mines quickly sensed the need for carefully analyzed and weighted statistical information on accidents. A considerable amount of effort has been directed toward investigations that will place such data in a readily comprehended form before operators, safety engineers, superintendents, and the men who are engaged in hazardous work. The first report (Miller, H. C., *Industrial Accidents in the California Oil Fields*) of petroleum accident statistics was issued in December, 1923. The figures used in this paper were based upon the accident experience, during 1921 and 1922, of 10 representative producing companies in California. Later the studies were extended to include the whole petroleum accident-experience of the States of California and Oklahoma during certain years. (Bureau of Mines Technical Papers 382 and 392.) Beginning with the calendar year, 1923, a report has been made annually of the fatalities in the California petroleum industry. It is realized that complete analyses of all accidents, if it

were feasible to make them, would establish more definite criteria of the trend of accident prevention than are established by using the fatality figures alone. However, fatality figures are an index of safety progress, and it is possible that figures for nonfatal accidents may follow similar trends. With reference to California fatalities, Shea says: (Shea, G. B., Review of the Fatalities of the California Petroleum Industry During the Calendar Year 1927.)

"A retrospective view of the fatality record for 1927 and a comparison of it with those of previous years show that California petroleum industry is gradually reducing the number of injuries causing death." Unfortunately, the accident commissions of some States have no jurisdiction over industrial-death cases, and therefore complete records of fatalities are not available for making comparative studies.

As an outgrowth of the work on the various analytical investigations, a comprehensive form was evolved for recording accident statistics. Later this form was modified to meet the requirements of regional safety organizations.

Drilling and Production

An outstanding value of the statistical analyses was to indicate in what divisions of the industry the larger percentages of accidents were occurring and what equipment was responsible for the greatest number and most severe of the accidents. After a careful study of accident records (Miller, H. C., Industrial Accidents in the California Oil Fields) (Fowler, H. C., "A review of the petroleum accident records in Oklahoma during 1923": Proc. Nat. Safety Council, 1924), it was apparent that drilling and producing operations presented the greatest hazards at the time the statistical studies were made. With these facts as a guide, field studies were started, and the following publications were issued in the order named:

Technical Paper 369, Mechanical Safeguards in Rotary Drilling.

Bulletin 272, Safeguarding Workmen at Oil Derricks.

Technical Paper 419, Safe Practices at Oil Derricks.

Technical Paper 422, Prevention of Pipe-Tool Accidents at Drilling and Producing Wells.

These four publications deal with drilling and producing practices and equipment in almost every oil-producing section of the country. They represent the combined thought and study of petroleum and safety engineers, drilling and production superintendents, manufacturers of tools and equipment, and men who handle the tools and equipment at the derricks. Many companies are following the recommendations suggested in these published reports.

Natural-Gasoline Plants

A comprehensive paper on safety at natural-gasoline plants is now in preparation. The author, G. B. Shea, presents the main safety problem of natural-gasoline manufacture concisely: "A combination of hazards exists peculiar to the handling of two highly explosive and flammable substances, namely, gas and gasoline. * * * Owing to the fact that the treatment of gas must be done under pressure and to the high flammability of gas and gasoline, a certain risk always attends the process of recovering gasoline from natural gas." One of the chief factors, then, in safety at natural-gasoline plants is the prevention of fires and explosions.

All phases of plant design, construction, and operation have been studied and discussed in detail. There is good reason to believe that when Shea's paper is released for distribution, it will be used by men of the natural-gasoline department of the industry in a manner similar to the use made of Bulletin 272

(Miller, H. C., Safeguarding Workmen at Oil Derricks) by men in the drilling and producing departments.

Compressor Stations

With the introduction of the air-gas lift and of methods of increasing the recovery of oil by forcing compressed air or gas through the oil-bearing formations, a serious hazard from explosive mixtures became apparent. Lewis, writing on the subject in 1917, said, "The presence of air in the gas should be taken into account and factors of safety adopted accordingly."

Lindsly cites an example of an explosion of 400 feet of 2-inch pressure line at a compressor station in the Elliott pool, Nowata County, Okla., in which "the line was split open and flattened out and in many places was blown into small fragments." He describes "explosion preventers" and thermostatic-control devices which were installed at the plant after the explosion.

In July, 1927, at the bimonthly meeting of safety men in the Mid-Continent area, R. Van A. Mills, then in charge of the oil recovery section of the Bureau of Mines, gave an outline of explosion hazards in repressuring old oil properties. Mills discussed several examples of explosions at air-compressor plants, explosive mixtures of air and gas, the causes of explosions in compressors and pipe lines, general safety precautions, and safety precautions observed in the Bureau of Mines high-pressure laboratory, applicable in part to field plants.

The number of explosions that have occurred, and conditions that have been found to exist that are favorable for explosions, have caused the bureau to begin a definite study of the explosion problem. Engineers found plants where the fluctuation of air-gas mixtures varied as much as 8 per cent. Near the limits of explosibility this practice is very dangerous. C. J. Wakenhut writes, "At the present time analyses are made twice a day (at some of the plants), but I doubt if this gives a sufficiently accurate control. I believe a recorder similar to the methane recorder used in mines would be a safety measure." The whole subject of safety at compressor plants will require further study and experiment before definite conclusions can be reached.

Refineries

Refineries are more easily organized for safety by the companies than are the producing fields where men frequently are scattered over wide areas. Up to the present time the Bureau of Mines has published no reports dealing specifically with refinery hazards—with the exception of papers on hydrogen sulphide. However, studies of other safety conditions at refineries have not been overlooked, and the development of safety problems peculiar to the manufacturing processes has been followed as closely as possible. It is likely that a study will be made of the design and operation of refineries from the standpoint of safety and of fire prevention.

Hydrogen Sulphide

Hydrogen sulphide is no longer an unfamiliar word to the petroleum industry. The injurious effects of this poisonous gas were first recognized by the refiners along the Atlantic and Gulf coasts upon receiving shipments of crude petroleum from Mexico. In 1925 the Bureau of Mines and the Public Health Service, under a cooperative agreement with the American Petroleum Institute, studied the causes and effects of hydrogen sulphide poisoning. Bulletin 231 (Sayers, R. R., and others, Investigations of Toxic Gases from Mexican and other High-Sulphur Petroleums and Products) is a report of this investigation.

The former experience of the bureau was very useful when "poison gas" was encountered in the Texas Panhandle and fields in the southwestern part of the

State. Engineers and chemists visited these fields at the request of the operating companies. They conferred with company officials, determined the concentration of the gas in several areas, suggested certain changes in operating methods and the use of proper breathing equipment, and in other ways worked with the operating companies to start safety campaigns to cope with this outstanding hazard.

Two reports have been published giving the findings of the more recent investigations. These are:

Report of Investigations, Serial 2776, Hydrogen Sulphide Poisoning in the Texas Panhandle, Big Lake, Tex., and McCamey, Tex., Oil Fields.

Report of Investigations, Serial 2847, Prevention of Hydrogen Sulphide Poisoning in Handling and Refining High-Sulphur Petroleums.

One of the most difficult problems of protection was to teach the men the value of precautionary measures—previous to the time that they were “gassed.” There are still some men who refuse to believe that hydrogen sulphide is an extremely poisonous gas; as a matter of fact, it is even more toxic than hydrogen cyanide (Yant, W. P., and Sayers, R. R., “Hydrogen sulphide, as a laboratory and industrial poison”), and one breath of the gas may cause death.

Reports of fatal accidents caused by hydrogen sulphide are still received. Subacute cases are too prevalent. Conditions show a need for continued work on this subject in the fields and at the refineries. The Bureau of Mines realizes that the papers on hydrogen sulphide which it has issued only point the way toward the control of this serious industrial hazard. More research work must be done. The actual prevention of the accidents rests with the companies and the men.

Spontaneous Combustion of Sulphur Compounds

Another safety problem associated with high-sulphur crudes is the formation of sulphur compounds (presumably iron sulphide) in tanks and other containers. Upon exposure to air when conditions are favorable, spontaneous combustion takes place, sometimes followed by explosion of petroleum vapors. Fundamental research is required to determine the true nature of these compounds, the conditions under which ignition takes place, and methods of preventing the formation of the substance. This study is directly related to the corrosion or equipment phase of the hydrogen sulphide problem, which is being earnestly studied by the industry at this time. Several experiments have been started by the bureau, but no conclusive results have been obtained thus far.

Fires and Explosions

Previous reference has been made to the work of Burrell and others on explosive mixtures of petroleum vapors and air. Refinery fires and safe methods of freeing tanks and other containers of dangerous vapors are related subjects that have attracted the attention of the bureau. The determination of atmospheres that are explosive is of great assistance in preventing fires and explosions. A simple portable device for detecting small quantities of petroleum vapor (Jones, G. W., and Yant, W. P., Detection of Small Quantities of Petroleum Vapor with the Burrell Methane Indicator) has been developed. Many oil companies are using this indicator for testing tanks, tank cars, and other refined spaces where dangerous quantities of petroleum vapors—either explosive or asphyxiating—are likely to be present. The studies already made of fire and explosion hazards show a need for further work on these problems.

Bowie (Bowie, C. P., Extinguishing and Preventing Oil and Gas Fires: Bull. 170) in 1918, made a study of oil-tank fires at wells. Several “wild” oil and gas fires in the Mid-Continent area have been brought under control through

the assistance of bureau engineers. Where extreme fire hazards have prevailed, conferences have been held and reports have been made directly to the companies or organizations most concerned.

A "Bibliography of Fire Hazards and Prevention," is issued semiannually in mimeographed form by the San Francisco office and is available upon request. The bibliography gives a direct reference, with a short abstract, to all current articles appearing in trade journals and other sources that deal with fire hazards in the petroleum industry. A similar bibliography of articles pertaining to "Safety in the Petroleum Industry" is published conjointly.

First Aid and First-Aid Meets

It is the duty of every person to be able to render proper assistance to his fellowman in time of injury or sudden illness. Moreover, the Bureau of Mines believes that the teaching of first aid to employees implants the fundamentals of the proper safety attitude where they do the most good.

At the beginning of the bureau's active safety campaign in the petroleum industry, a considerable amount of missionary work was required to convince some operators and many workmen of the value of first-aid training. In fact, upon more than one occasion, a minimum class of 15 men could not be organized in areas that should have furnished several times that number, and the arrangements for training had to be cancelled.

Quite in contrast are the reports of recent training. "One hundred per cent training" has become the objective of many companies. During the recent campaign in the Seminole field, which covered a period of three and one-half months, 3,000 men completed the prescribed course. This probably establishes a record for men trained in first-aid in any one petroleum district. An effort is being made to adequately reach the fields of west Texas where hydrogen sulphide is so important a factor. The Rocky Mountain district is requesting more and more training. During 1928, training has been given for the first time to petroleum-industry employees in many of the Appalachian areas. It is hoped that within a short time there will be few remaining producing districts and refining centers where bureau instructors have not given training.

The number of first-aid instructors is limited, and the areas to be covered are extensive. Therefore it is especially necessary to reach key men of the companies who will become qualified to instruct their fellow workers.

The Bureau plans to offer a course of advanced training for oil-field and refinery employees. This course will be given to qualified men in conjunction with first-aid training. Tentatively, the advanced course will cover such subjects as:

- Hydrocarbon vapors and other gases (including hydrogen sulphide).

- Methods of detecting and determining the concentrations of these gases.

- Breathing equipment (their construction, care, limitations, and places where they should be used).

- Artificial respiration (including the use of inhalers).

- Approved lamps for use in explosive mixtures.

The complete outline of this advanced course is nearly perfected and should be available within a short time.

The bureau does not feel that the main objective of first-aid training lies in turning out teams for competition in first-aid meets. Far more important is the fact that men are given a feeling of responsibility, impressed with the need of carefulness, and made better able to handle an emergency when it occurs. However, the spirit of friendly rivalry and good sportsmanship developed by these contests goes far in maintaining the necessary interest in safety. It is a matter of much pride and an incentive to greater effort to know that a petroleum team placed second in the recent International First-Aid Meet at Butte, Mont.

The need for consistent and persistent education of employees in safe ways of thinking and acting has been stressed repeatedly by the Bureau of Mines. In helping companies to start their safety programs, one of the first injunctions always is: "Get close to your men; make personal contacts and maintain them." The bureau can do this only to a limited degree, but company representatives have few barriers—provided a certain finesse is used. The employees' minds must be molded and trained to think of safety as a part of the day's work.

The aptitude of workmen is another important consideration. A man has no right to endanger his own safety or that of his fellow workers by attempting to do work for which he is not fitted.

"Employers of labor are giving more and more attention to medical examinations. When the method of selecting workmen according to physical qualifications has become general throughout the petroleum industry and when men are placed only in positions for which they are fitted physically and mentally, many avoidable injuries will cease to appear on the accident records of American oil companies. Organizations that have adopted this policy are finding marked improvement in their accident records. Labor turnover is reduced and the undesirables are gradually eliminated, thus making it possible to build up a personnel of workmen who are anxious to stay on the pay roll and are qualified to do so. In time, all of the major companies will require rigid physical examinations of prospective employees, because only in this way can they obtain first-class workmen." (Fowler, H. C., *Prevention of Pipe-Tool Accidents at Drilling and Producing Wells*; Tech. Paper 422, Bureau of Mines.)

Nowhere, perhaps, has more progress been made by applying technical skill, based upon accurate research, than in the petroleum industry. The safety work of this great industry must keep pace with the progress made in developing methods, processes, and equipment. Commendable reductions in accident frequency and severity have been brought about through the efforts of organized safety work in all branches of the industry; but new methods, processes, and equipment introduce new hazards. New workmen continually are seeking employment; and they introduce new problems. Accident prevention work is never in stable equilibrium; it must go forward. Otherwise there will be a backward movement. Consistent progress in safety depends upon the coordination of the working principles of the science of safety. Factors of safety must be applied carefully; the "safety factors" must be handled with consideration and care; technologic research must point the way to the practical application of theories, because methods of eliminating hazards and preventing accidents are not evolved out of thin air.

The Bureau of Mines is deeply interested in the problems of safety and health in the petroleum industry, and in so far as its resources will permit, it is anxious to help in their solution.

MR. SWIM (Skelly Oil Company): In certain districts, or I might say certain oil companies, there seems to be a particular hazard in oil well fires caused from, I do not know just what. These fires have not just occurred in the wells of my company but in several other companies. As near as we can make out, there seems to be a certain gas which accumulates at a well and sometimes during the removal of pipe a fire results. This has been the experience in my company and in a number of other companies and there seems to have been at least a half dozen serious fires resulting from this gas. It is the theory of our people that there must be an iron oxide gas that is stirred up when you start to do anything at these wells. Before you realize it you have a fire on your hands. You can not use water because the well is making a lot of gas. Have you any suggestions, Mr. Fowler, as to what might be done to prevent a fire in a problem of that nature?

MR. FOWLER: I am afraid I am not able to answer your question with regard to that point. I do not think I am familiar enough with that phase of the subject.

MR. SWIM: You may be familiar with the district to which I am referring, Mr. Fowler. It is out in the western part of Texas, known, I believe, as the Panhandle Field.

MR. FOWLER: Gentlemen, I believe Mr. Swim now brings up that phase of spontaneous combustion which has been a problem to many of us for many years. The problem of iron sulphide gas is new to me, I must admit, and I would not attempt to suggest any precautionary measures to be taken at this time because it is something I know nothing about. I would have to make an investigation before I could express an opinion. No doubt his theory is right. From what we have found out so far, iron sulphide in a very minute form is very likely to oxidize in the presence of air, and if conditions were right, there would be an explosion and very likely a fire would result at these wells. It seems to me that there is a very difficult problem to be studied.

MR. SWIM: The original attempt was to drill for oil and in each instance they have all struck this gas above the oil.

MR. FOWLER: Is the gas inside the casing?

MR. SWIM: I think that it is.

MR. FOWLER: Is it shut in at the casing head?

MR. SWIM: Yes.

MR. FOWLER: It is quite possible that this is like the condition described by one of the gas companies where they stated that sometimes when they were blowing some of their gas lines out they would get a black deposit and sometimes it would be blue. Spontaneous combustion from iron sulphide is not a new problem, by any means. You will find it in the mining industries. They run up against a condition not unlike that described by Mr. Swim. At the time the Panama Canal was dug, I believe they had a similar condition down there. It seems to me that what needs to be done is to go back and find out where this hazard has occurred in every industry and try to apply protective measures.

R. S. BONSB (Standard Oil Company (N. J.)): I would like to ask Mr. Fowler when the publication he spoke of on natural gases will be out and how can we secure such publications? I would also like to ask him whether it is a free publication or whether it is to be one of those dollar publications?

MR. FOWLER: I smile, gentlemen, because this matter of "dollar publications" at the Bureau of Mines has become quite a mooted question. We have tried to give at least one copy to each company without charge. However, we are very limited as to a supply and if the supply has become exhausted then the only way to obtain these publications is through the Superintendent of Documents, and then it is at a nominal cost which is usually a charge for the printing of extra copies. I think there are one or two publications that cost as much as a dollar but I believe most of them range in price from fifteen cents to forty cents.

To answer Mr. Bonsb's question with regard to securing the publication on natural gases, this publication has been reviewed once and returned to the office. As I told you a few moments ago, these papers are not written by just one man although one man's name may appear on the front cover, so of course it necessitates a great deal of time being spent to get such a paper ready. There is a question as to just when this publication will be available because the wheels of the governmental printing office grind very slowly and this being a publication with many illustrations, it will require, I would say, from two to three months, and possibly longer.

MR. SWIM: I believe, Mr. Fowler, that I have been able to think of that area I spoke of a short time ago. I think it is called the Sanford Area and believe the difficulty occurs at the time they put in their pipe or do anything else at the wells. They strike the same sort of gas.

MR. FOWLER: Had the gas been blowing through the pipe previous to that?

MR. SWIM: I think so. We had a well, for instance, that caught fire and burned

the rigging down and the state authorities made us shut in. I know we had to pay the gas crew an extra bonus and double time for working around the well because it was such a risk. I don't believe we are the only company having such experience with these fires.

MR. FOWLER: The Bureau of Mines is now making several experiments and while I am not in a position to tell you what those experiments are going to show or how nearly applicable they will be to field practice, I am sure they will give some help. I know we have had the benefit of various chemical engineers who have given us different theories to work on. We have packed some pipes with iron sulphide and have added to the iron sulphide from time to time, and we have also divided the sulphur. These pipes have been buried in acid soil, some have been buried in alkali soil and some in new soil to try and find out what has been taking place. We think we have got to find out just what is taking place before we can do any combating of the situation.

MR. MULLHAUPT (Kendall Refining Co.): I think these fires starting at the oil wells start at the tanks. I know we had one at our own plant. Now, I believe if the oxygen which is present can be eliminated at that source when operating, it might result in less of a hazard.

MR. SWIM: I appreciate the different suggestions that are being made but I can assure you gentlemen that I still do not think you have the correct slant on what I am trying to bring out. I am sure that I am correct in stating that every one on the ground is thoroughly satisfied that that gas contains something that is not usually contained in ordinary casing head gas. It is not a situation that has arisen in my own company alone but I might safely say it has occurred in at least a half dozen other companies.

CHAIRMAN SMITH: I might say, gentlemen, that Mr. Fowler gave us just a slight insight on his topic last year and I am sure we were all very interested and extremely glad to have such an interesting paper read to us this year. Mr. Fowler, we thank you.

CHAIRMAN SMITH: Going on with our program which has been arranged for this morning's session, we have with us a man who has been greatly interested in and also who has done a great deal of valuable work on Fire and Accident Prevention. The Conewango Refining Company has just completed a year's work on this particular subject and a great deal of this work has been led by Mr. James H. Herbert. At this time I take great pleasure in introducing Mr. Herbert, president of the Fire and Safety Marshals of the National Petroleum Association and also of the Conewango Refining Company at Warren, Pennsylvania, where he is assistant superintendent.

Group Activity in Fire and Accident Prevention

By JAMES H. HERBERT

**President, Fire and Safety Marshals of the National Petroleum Association,
Warren, Pa.**

About nine o'clock, on a hot July morning a little over two years ago, a small fire started in a pump house in a Pennsylvania refinery. Although the fire spread quite rapidly and made the pump house almost immediately inaccessible on account of the oil burning on the floor, it seemed to almost every by-stander that the fire could never reach to any great proportions because it was just in a pump house. When no visible attempts were made to extinguish the fire, the by-standers inquired and found that the water pumps which provided water for the fire hose could not be reached because they were in the pump house.

The sirens of the town Fire Department were soon announcing the arrival of fire fighting equipment. Many people were disappointed, and selfishly so, because,

liking the spectacle of a large fire, they believed that it would now be controlled and extinguished. However, the Fire Department seemed to be wasting time. A number of people failed to appreciate that there were no water hydrants in the vicinity of the refinery because it was located just outside of the Borough limits. It took several long minutes for the firemen to find a satisfactory location in a small nearby creek where their pumper might obtain water for the hose streams. Then, the hose sections had to be attached, and it was found that there was only enough hose for two water streams at the scene of the fire.

By the time water was brought to the fire, the pump house was a seething mass of flames, the still receiving house was on fire and several nearby run-down tanks were in flames.

In a comparatively short time a small fire had developed into one which threatened the very existence of an entire refinery.

The ineffectiveness of water, with the exception of its use as a cooling medium, in fighting an oil fire, is understood by practically every one. Only three streams were available during the first day of the fire, and only five the day following.

A long story of explosions and fire and smoke may be shortened by a brief statement that the entire refinery was demolished by a fire which lasted over four days. Approximately one and one-half million dollars represent the money value of the oils and equipment which were destroyed. Fortunately, no one was injured while fighting the fire but many men watched their source of income burn to a mere nothing.

Approximately one month after this disaster, a tank on the property of another refinery in this same district was struck by lightning; as a result, seven tanks and a wax house were burned before the fire was extinguished.

Shortly after this, a tank on the property of still another refinery in this district was struck by lightning. This fire was extinguished before any appreciable damage could be incurred.

Ten refineries are situated in the above mentioned district. The executives in each one of them began to worry not a little bit about the recent fires. At one of their weekly cooperative group meetings they decided that they should cooperate in some way in studying the causes of refinery fires and efficient methods of extinguishing them.

As a result of this decision, the fire marshals of the refineries in this district were instructed to assemble weekly at a predetermined refinery to inspect it in a search for fire hazards. The marshals were asked to make recommendations relative to the betterment of hazardous conditions. They were asked to recommend any amount of fire fighting equipment which they believed to be necessary to make the equipment at any one refinery complete.

This cooperative plan was adopted by the executives of these ten companies because they realized that, up till that time, the fire marshal in each refinery was working alone. What experience each one had had with fires was gained from fighting fires on the property of the company by which he was employed. What conclusions each one had relative to fire prevention were a result of their own theories which in turn were based upon their own individual experience.

The fire marshals in these refineries are not employed to act alone in this capacity because the average size of the Pennsylvania refineries does not warrant such an expenditure. The majority of marshals are usually assistant superintendents or yard foremen. They do hold responsible positions in the manufacturing departments and are, therefore, competent men.

Generally, the fire marshals paid particular attention to this side of their work only at times immediately after a fire was experienced on their property or on that of a nearby refinery. At other times, they may have kept an eye open for fire hazards but seeing the same conditions day after day, they soon become

accustomed to them to the extent that they dispelled any thought of their being hazards.

In the operation of the Cooperative Group Plan ten fire marshals, for instance, including the fire marshal at the refinery where the inspection is made, inspect a given refinery. With such scrutiny there will be failure to observe very few existing fire hazards. When any particular problem arises, there will be ten theories to assist in solving it, and these theories will be based upon experiences at ten different refineries.

This plan followed so exactly the cooperative spirit prominent in various departments of the National Petroleum Association, that the Fire Marshal's Department of that association urged the other districts to follow the same procedure.

The undeveloped resources which were brought forward through this work, and the potentialities of each group of fire marshals proved to be of such value that hearty cooperation was given to the work by many groups of refineries. The group work can, of course, be carried out only in districts where the geographical location of several refineries permits the fire marshals to meet together without anyone man having to travel any great distance.

During the refinery inspection tours, one fact seemed to stand out very clearly. Every fire hazard was an accident hazard, and a great number of hazards which were conceived at first to be in the accident category could also be considered a possible contributing factor in a fire hazard. It was very evident to the fire marshals that they could inspect a refinery in the search for accident hazards at the same time that they were inspecting for fire hazards. The two ideas run so closely together that one allies very easily to the other.

The work of accident prevention was then officially assumed by the fire marshals, and the original belief that they could consider safety as well as fire in their investigations proved to be not only possible but very desirable.

In inspecting a refinery in a given group, the fire and safety marshals, as they are now called, should and do act in the role of a competent advisory board whose suggestions, if followed, may determine at a crucial moment not only whether or not a refinery may be saved from destruction but also whether or not a life may be saved.

In becoming a member of such an organization each marshal more thoroughly appreciates his responsibility. He becomes a more competent man.

The activities of the groups are kept before the executives of the member companies in any district because copies of the minutes of every meeting are forwarded to the manager of every company represented. In this manner, the suggestions offered by the fire marshals to the X.Y.Z., Refinery, for instance, are read by the manager of the A.B.C. Refinery. Therefore, membership in such a group is stimulating for any company because it encourages the adoption of methods and equipment which should be a part of every progressive oil refinery.

The groups have supported two very important activities. They are, Fire Drills and First Aid Training within the refineries.

It is very difficult to talk to the employees in a refinery in such a way as to keep them continually alert toward the prevention of fires and accidents. Such a procedure is not an uncommon one, but it takes continued perseverance and the effect is not always as desired. Talks to the employees should not be discouraged but their effectiveness will be 100 per cent greater if the men are trained in First Aid to the Injured and in Fire Drills.

The Bureau of Mines has very graciously cooperated with the fire and safety marshals of the National Petroleum Association in assigning instructors to teach the principles of First Aid to the employees in the refineries in the various groups. The results of this instruction have exceeded all expectations. The employees are not only able now to administer proper aid in case of accident, but have been shown indirectly the results of carelessness. Every man who has completed the first aid

course prescribed and given by the Bureau of Mines, automatically becomes a safety first disciple. It is very interesting to observe the change in attitude which employees take toward accident prevention after they complete this work. In several instances, employees who had to be warned continually of accident hazards are now the ones who are issuing the warnings and making the suggestions toward more safe working conditions. It is a very splendid spirit.

The Fire and Safety Marshal's Department of the National Petroleum Association is attempting to keep this spirit fresh in the employees' minds by a proposed First Aid Contest which will be held for the first time during the coming Spring, probably at the semi-annual meeting of the association.

Fire drills produce an analogous effect upon the minds of refinery employees. Continued adherence to regular and systematic drills not only prepares the employees to be ready at any time in case of fire but also makes each employee a fire prevention man. Every time the fire whistle blows to announce a fire drill, every man thinks of what the sensation would be if the whistle were announcing an actual fire. They more thoroughly appreciate the danger of fires and it has been proven that, as a result, the men are very prompt in making suggestions toward the removal of any condition which they believe to be a fire hazard.

One advantage of dividing all the fire and safety marshals of the National Petroleum Association into as many group organizations as possible is the ability of being able to have each group study certain problems which are of interest to all the groups. For instance, one group may investigate to determine the proper method of applying raw steam to a burning tank. Another may investigate to determine the proper method of applying foam to a burning tank. Another may study the subject of safe loading rack construction, and so on. At the Annual Meeting of the Fire and Safety Marshals each group makes a report of its investigations and conclusions. Many interesting conclusions to important problems, may in this manner, be obtained by every fire and safety marshal. In an equal interval of time it would be practically impossible for a single group to investigate as many important problems. And very few marshals could intelligently do all this work without the cooperation of others. In a similar manner, any current problem which arises before any one group may be referred to another for comments.

The fire and safety marshals of the National Petroleum Association have been organized for not quite three years. Their work and plans for the future are still in a formative state. What success they may have experienced has been a result of the attentive cooperation of each individual fire and safety marshal. There are still many problems facing them, but the knowledge that they each possess a willing attitude toward this cooperative spirit leads one to a very firm belief that their success will grow.

This department heartily endorses this Group Plan, and it is the department's desire to be of all possible assistance to any organization which is contemplating the adoption of similar work.

MR. COOK (Travelers Insurance Company): I would like to ask Mr. Herbert a question in regard to safety measures under fire. Many times we run against a situation where people congregate around a tank or a well during a fire and many do so with the intention of giving aid, I suppose. However, it seems that too many congregate at such times and along with the by-standers who happen to be around, it results in a good number of injuries and even deaths which perhaps could otherwise have been avoided in cases where explosions have occurred. It has occurred to me that a fire crew around a fire should be limited to as small a number as could be considered efficient. Can you tell us what number or how many you would consider necessary for a crew around a tank on fire?

MR. HERBERT: I believe that would depend greatly upon the individual fire and its size. I agree with Mr. Cook that it does appear many times that there are 2

number of unnecessary by-standers visible. I do not, however, feel competent to answer that question without knowing the exact circumstances. I think that might be answered by some of the men present who have had experience along this line.

CHAIRMAN SMITH: I think with Mr. Herbert that the question is quite a general one and would be a difficult one to answer because it depends upon conditions which occur at the time of the fire.

MR. HERBERT: I might say the principal way of avoiding having too many men and to my mind the only way to be sure of having the proper number of men in a crew is to have fire drills within the plant. To my mind that is the only way and I have no doubt it is the safest. I say it is the safest because when you have fire drills at a plant that plant is usually divided into sections and each section has a number of men, and every man in that section has a different duty to perform. All the duties should be planned out ahead of course. You will find that such drills show a greater amount of efficiency at the time of a fire than the plants not having fire drills. A plant which has not had a fire drill is usually the most confused organization at such a time. Most of the fires that I have seen have proven so. This plant I spoke of in my paper would not have suffered such a loss had they organized a system of fire drills. The only way safety can be applied to fire fighting is to have fire drills and drills for safety.

R. S. BONSB (Standard Oil Company (N. J.)): How often have you found it effective to have these fire drills? Are drills held regularly; are the men paid extra when attending these drills and do you have them at the same time?

MR. HERBERT: The drills are usually held regularly. Some plants have their fire drills once a week, others have as many as three a week. Some plants have them every two weeks but they are held regularly. In many instances the president or some of the executives have cooperated to such an extent that they have encouraged the idea of competitive drills between the different tours or the different sections at which time they will offer a prize. Every man has his specific duty to perform and usually the tour which gets the prize or is chosen the winner the men are usually compensated in some manner. Some plants will give the winning tour a treat—for instance, a dinner is given by the executive of one of the companies which is more or less in the form of a reward. Another might give a day's leave and so on. The drills are usually held about the same time. The men are not always told when they are to have a fire drill. At some plants a whistle is blown.

I believe your second question was about pay? They are not paid.

MR. BONSB: I can't see what benefit they would derive out of a drill if they were always informed beforehand when a drill was to take place.

MR. HERBERT: Well if they should have a whistle blown for a drill and then the men find out it was done just to fool them they are not going to pay very much attention to fire drills when it is really necessary.

MR. MULLHAUPT (Kendall Refining Co.): Then it is your belief that they should know when a fire drill is to take place?

MR. HERBERT: Yes.

MR. MULLHAUPT: Do you not destroy the effectiveness if they know beforehand and are all ready for it?

MR. HERBERT: I do not believe you do.

MR. BONSB: I should think it would be best to have them unexpected, sort of offhand. I was just wondering if in your experience, Mr. Herbert, it would not be better to have those drills come unexpectedly, because the unexpectedness of a thing rather unnerves a man and he is usually on his mettle.

MR. HERBERT: That may be true, but I personally, am against it. I think that continual fooling them will not produce the desired effect.

MR. BONSB: I do not see why you call it fooling them. You mean you would

inform them of the day? I personally think you would lose the efficiency of the drill. Take any fire drill at a public school, they give the alarm and the children always file out very orderly and there has been no notice given previously to the sounding of the alarm. They go right through it and when a fire drill really comes they are used to it. Fire drills at plants are expensive things to hold unless you get efficient and worthwhile results.

MR. HERBERT: I admit fire drills are expensive.

MR. BLAKESLEE (Petroleum Representative, N. S. C.): I believe this matter is one of personal opinion. If men are trained to fight fires and know how to go about this work, it makes no difference whether they have been trained by surprise drills or not as long as they know how to go about fighting the fire. It is their knowing what to do that gets results.

CHAIRMAN SMITH: I think that is about right.

GEO. F. PRUSSING (Union Oil Co. of Calif.): The same method as that Mr. Herbert outlined in his paper has been applied simultaneously on the Pacific coast. I believe we had almost the same sort of fire there as Mr. Herbert described as having got away from them. Afterwards we made an investigation to see just why the fire got away. In the fire mentioned we were left in total darkness due to an explosion which occurred and destroyed the incoming lighting and power lines. After some study we adopted a zoning plan, making each operating force a fire-fighting force as well, so that we know now that when a fire occurs we shall have available men trained in fire-fighting.

The scheme before was to depend upon the maintenance men for the fire-fighting force. We all know they are not always present at night hence you must depend on the operating men.

The scheme finally adopted we call "problem fire drills." In any given zone every man has a specific fire duty. He is trained in the performance of these duties, one day a week immediately after going off shift. The men are assembled, specific fire duties outlined for them in their particular zone. The causes of the fires are taken directly from fires occurring there or elsewhere so that the problems are based on actual experience. Some men are assigned to handle the apparatus, but, in every case the exact duty is assigned. Other men shut down the equipment and stand by.

The men are paid for overtime and after they assemble and the problems are outlined for them and duties assigned, they go to their regular operating positions. Instead of calling a fire drill by fire whistle, the code signal is given, with the little call bell that is used in most of the plants for the purpose of calling men to the telephone. These men then go through their fire duties as outlined, some assigned to the fire apparatus, others bringing water or foam to the end of the hose, others placing foam pumps into operation. All cooperate to the utmost, and the theoretical fire is put out.

These fire drills after being tried in one refinery were introduced in all refineries and in many of the pipe line stations with the result that at the end of six months the men were begging for new problems as they had gone through the entire list that had been prepared for them. We have had these drills going more than a year and there never has been a fire that has gotten beyond its initial state. I want to add my word of commendation to Mr. Herbert's idea. (Applause.)

MR. HERBERT: I think it would be a very fine idea to have the Fire and Safety Marshals from each of the different plants make an inspection of other plants and get the different ideas from each of the different plants and compare their experiences with experiences of their own. Of course I realize that there may be some doubt as to whether or not they might get the impression that such a procedure might develop into a spying system. I know we do not consider it in that light in Pennsylvania fields. The men going about there have considered this phase as being in the light, more or less, of legal advisers. They do not go down

town, for instance, and talk about those matters on the street corners and they do not go about stealing the different methods from the different plants.

CHAIRMAN SMITH: Then there has not been an objection. In other words they are nearly as friendly as "Safety Men."

MR. HAMLIN (Standard Oil Company): During these fire drills, do you designate a certain place before the drill takes place?

MR. HERBERT: The place is usually unknown to the men.

MR. HAMLIN: Do all the different departments turn to every fire drill?

MR. HERBERT: Well, in the case of the Pennsylvania plant, it being a small plant, that is possible, but I would not care to state just what would be feasible at a large plant. That would depend upon the size of the plant, I rather think.

Member (Knowlton Olean Works Vacuum Oil Co.): I would like to ask Mr. Herbert what equipment they have?

MR. HERBERT: I will just give you a brief description of one plant which has the foam equipment. They have regular forty gallon extinguishers. They also use the regular foam system which is piped from what is termed the A and B tanks.

MR. PRUSSING: You have mentioned one method of fighting fires which in our experience has come in for a good deal of criticism. We have put in the plants under our control, various types of fire fighting apparatus and have also used the steam smothering system. In some of the natural gas plants, in certain of the buildings, steam smothering lines were part of the original equipment. We have never had a fire in one of these plants in which these buildings were involved. At the time the problem fire drills went into effect, one of the operations that had to be gone through was the flooding of specific buildings with the steam. It just happened that at one of the large plants a small building was to be abandoned and the executives of the company agreed to permit the building to be set on fire so that we could see whether or not we could put it out. The steam apparatus was hooked up and a line connected to a supply of absorbed oil. The valves were opened up slightly and the oil leaked on the floor of the building at a fairly good rate. The building was then set on fire. The foam system was available and there was plenty of water but the point was to see whether the steam smothering apparatus was really worth anything. It was interesting to learn, that all the steam we could pour into the building did nothing but accelerate the fire. This was due, I believe, to the fact that the building was equipped with a ventilating system. At all events, the building melted down before the steam could be put on to it. The result was we abandoned any reliance on steam for fire fighting in gasoline plants and made connections for using the foam system.

TRACY SHAW (Mid-West Refining Company, Casper): Our experience has been just the reverse. We found that the steam system worked very effectively when we had a fire where high test gas was burning. You could flood foam over it and it would have no effect. We have tried to fight such fires where we have put the foam in a regular blanket and have had the various companies send their men to our plants and demonstrate the different systems of foam apparatus but they have never been able to put out a fire for us with the foam system. We found we could fight a fire with steam and put it out in a very short space of time.

CHAIRMAN SMITH: Can you give us any information in relation to the ventilation of the buildings when you had these fires? Have you had any experience with the ventilation as a draw back to the use of steam?

MR. SHAW: No. The actual fires we have had to contend with the steam has always put them out effectively. If the buildings were ventilated it did not seem to make any difference. We always poured the steam in great volumes and kept it up.

MR. HERBERT: Speaking along the same lines that Mr. Prussing and Mr. Shaw have just told us about. We have found from past experience that the steam

proves very effective at certain times but there are times when it can not be used so successfully. I think it is most effective where the velocity is reduced, going from say a two-inch line and increasing to a four-inch line, giving a blanket effect.

MR. SHAW: Relative to the air and ventilation, I recall that while at a fire, I think it was about 1922, at a well that was producing approximately twenty-five hundred barrels of oil every twenty-four hours, we put that fire out with steam. I know you will agree that there was nothing around that well but the wide, wide world. There certainly was plenty of ventilation and the steam system worked very effectively. I must say we hooked up a lot of steam, used three lines. It took fourteen hours to rig it up and approximately fourteen seconds to put the fire out. We poured the steam directly at the point of the top of the casing and the flame. The flame probably ranged about fifty feet high above the top of the casing. We just poured the steam around the top and it went out.

CHAIRMAN SMITH: It would seem that as it happens in that particular case, you had lots of steam to depend upon. Some plants may of course not be so fortunately situated. It is a very interesting experience to learn about and I am sure we all appreciate hearing about it.

There is one other announcement I want to make while we are all here. It is sort of a personal announcement. You know we fellows all primarily have a job somewhere, a job with some organization and one which requires most of our time. Yesterday they gave me the honor, and I do consider it a great honor, of becoming Chairman of this section. It just happens that I too have a job besides being your Chairman. It is a lot bigger job than it was last year—all our jobs are bigger than they were last year. That was what I heard somebody say the other day—that our job is more than turning over nails and putting guards around belts, as it was possibly a few years ago. Our jobs have grown. You know what that means to most of us as much as you know what it means to you in your own organization. Our job is a research work which requires lots of thought and lots of time. I am coming to one point, perhaps you have jumped there already. That is this: the value that this Section is going to be to its members depends upon how much time each member will spare us to help out. It does not depend upon your Chairman alone, thank goodness, or upon the other officers. One of the most pleasing things that has happened to me since I came to this Congress, happened yesterday, after they had elected me Chairman of this Section. As I left the room yesterday after the meeting had adjourned, I had gotten as far as the door and many of the members here said "Smith, we are going to help you out all we can, and whenever you want any help just write us about it and we will give you whatever help we possibly can." I was extremely pleased about that. There were so many offering their help. I think you will all agree with me when I say that a few years ago, there would not have been very many members grouping around the new Chairman offering their help. I am going to say they are with us one hundred per cent because I really believe they mean it. There will be many times when the men in this room will need the help of others, I am sure. We all know that it is quite a job to bring about these meetings and that they entail a great deal of expense. I know we all want to get as much out of these meetings as we possibly can and also give as much as we can to the success of such meetings. It all depends, in my opinion, upon everybody doing his part and I hope you will all continue to be with us for the success of this Section.

I am going to submit a proposition which I think will bring about better interest in this section. It is that questions be written before these meetings and submitted by the different men involving general hazards, general safety problems, and so forth. Then these questions can be distributed to each man in this section and each man will answer the question in his own way, and regardless how small the matter involved may be, every fellow's viewpoint will be there. We may take a hundred and fifty answers or questions but it may be that the one hundred forty-

eighth answer on the same question may throw an entirely different light on that particular situation.

We could take—let us say—one hundred questions regarding the entire field, have them bound together and sent to each member. He could then refer to the questions which are of vital importance to him and in that way we would get each of the fellow's viewpoint. I do not suppose that there are any two men in this entire group who follow the same principle.

I believe we can arrive at the most stimulating and best way for the success of these meetings by sending out a regular questionnaire.

As an illustration take Dr. Lederer's paper, which was very important and helpful to most of us. I happened to ask the question with regard to preserving metal. He gave the answer right then and there and many of us profited by having the benefit of his knowledge. I'll bet there were at least twenty-five men who had the same question in mind, who were not going to get up and ask that question. Asking questions will certainly stimulate interest and we all will get ideas that will prove of great value to each and every one of us.

MR. SHAW (Mid-West Refining Co.): The Executive Committee is going to try and work out a publication program. You will receive a request for your experiences and any information you may have at hand, for use of our Section. You will have an opportunity to prepare papers. I would like to put over this one point to you. I take a great interest and spent a great deal of time in the Boy Scout movement. When we take a new member into the troupe the thing I try to impress upon him is that he will get out of scouting just what he puts into it. You will get out of this Section, gentlemen, just what you put into it and you will get more from your research work in the preparation of papers, probably, than anybody else. When we call upon you in regard to certain things for publication we hope you will give the best you have in it.

CHAIRMAN SMITH: I want to say that we have an Engineering Committee which has promoted some very valuable ideas. It is the intention of this Committee to promote more of this work. While it may not meet with just the specifications you gave, I assure you the Committee will give all consideration and will try and cover during this coming year all you have talked about.

Yesterday most of us saw the film strip which was promoted by the Engineering Committee of this Section. I forgot to tell you that this strip is available to anyone at the National Safety Council Headquarters if you desire to use it. We do not feel that this film is complete, in fact we know it is not complete. I recall one thing in particular that happened after this strip was made and before I left Chicago. A truck went in to one of our service stations to get gasoline and it so happened that the gasoline tank was situated under the front seat. The man put the hose in and started the pump. While he was pumping the driver stepped around to the other side of the truck and took up the floor board and began to clean the terminals of the truck battery. He apparently was using a screw-driver, and while he was cleaning the terminals a spark and a flash were produced. The truck caught on fire and was burned up and the service station was nearly burned up and that was all caused by a spark. That is one of the new problems which we have run into since getting out this service station film strip.

We have Mr. Newcomb with us, perhaps he will tell us something about high pressure equipment.

MR. NEWCOMB (The Standard Oil Development Co.): You all heard Dr. Lederer's paper yesterday and no doubt found it as interesting as I did. It has been my sole job, almost, for the past few years to study corrosion in all its forms. Particularly have I devoted a great deal of study to cracking equipment. We are inspecting cracking equipment in some nineteen different plants at the present time, six of which are in foreign countries, and I propose to give you a little talk now

not on how corrosion occurs but how we find it, and that has not always been so easy either.

When we first started seven years ago, we did not have much knowledge. We tried various methods to determine where corrosion started. First we drilled a few holes through the shell and found it was not as thick as when we started. We took one still that was condemned at a certain plant and drilled it at various points. At that time I found most noticeable corrosion at what was practically liquid level. It has been eight years since I did that first experiment, and I believe that ninety per cent of the corrosion will be found at the disengaging surface. Of course we do not overlook the other part of the equipment in our investigation.

One safe way we found to inspect cracking equipment is to inspect every single inch and piece so that you can determine the thickness of it. I will give you just a little idea how we go through cracking equipment. In the first place we made an inspection of a drum on the inside to see how far down it went from the surface, particularly examining the rivets with a magnifying glass to find how much corrosion was on the head. We found in some cases no head at all. We go over every inch and if it is not too thick we sound it all over with a hammer. We can tell by sound where it is thin and where it is thick. Then we drill holes, usually about nine-sixteenths. Then when it comes to the tubes in the pipe sills, we have developed a tubular micrometer which will reach in any point on the inside of the tube up to about twelve feet. We can expand that micrometer to reach any length. It is made with three pins sticking out of the cylinder held by a cone on the inside, the cone being moved by a screw shaft on the handle. A total limit of the micrometer is one inch on a four inch O. D. tube.

We also use the same method on our various pressure pipes from one part of the equipment to the other in so far as we can accurately use it. We also use long inside calipers to determine inside diameter of pipes. In many cases we found excessive corrosion and in many instances the tops corrode much more readily than the bottoms. We pass a light through the tubes and in this way we can tell whether there is excessive corrosion or not. Just as soon as a tube gets out of round the light becomes an eccentric beam of light and it becomes much more eccentric as it passes through the tubes.

We reach in with special tools into the valves. We measure the gate valves with split rings if valve is used for a throttle valve. For the various plug cocks we use the calipers. We put on special links so we can reach down into things. We measure every plug, get the thickness, and so forth.

I might state further on the oil equipment we drill particularly at points where the oil enters into the drum. Every safety valve is taken down during our inspection and by so doing we find out whether it has stuck in any way since the last inspection of the boiler. We find in many instances, that if we take a safety valve and pop it, it will pop much higher than it is set at. If we find that the valves are sticking and that this occurs between inspection periods, we then get the people at the plant where this occurs to have them taken down and inspected in between inspections. In this way we go over very thoroughly, every single part of these plants.

I have one man in particular who travels completely around the world and then when he comes back he starts out and makes another inspection around the world. We have an office force of several men whose duty is to check the inspection reports and do the necessary computations on them as they come in.

That is a very brief resumé of how we are handling this proposition. I might say we do this work in this country every four months, and in foreign plants it is done by my men once a year and by local people twice.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Power Press Section

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October 1, 1928

J. B. GIBSON, Chairman

Safety and Health Division, Western Electric Company
Chicago, Ill.

The first session of the Power Press Section at the Seventeenth Annual Safety Congress was called to order at two o'clock by the chairman, J. W. Henning, assistant superintendent, Personnel and Operations, Automatic Electric Co., Chicago.

CHAIRMAN HENNING: As chairman of this Section I am going to turn the meeting over to Mr. J. B. Gibson, our vice-chairman, who has had charge of the program. He will occupy the Chair for this meeting.

CHAIRMAN GIBSON: It seems quite appropriate that the Power Press Section should open with a luncheon as it is a well known fact that the power press people are a hard working people and I think the doctor will bear me out that good food, well served in a pleasant atmosphere improves the digestion. We will all have a chance to renew old friendships and make new ones, and we hope you will all enjoy the meetings during the week.

I think we are particularly fortunate in having with us today Dr. Harry Myers. We had to make arrangements with him way back in March in order to get him, as we understood he was wanted by other sections. From my own experience I know there is no speaker better qualified to strike the keynote of the Power Press Section than Dr. Myers, and it is a great pleasure for me to present him to you at this time.

Some Principles of Safety That Make for Success in Life

By DR. HARRY MYERS

Superintendent of Personnel, Frigidaire Corporation, Dayton, Ohio.

I feel very much complimented to see a great number of people in this audience who have heard me speak before and that you are here in the face of the fact that I am going to talk on such a subject; for I know that in most of the addresses that I have made I have discussed some of these principles, and here many of you are willing to hear it all over again. This is a very great inspiration to me.

I don't mind telling you that I could easily have found some other subject to discuss, but I am fond of talking on this particular subject for two reasons:

First—Because it is so necessary to the day's work.

Second—Because so few people are really thinking in terms of principles.

Now, can I prove these two statements? Take a look, if you please, at the first. Is it very necessary that we first find the principles involved before we can do good work? Well, let us see what some of our greatest men say. Let us consider Emerson first, and when we quote Emerson, we are quoting one of the most fundamental thinkers that America has ever produced. Hear him, then—

"Without *ambition* one starts nothing. Without *work* one finishes nothing. The prize will not be sent to you. You have to win it. The man who knows *HOW* will always have a job. The man who also knows *WHY* will always be his boss. As to methods, there may be a million and then some, but Principles are few. The man who grasps Principles can successfully select his own methods; but the man who tries methods, ignoring Principles, is sure to have trouble."

Consider the methods of Lincoln, upon whose principles rested the very life of our nation. Ingersol said of him, "Where no Principle was involved, he was easily swayed, willing to go slow if in the right direction, sometimes even willing to stop. But he would not go back, and he would not go wrong." Yes, he thought and acted in terms of Principles, and any executive today can learn the greatest personal lessons from Lincoln—the Executive.

Henry Ford says, "All of our apparent going forward is simply a progress farther into the heart of Principle. It is not a learning of new things, but a new learning of the old."

We could go on and quote the ideas of many of our great men and you would find running through it all this thought that we must find the proper principle involved if we are going to do anything right.

How in debt we are to those who can think out the fundamental principles! If you examine history or the great men of our present day, you will find that one of their greatest characteristics is that they think in terms of simple principles and define the issue clearly.

No one has stated the principles of modern business better than has Mr. Sloan, president of the General Motors Corporation. He says:

"Our principles completely expressed, as I see them, and they apply to every other business as much as they do to that of General Motors, are: Get the facts; Recognize the equities of all concerned; Realize the necessity of doing a better job every day; an open mind and hard work. The last is the most important of all. There is no short cut."

Please note that he says these principles apply to every other business and I believe if you analyze them you will find they do apply to every other line of work represented here today. Won't you agree with me that these ideas coming from the man I have named, proves my first statement, and that is, it is very necessary to find the proper principles to do the day's work right.

The Second Statement

Now let us see if we can prove the second statement. Is it true that very few people are thinking in terms of principles? Well, you try this out for yourself today! Ask anybody this question, "What are the principles involved in your job?" See what they say! Ask them then what were the principles of men like Lincoln. Ask them then the principles of any other of our great statesmen. Ask them the principles of our great industrial leaders and see what answer they give you. Yes, go back to our Greatest Teacher, Jesus Christ, and ask people what they know of His principles and I believe if you will carry out this experiment, you will find that very few people are thinking in terms of principles, but rather

in terms of isolated incidents. Yes, we know far more of historical facts than we do of principles. Yet these historical facts are really of less consequence to us for they can do practically nothing for us in our personal development or our work.

I heard Dr. Harry Emerson Fosdick preach a wonderful sermon on this subject. In brief he said, "There are two kinds of religion, the religion about Jesus, and the religion of Jesus. The first concerns itself with the historical facts of Jesus' life, and the second, with his ideas and ideals—his principles. Now the historical facts are something we can do nothing about personally, while his principles are the things that we can reproduce in our own lives. Yes, these are the "reproducibles." This was a wonderful sermon and I am glad it has been included in his recent book, "Adventurous Religion."

Now then, you ask the average man what these principles are, these things that truly influence us in our work and personal development and see how few people can tell you. I feel sure that if you carry on the experiment you will agree with me that very few people are thinking in terms of principles. So then you need not wonder why I am so interested in discussing this subject, and do so whenever I can.

The Principle of Your Work

I wish that I could carry out the experiment right here today and ask each one what are the principles that underlie your job, but the crowd is too large and the time too short to do this. If I could, I would like to ask every Safety Director, every Industrial Physician, every Personnel Manager, what are the principles that underlie your work?

So, Mr. Safety Director, let me ask you, "Is your job saving fingers, toes, legs and arms, yes, and lives?" To this I would answer "Yes" and again "No." And you, Mr. Industrial Doctor, what is your job? Is it creating a healthy working force by applying the potent principles of medical science to people as we now apply the science of physics and chemistry to products? To this I would answer "Yes" and then, great as that job is, I would have to say "No." And Mr. Personnel Manager, wherever you are, what is your job? Is it creating an intelligent and interested working force, ironing out human grievances and producing a harmonious working organization? To this also, I would say "Yes" but then again "No."

No, the work of every one here is the work of your company, and the work of your company is to make things at a profit that people can buy. Now let me see if I can prove this statement. If you have not already bought a Frigidaire, when you do buy it and I am sure you will, for it is incredibly quiet (Laughter); Oh yes, the advertisements are true; it is Beautiful and Dependable. Well, when you do buy this Frigidaire, are you going to ask of the salesman, "What is your Safety standing in General Motors?" "Do you have a Medical and Personnel Department in your company?" No, you will not be asking any of these questions, and mark you if you are buying a Frigidaire, you are our boss. Yes, we like to make this statement down at our plant, "We are all working for the same boss and that boss is the customer." No, the questions you will be asking are those which will assure you that Frigidaire is the kind that you want to buy and that the price is the price you should pay for it. So if you, the customer, the Big Boss, are not asking about our safety work and our medical and personnel departments, does it not prove to us that perhaps our job is far broader than we ordinarily think of and that all represented here today must be interested in production just as much as those actually engaged in it? I believe that is the true conception of your job, and the fact of the matter is that the safety, medical and personnel work done in your plants are the very things that help to make the kind of product that people

want to buy and at the price they want to pay for it. Yes, it is a definite fact that we could not make good Frigidaires at low cost unless we did have a safe shop and healthy people and a harmonious working organization. So that the principles that make for Safety undoubtedly must be the same principles that make for good work.

Now let us see if we can prove this statement. What are the things that are necessary to do good work? What are the things that every foreman must provide for his men before they can do the work of that department? There are six definite things:

1. A Clean and Orderly Department.
2. Proper Equipment.
3. Proper Materials.
4. Proper Instructions.
5. Proper Supervision.
6. Proper Pay.

But now, no foreman can give these things to his men unless the men themselves carry out the six things that are necessary to do good work. And here are the "Six laws of good work."

1. Follow instructions willingly.
2. Be clean and orderly.
3. Take good care of property and materials.
4. Work well from whistle to whistle.
5. Work every day and tell your foreman when you cannot.
6. Work well with others.

Now, I wonder if you see the relation of these two sets of laws? I believe here are the most valuable "pair of sixes" you have ever seen.

Responsibility of Foremen and Men

Now, let us see the perfect tie up between these two sixes. The foreman must provide a clean and orderly department, but he can never do it unless his men are clean and orderly. He must have proper equipment and material, but he can never do so unless his men take good care of the property and material after he does give it to them. He must give proper instructions, but what's the use unless the men want to follow these instructions willingly. He must give proper supervision, but how can he unless his men work well from whistle to whistle, and every day that they can, and well with others? Now if the foreman provides the first five, and the workman carry out his six, the foreman will then be able to provide his sixth, "Proper Pay," for pay is just the score card representing work well done. Now, my friends, we are not departing from our subject, we are in truth talking principles, and we are talking principles of good work, yes, principles of success.

Think then, if you will, about the principles that underlie these principles. Do you know that the second and third laws of good work have the power in them to change almost any man from a failure to a success? Do you know that they contain the very force that makes for progress of a man or a company. I wish I had several hours just to develop these principles. For once again, my friends, I am afraid that you are not thinking in terms of principles about these things. For instance, the average man thinks of a clean and orderly department in terms of janitors. Yet you can never keep a place clean just with janitors no more than our mothers could keep the home clean and orderly unless all of us kids would help by being clean and orderly. No, there is no greater mistake than to think of getting your plant clean and orderly by increasing the janitor force. The only way it can be done is to teach each man that he must be clean and orderly, and take good care of property and materials, and this will mean that expenses

will come down and the condition of the plant will improve just as when in the practice of medicine, I knew that my patient was getting better when the fever came down and his general condition improved.

Teaching These Principles

All of these things we try to teach our people both in lectures and by the use of our booklet, "You and Your Work," and if any of you are particularly interested, we will send you this literature if you will write for it. This I know, if you will grasp these principles and try to teach them to your people, you will soon see a wonderful improvement in both your men and in your plant. And, of course, in your product.

Have you thought of the principles behind the third law? Have you thought that this is the very foundation of success? Do you see in it one of Christ's principles, "To him who hath shall be given, and to him who hath not shall be taken away even that which he hath"? In fact, I believe the principles underlying the second and third laws are such a definite part of a successful life that we could absolutely change the world if we could get these two things done universally. I hope I am not too optimistic or enthusiastic, but I do believe that just as we have wiped out the scourges of yellow fever, malaria and many other diseases by getting whole districts clean and orderly, I *also* believe if we could get people to be clean and orderly and take good care of property, we could wipe out the scourge of unemployment and likewise of poverty, for it is a definite fact that the principles that underlie good work are so sound that there is not a thing going to be asked of any of us to make us better at our work, but that will make us better wherever we are.

We try to impress all of these truths upon every one in our plants through our booklets and our posters. Sometime ago we put this on our posters:

"There are always jobs some place for people who do good work. Do you know of any one out of work who follows the six laws at his work, and the second and third in his home? If so, please send his name and address to our employment department."

I do not believe we have ever put up anything that has created more thought in our plant. I have talked to many of our men about this and all agree that people who do these things are not out of work very long. No, they know how to work. That is, they know how to make things at a price that people can buy and this is what makes work, and moreover this is what makes success.

A short time ago, I was in one of our Employment Offices, with a visitor. In walked five young fellows, about twenty-one years of age. I asked them if they were coming in for work. They replied, "Yes." I then asked them where they came from and if they had all come together. The spokesman said that they all lived in a nearby town and that they had driven up in his father's automobile. I said then that I wondered if they knew how to work. They all replied, "Sure, we know how to work," and I answered, "Well, there are a lot of people who think they know how to work, but they don't." "Now these laws which you see before you, we believe, are the laws of good work, and I am going to show you how truly they describe people who can do good work."

"The second and third laws, 'Be Clean and Orderly, and Take Good Care of Property and Materials'—tell us more about people than anything else we know of; so I am going out and look at your automobile and if it is as clean inside as we want our plants to be, and if the mechanism is as good as we want our machinery to be, I am going to give you fellows jobs." I could see by the expressions on their faces that they were not very anxious to have me make this investigation, and I am wondering now just how many people in this audience would like to have their boss decide whether you would be retained or fired just

on the condition of your automobile or other property, and yet, my friends, there is no one test that will tell more about you than this. Well, one look inside of their automobile and it was easy to decide that we did not want these young men in our plants, for there were cigarette butts and burnt matches all over the floor and a big hole burned in one of the seat covers.

I tried to show them just what this told me about them, that it told me to a certainty that they were so unconcerned and so careless that they would not even throw a cigarette butt or a burnt match out of the window. And I told them that I was sure if we had many men like that our plants would soon look like their automobile, and with such carelessness we could not make good Frigidaires. Yes, I showed them that most people today, who are behind in their bills are in debt because they are not clean and orderly, and do not take good care of property and materials, that due to such neglect they were consuming more than they produced and that no one could ever get ahead who did this. These boys agreed with me that they did not represent good workmen, and that we should not be expected to give them jobs in our plants unless they changed.

These are the things we are trying to teach right out in our employment office before men are even interviewed, and I regard the teaching of these principles as one of the most important things that can be done in any employment department.

Safety and Success

But here we are at a Safety Meeting and are supposed to be talking things of safety. Now, let us see if these are not the things which really underlie safety. If a foreman provided these five conditions necessary for good work and his workmen really carry out his six laws, upon which all good work depends, what per cent of your accidents will automatically be wiped out. You will find this a most interesting check-up. If you will analyze your accidents in light of these two pairs of sixes, I believe you will find that practically all of them are caused by one or more of these things not being done.

I have asked many managers, safety directors and foremen to make this analysis. I have asked them, "What part of your accidents have been caused by people falling over things that should never have been there? What part of your accidents have been caused by something misplaced which fell upon someone? What part of your accidents have been caused by people stepping on nails, broken bottles and other things that come along with dirt and disorder?" For you see all of these questions indicate a violation of the second law and would not happen if a plant was clean and orderly. You will probably be astonished, unless you have thought it out clearly, to know that many of these men say that from twenty-five to forty per cent of accidents result from these things, and certainly if we would take then the lowest figure of twenty-five per cent, we would be very fair in our estimate. And I feel sure, just from my own experience as a family physician, that an equally large per cent of accidents about homes come from the same causes.

Now, let us look at the second principle, proper equipment. Analyze your accidents and see what per cent come from improper equipment, equipment that is not running as it should or equipment that is not properly guarded. And mind you, I do not mean to infer by this that equipment must be new or a type that is too costly for your own plant operations. I have seen many foremen confused on this point. By proper equipment we certainly mean equipment that is necessary to do work and that the plant can use economically. Ofttimes a plant must content itself with some improvised machinery because it does not have enough work of a certain kind to buy improved machinery. But I do mean this—whatever machinery you have, old or new, is it working properly or is there something about it that is not quite right, something that easily could be fixed in a very

short time and the only reason that it is not fixed is on account of carelessness and indifferent management? It is surprising to see the number of men working with small tools that are not intended at all for the use that is being made of them. Many workmen are hampered by just such things, and I really believe that it is a very simple matter to judge the type of foremanship you are dealing with, just by the kind of small tools that men are made or allowed to work with.

You see this subject of proper equipment is a large one and it reflects in no uncertain way the type of supervision in a plant. Yes, let me walk into a plant and find the machinery and tools in good condition and I will immediately tell you a lot about the management of that plant. There is an old expression that "a man is known by the company he keeps." I believe we can add a new one and say "a man is known by the equipment he keeps." If I were a foreman, one of the first ways I would prove my interest in my men would be by the kind and condition of the equipment I made them work with. It is all very nice outside of the plant "to say it with flowers," but in the department let us "say it with equipment."

Fundamentals of Safety Efficiency

Now, I just had to throw all that in to get you to see what I mean when I say, "What per cent of your accidents are caused by poor or improper equipment?" Estimates from men well qualified to know, place this as high as 25 to 35 per cent, and once again let us take the lowest figure, 25 per cent, so that we are, at least, reasonably accurate; and if you will add to all of this the fact that carelessness is one of our biggest factors in all accidents, and that dirt, disorder and poor equipment are the main signs of carelessness, it would be hard to place high enough estimate upon these two principles as causative factors in accidents.

In a similar way question yourself on the next three principles, proper materials, proper instructions, and proper supervision. I believe you will agree with me that most of the remaining 50 per cent of accidents come from poor materials, poor instructions and poor supervision. We will say perhaps ten per cent for improper materials, twenty per cent equally for improper instructions and poor supervision, totaling all these you will find this accounts for one-hundred per cent of all accidents. Now, maybe you will find these estimates too high. If you do, cut them down to any per cent that you think correct, and I honestly believe that any analysis of your own accidents will easily convince you that most accidents come from a violation of one or more of these principles. And if you will add to all of these different factors the influence of individual carelessness which accounts for these violations, I feel sure that you will find the cause of all of your accidents. And if you analyze these principles I believe that you will find the principles that underlie a safe shop are the same principles that underlie a successful shop. Yes, the principles of Safety are the principles of Success.

And if you as managers and foremen, safety, personnel and medical directors will see that these two sixes are done in your shop, you will bring about the very conditions that will mean safety, harmony and good work which always make good production and low costs. And if you will view your job in light of these principles you will find that your work is not a special department off by itself, but a real part of the whole production program, and I believe this understanding of your work will produce a type of cooperation that will always mean success for all concerned.

I feel absolutely sure that if you analyze all of these things, you will agree that the principles of safety are always the principles of success, and as you go back into your plants, this is the success I am wishing for you, and I hope you are wishing for me.

CHAIRMAN GIBSON: Dr. Myers, on behalf of the Program Committee, I would like to express our formal thanks and I feel sure I voice the expression of those who are here this afternoon. I am quite sure that Dr. Myers in this speech struck the right keynote.

ADJOURNMENT

October 2, 1928

J. W. HENNING, Chairman

Assistant Superintendent, Personnel and Operations, Automatic
Electric Company, Chicago

The second session of the Power Press Section at the Seventeenth Annual Safety Congress was called to order by the chairman, J. W. Henning, at ten o'clock.

CHAIRMAN HENNING: The first item on the program is "Reports of Committees" but we are going to dispense with that at this time. We will have these reports tomorrow morning.

We have with us this morning a woman very capable of talking on the subject, "The Woman Operator in the Punch Press Department." Lots of women have been employed in punch press departments but I don't think a man ever gets as close to the subject as a woman could and I think it is very fitting and very fortunate that we have this woman with us who will give us this talk today. She no doubt will bring out very many interesting points. We all have this problem of how to handle women and there are different things about them that a woman might see and know that a man would not and I believe we will learn a lot on this subject today.

The Woman Operator in the Punch Press Department

By RUTH I. STONE

Chief of Women's Personnel Department, Operating Branch,
Hawthorne Works, Western Electric Company, Chicago

I feel that I am not qualified to discuss this more than yourselves but perhaps I can bring a message to you and I am going first to read a letter that was sent to me. I will hold up the envelope so you can see it is a bona fide letter. The first part of the letter is of a personal nature so I will not read it. The writer is a girl who came to me before Christmas with two fingers entirely gone and part of the third. This is the letter dated February 27, 1928:

"The company has not settled with me yet. The Legal Aid Society said I have lost the use of my whole hand so I told it to the man in the Insurance Company and they are trying to do away with as little as they can. Miss Stone, don't you think they should have been more careful about having the machines guarded better and the left lever was tied? It was simply carelessness of the foreman. There are so many accidents here only on account of the careless foreman. Can't something be done? As long as I've worked in the Western Electric Company I've never seen one quarter as many accidents as I have here in two months. It will not help me but some other poor girl."

After having received that letter I have come down here to talk to you, not only about machines and the carelessness of foremen, but to see if there is not something we might do for some other poor girl, as this letter states, so she will not lose her hand or her fingers.

Now, may we be quite informal in this discussion. How many of you represent factories where women are employed in punch press work? Will you kindly hold up your hands? Well, that is fine, there are quite a number of you, so it is a common problem.

You know as well as I do that there are certain places where women cannot work on account of the machines and the size of the pieces to be handled. It

is almost entirely a question of weight as far as I have been able to determine. There may be some other reasons which will be brought out at the end of the discussion, but the only reason I see why a woman will or will not work in the punch press department is the weight of the part she has to handle.

What are you going to do about the girl who comes to work in the punch press department? How are you going to lay the scenery so she may play her part? I think the first thing to consider is this: the safe working conditions. I am asking for just the same working conditions that would be safe and good for men.

First, taking up the subject of light, which is of particular importance when you are working with small parts. I have worked on a punch press machine and I know what I am talking about in this respect. You need a good light and when you go back to your punch press department, I ask that you find out if you have a light on the machine that is good, see if you have a glare. If there is a glare, equip your light with a frosted bulb.

There is another thing to consider and that is noise. Often the dropping of a pan will frighten a girl, causing her to fall against the machinery and be crippled. You cannot keep it quiet, that is out of the question, but the aisles should be clear so that nobody is stumbling or falling against the machines, or unexpectedly dropping parts behind a girl who is operating a machine. Such sudden, unexpected noises cause accidents.

Then comes the question of seating. I was surprised in looking over the exhibit to find that many do not use chairs. I am told that some people like to sit and some like to stand when they work. That is perfectly true, but to use the treadle without sitting would be a terrible strain and I cannot imagine anyone doing it all day. I hope I may be successful in persuading you to provide chairs and fairly comfortable ones with backs. If any of you have worked in a punch press department you will know that the noise is fatiguing and that is something you cannot help, but we can reduce a certain amount of fatigue by allowing the girls to sit down. I think a comfortable chair should be provided instead of a box or a stool and you would then find a difference in production.

Also, everyone who works in the punch press department should have a physical examination. I knew of a case where a girl had an epileptic seizure and slumped forward throwing her arms in behind the guard. No one was to blame for that accident, but there must be lots of people in punch press departments who should not be there any more than she. Some people are subject to dizziness, some are apt to have nausea and other things that cause a girl to faint, and the punch press department is no place for the girl below par. Please see that your girls have a physical examination. In that way you will protect yourself and the girl as well.

I have visited a number of factories where all of the girls wore caps. I remember at one such factory I asked the manager, "Why do all of your girls wear caps?" The manager answered, "That was the first safety thing we did, we put caps on the girls." Excellent, but conditions have changed during the past ten years. The girls are not wearing long hair, they have bobbed hair and they have it marcelled, which costs a dollar and a quarter and then when they have to wear a cap it makes them warm and the marcel comes out.

That may sound like a trivial thing to you but it is not trivial to the girl. She has a "date" for the evening and has her hair marcelled for which she has paid her good money, but when she takes her cap off the marcel is all out and her hair is smooth and she is unhappy and has worried about it all day. If you would only consider the girls, you would remember that the girls you have on the job are more interested in the "marriage market" than a market for the goods she is producing for you.

Of course, girls are always thinking about their appearance and you have no

use for the girl who comes to work without regard for how she appears. I agree with you that a marcel is not essential to a good punch press operator, but the good operator is the careful girl and she is going to be appreciative of any little consideration you may give her. May I ask how many of you require the girls to wear caps? Several of you. May I ask you to go back to your punch press departments with the idea that you are not going to insist upon the girls wearing caps unless they are needed.

One man told me his girls were wearing them because they always had. Of course, they always have, but it is no longer essential in certain new types of machinery.

Then comes the question of special clothing. May I ask once more for a showing of hands? How many of you require the girls to wear some kind of a work costume, overalls, coveralls, or any other special kind of working clothes? There are a number. That is very interesting but I cannot see the reason for it. It may be that I have not thought through things far enough but I have not seen the necessity of having girls wear a special uniform in the punch press department.

When I first studied the question of women in the punch press department I looked for data about accidents of women but I found nothing except this little pamphlet, "Industrial Accidents to Women," which is put out by the Women's Bureau of the Federal Department of Labor. The states included in it are New Jersey, Ohio and Wisconsin, but they do not separate the punch press from power driven machinery.

However, it states that three-quarters of all accidents affecting women occur in the manufacturing group. One-half of these are due to machinery. Forty per cent of all of the accidents are due to power working machinery. Sixty per cent of these accidents are in the upper extremities. Seventy-two per cent of those involve thumbs and fingers, and that shows where we come in as the punch press, I believe, is the worst of all. At least in a New York State report the punch press was quite the worst—I might say, by far the worst. The large majority of the accidents are in the power driven machinery and the accidents are usually in the upper extremities.

As we consider the accidents in the punch press, let us consider the cause of these accidents. According to this report, one cause is that the machine repeats. Let me ask you to go back home and put your foot on the treadle and see if your machines repeat. I know of one company that has a fine record with regard to safety but through a slight accident they discovered that many of their machines would repeat. It was the fault of the engineering department and the foreman that there was no repeating device on them and it was just luck that nothing serious happened. There are two other reasons; one is "the guard did not lower far enough." That is one of the most tragic things one could imagine. Think of the girl sitting down at the machine with that hazard, the guard that will not protect her. If we give her a guard why don't we adjust it properly?

We owe that to the girl. We teach her to use a guard but when it does not lower far enough it is of no use. It would be much better to sit her down there and tell her about the terrible machine, tell her she is liable to lose her fingers or hand but that there is nothing to do about it but be careful. If the guard is not what it should be, all the protection is removed.

As to the result of these punch press accidents, when a girl has lost some fingers she is limited in the kind of work she can do, just as a man is. Not only that, but there is also the social effect. You don't like to look at the hand of a woman who has lost one or two or three fingers. Even if it does not make you particularly sad remember there are many things around the house she cannot do, such as washing and other kinds of housework. In several cases the report mentions

that her husband has to help her with the work and that certainly ought to gain your sympathy.

Safety men say to keep the fingers away from the point of contact, that that is all there is to safety in the punch press department, to keep the fingers away from the point of contact when the power is on. How are you going to do it? You must build safety in the tool. I learned that from you. There are several ways you can put the piece in and take it out without the fingers coming within the point of contact. It can be fed in automatically, by dial, by mechanical slides, and tweezers.

A number of the people in the smaller shops are going to say, "We can't afford to put those things in." They feel they cannot afford the elaborate equipment, the elaborate slides and feeds, so it cannot be done because of costs. You can do what we have done, you can use tweezers. In taking the piece out we are using several methods, gravity, compressed air, knockout and tweezers.

No matter what the job is, except where we have the automatic or dial feeds, we require every girl, regardless of the kind of guards there are, to use tweezers, and that rule applies to the men as well.

May I interrupt to mention barrier guards. When I sat down in front of the machine I found it very difficult to feed the parts into the machine because I could not see as I should through the diagonal strips. When it is vertical, one can focus but with this bar one cannot see what is going on behind. I didn't like it. I am speaking from the viewpoint of the worker, when I say that if you have the vertical you can see easily but when you use the diagonal it is difficult to see.

As to tweezers, I have several here that have been broken by operators recently. We have swing guards and barrier guards, and take every precaution, yet these things happen and they happen right along, not only to the new girls but the old ones as well. This one was broken by a girl who has been working on a punch press machine for fifteen years.

Experience in the Employment of Tweezers

You are going to say that tweezers cost too much money, by slowing production, that you could not stand for anything like that. I am honestly convinced they do not.

We started using the tweezers about 1906, long before I came with the company. They tell me that when they gave the tweezers to the men for the heavy press work they had to increase the piece work rate about fifteen per cent in some cases and as high as twenty per cent in others, but they never increased the rates of the girls who worked on the small parts.

We have a young woman as an instructor who tells me that when they handed out the tweezers some years ago she and two other girls were the only ones who had not lost fingers. She has been an instructor fourteen years and she said not long ago, "Miss Stone, I am here to tell you that the day they take tweezers out of the punch press department, I am taking myself out." That girl supports her father and mother and she could not afford to be without work but that is the way she feels about it, she would not work there without them.

Recently we had the time study man make some observations. The pieces were removed by air and the girl used tweezers in feeding and it took her 3.46 minutes to run a hundred parts through. Then she fed by hand and produced a hundred in 3.40 minutes. There was six hundredths of a minute difference between feeding with tweezers and feeding by hand.

Then he made a series of tests with other piece parts and other machines because he felt there should be more difference and to prove if the tests had been conducted properly. Four tests were made and the results were as follows:

By hand	By tweezers
Minutes per 100 parts	Minutes per 100 parts
6.9	7.8
5.5	5.0
7.0	5.7
5.0	4.3

These are the actual figures and as you can see the tweezers caused no loss of time in three of the five tests. However, as a concession to your prejudice or inexperience of your operators, let me admit that they might slow production as much as 20 per cent. Based on this supposition, one of our cost men figured in making a standard part for the telephone the use of tweezers eliminated a hazard which presents itself 11,066,000 times a year, and the increase in the total cost of the part would be only six-tenths of one per cent.

You can't tell me that you can't get the people in the punch press department to use them or that it will affect your cost too much. That possible six-tenths of one per cent increase in the cost of production is no excuse for unsafe methods.

I would like to have you tell me later why you think women should not be employed in the punch press department. I know of a firm that had women in their punch press department but because there were a number of accidents they decided to take them off and put boys there. However, they found they did not do at all. The women were quicker with their fingers.

The woman is not naturally mechanical, she does not think she knows it all, so she is willing to follow instructions, much more so than men or boys. Because she is afraid of the machine, she is not going to try any short cuts.

Most of the women obey the rules, but occasionally you will find one who does not. We had a girl who must have had previous experience on a press because when she was given tweezers to feed the small parts, she held the guard back with her elbow and began feeding it with her fingers. Of course, she got into difficulty, lost her thumb nail; she was lucky that it was not her whole thumb or her hand. I can promise such disobedience is the exception among the women operators.

Usually when a new girl comes into our punch press department, it is half a day before she will allow the instructor to leave her. She will ask her to teach her for a couple of hours and then she will ask the instructor to sit beside her for another hour. These girls are too scared to try anything unusual and you know that would not be true of the men, the men would be trying all methods of feeding.

The girls are cheaper than men or even boys and I don't see why it is not to your advantage to put them in the punch press department and make it safe for them.

I will be glad to answer any questions you may wish to ask but don't ask too many as I may not be able to answer them.

CHAIRMAN HENNING: If there are any questions you would like to ask now is the time to do it.

THOMAS CRAIG (Irving Pitt Mfg. Co., Kansas City, Mo.): Is there any objection in asking women in the punch press department or any other department to wear a uniform, assuming that it relieves her of the financial burden of buying clothes to work in? I have in mind a large plant where there are a number of girls employed and we found that the clothing they were wearing was not suitable for work of any kind and therefore a uniform was adopted. I think this is decidedly to their advantage financially and it is much neater.

I would like to know if there is any objection to wearing a uniform.

MISS STONE: In my mind not at all. It is cheaper, much cheaper. They can be bought for five dollars or less and she could not get street clothes for that amount. There is no reason at all why the girls should not wear them, but

remember this, women don't want to look alike. You men try to dress alike. When you dress for the evening you all dress alike, but when a woman dresses up she wants to look different from any other woman in the room. If she happens to meet another woman with a dress just like her's, she would never wear that dress again.

H. J. PUTNAM (American Can Co.): I would like to hear what your policy is in shops where there are belts, what do they do about guarding the belts?

S. H. LIBBY (General Electric Co., Bloomfield, N. J.): I would like to say regarding the guarding of machinery and belts that we have had more trouble with our male help than with the female. The young fellows today have a bunch of hair up on the top of their heads that no girls would stand for at all. The boys and young fellows are the ones who are more liable to get caught than the girls, that is our experience.

MR. PUTNAM: We have had a good many accidents. We have had twice as many accidents in the kick press department than we have had in the power press, or power punches, and we have just about come to the conclusion that it is as efficient to work with presses number two.

CHAIRMAN HENNING: We did all we could to guard against accidents on kick presses, but still we had them, so we discarded the kick presses, replacing them with number one and two power presses, in this way we eliminated our accidents and in every case increased production. This is an actual fact.

C. W. SCHEITHING (Oxweld Acetylene Co., Newark, N. J.): We have a guard that we believe is the last word in efficiency. I have some pictures I am going to put up outside of this room and everyone can look at them. The pictures show you how it works. I can assure you it is very efficient.

MISS STONE: We may not be able to eliminate all of the noise but that feature does need attention. There are certain things which we should try to get rid of as quickly as possible. We have a new machine, whose production I do not recall, but I can tell you it makes no noise at all and there is no hazard at all.

HARRY MOODY (Rochester, N. Y.): I am not advertising anybody's business but we happened to find a little guard through a salesman and if there is anyone who would be interested I will be glad to tell him about it. This applies to foot presses and it is one of the best things I have ever seen. We happened to have a group of 35 foot presses in our particular plant and our experience was unfavorable. We attempted to do everything and finally we happened to learn of this device.

MR. PUTNAM: Miss Stone, you have not had any accidents for the past five years?

MISS STONE: No, except a girl who fainted, and one who was ill.

MR. PUTNAM: I would like to know how you do it. I don't know whether others have had the same experience or not. We have a number of operators and we think we have a good plant. Miss Stone has been in one of our plants, I know. I think our machines are well guarded, as well as we know how to guard them, but in spite of all that we have accidents and plenty of them and the question is, "What to do?"

CHAIRMAN HENNING: You are speaking of the punch press department?

MR. PUTNAM: Yes.

MISS STONE: I have been in your plant as you say, Mr. Putnam, and I have never seen more beautiful machines or machines better guarded, and I don't see why you should have accidents if you have your girls undergo a physical examination.

You may occasionally get a girl who is temperamental like the one I told you who nipped off her thumbnail. The girl who is trying to find short cuts all of the time is not the girl to have on a punch press machine; she tries too many tricks. Such a girl came to us some time ago and the foreman said, "That new

girl knows too many tricks, let's get rid of her." We did, and three weeks later she lost her hand in another factory on a punch press.

M. L. DANNELLS (Reynolds Spring Co., Jackson, Mich.): I would like to ask Miss Stone whether she thinks there are more accidents where there are boys and girls working together in the same department?

MISS STONE: I know of a plant that had a run of bad luck and they investigated and found that it was caused by the boys speaking to the girls. They had boys as inspectors and they found they were talking to the girls; so they made a rule that no man should speak to a girl while she was running a punch press and they have not had an accident this year as a result of that.

G. S. THOMPSON (Detroit): In walking through our plant I always touch an operator before I speak to him. It is just purely a matter of psychology. I go through the plant a number of times and sometimes I do not speak to anybody, but if I do want to I just touch him on the shoulder and in that way you have their attention and you put them in a receptive condition to transmit to them your instructions. As has been said we have had accidents where some man or some woman was speaking to another and distracted their attention and we stopped that, with the result that we have had very, very few accidents that can be traced to that cause.

S. F. WALTERS (General Electric Co., West Lynn, Mass.): I have to disagree with the gentleman who just spoke. There are some operators who, if you were to touch them while they are working, would jump and be frightened almost to death. When I am going to speak to an operator I hold out my hand to let them know I want their attention and then they stop the operation completely. We had an accident some time ago and we found it was caused by the girls discussing a dance that had taken place the night before. I investigated this case and found the cause; they did not have their attention on the work and the girl had a narrow escape.

MR. THOMPSON: I don't mean to come up behind them and hit them on the back and scare them to death. I mean to attract their attention to you, that you are going to speak to them. I go through the punch press department perhaps a number of times a week and sometimes I do not speak to anyone, but if I did want to speak to anyone I would get their attention first before attempting to talk to them. Our girls all stand, none of them are sitting down, but we allow them to rest occasionally. Our conditions may be a little different from others but I am firmly convinced that you should get the operator's attention before you attempt to speak to him and in that way you will save trouble and accidents.

MISS STONE: I was brought up on a farm and one of the first things I learned was this, that before going into the stall of the horse you should always speak to the animal before you put your hand on it, and I think that would apply to humans as well.

CHAIRMAN HENNING: I will say that is quite a come-back.

L. BORAKS (Liberty Mutual Insurance Co., Boston, Mass.): I think the rule that they have at the Western Electric Company is very good, where the men operators are not allowed to converse with the women during the working period. It is good if you can enforce it but I think that would be a very difficult thing to do. These boys and girls are mostly at an age where they are attracted to each other; it is a perfectly natural thing. A boy will be running a press and there will be a girl directly in back of him and he will turn to look at her, especially if she is attractive. This is natural and the boy will be looking at the girl in back of him or the one in front of him and that will take his mind off of his work and in that way he may lose a finger. I really believe it is a serious problem to have boys and girls working in the one plant, more especially so in the punch press department, where it is necessary to have the boys or men to

handle the heavier parts, the heavier work. On the foot presses we have the slide feed but on the power presses we have automatic and we have the standard guards.

On the foot presses the accidents are not as severe as they are with the power presses. The finger may be pinched and you may even lose a finger but there are not as many lost fingers with the foot presses and the accidents are not as severe.

CHAIRMAN HENNING: I think it would be the reverse sometimes.

MR. BORAKS: I think the quality of the work may not be maintained by the foot press operator, because about four o'clock in the afternoon the legs become weakened and they can't always keep the work high enough to get the impression of the form and the work is not then of the best quality, but I feel that the accidents are not greater and not as severe, that is sure.

H. L. BRIGHT (Standard Oil Company of New York): There are certain cases where there are no guards and it would be very dangerous to touch the operator but I think you can attract his attention without that, just let him know that you want to speak to him and this can be done without either touching or speaking to him.

WILLIAM J. CULLEN (Royal Indemnity Co.): With regard to the accidents that occur, I would like to know if the accidents are investigated as soon as they occur?

MR. PUTNAM: Yes, they were.

MR. CULLEN: It seems to me if you can ascertain the cause you can correct that and in that way reduce the accidents.

MR. PUTNAM: We did all that. We have guards and we have almost built fences around the machines to avoid these accidents. Sometimes it is because of carelessness but we have these guards. We have people in the American Can Company who do what they are supposed not to do and what are you going to do with them? There has been a marked improvement at times and then we feel we are getting somewhere when someone throws a monkey wrench in the machine and we have to start all over again.

ROBERT H. LUCKENBACH (E. G. Budd Mfg. Co., Philadelphia): May I ask the gentleman from the American Can Company what inspection you have of the guards; do you have a proper inspection of the guards in the departments where the accidents occur? We have a punch press department and we use tweezers like Miss Stone told you about and these tweezers show you what would have happened if they were not using them. We had an accident some time ago and we traced the cause of it and we found it was due to the carelessness of the supervisor of the department, we laid it right there.

We know that the operators must be instructed to use the tweezers and the guards, or whatever it might be, and we have a strict discipline. The operator who is found to be disobeying instructions is sent home for a day so he can think it over. This is hard on his pocketbook and it may seem very hard to many of you, but by doing this we feel we are saving the operators' fingers and hands.

I want to say to you right now there is not a punch press department that cannot be made safe and if there is I want to see it. I have been in charge of punch press departments and I know what I am talking about. The machines can be guarded, it can be done, but you have got to get behind it, you have got to have a follow-up system, an inspection, and you have got to keep after it.

If you do not keep after production it is going to go down and the same is true of safety. I think the answer to your problem is a follow-up system of inspection, put the efforts behind the safety department as you do behind production.

MR. PUTNAM: We are doing everything we can along that line. We prepare a report that goes out to every superintendent each month, but in spite of all

the precautions we are taking we still have accidents. I don't know the cause and I am getting discouraged.

There is nothing to do except keep after them. We have gone thoroughly into the matter of protection and discipline, and also supervision.

MR. WALTERS: We have certain rules which the foreman must follow. The foreman must look after the men, he must see that the equipment is right and he must clean up.

If there is an accident the foreman must report it then and there to the proper authorities, he must investigate the cause immediately and report it that morning or afternoon, whatever the case may be. In other words, the foreman does not say, "My God, another accident," and then investigate it some other time. We get after it right away because you have got the whole thing right there.

Just one hour before I left to come to this convention I had one of the foremen up on the carpet for failing to report an accident at the time he should have done so. He said the reason was because they were so far behind with the work; and I said, "I don't give a damn what you get out; follow your instructions as they come from the management."

MR. PUTNAM: We have a report of all accidents immediately.

MR. BORAKS: I would like to know how many accidents you have a month and compare that with the number of employees.

MR. PUTNAM: I could not give you the exact figures.

MR. BORAKS: You have to have the number of employees to tell whether your accident record is good or not and what you consider bad may be a good record for some of the rest of us. If you could just give us the approximate number.

I have been through a number of plants, including the Continental Can plant, which I think would be similar to the American Can plant, and I really would like to know the approximate number of employees and the number of accidents per month.

MR. PUTNAM: I could not tell you how many punch press operators we have but I should judge about 4,500 or perhaps 5,000, and we have perhaps two or three accidents and perhaps more.

MR. BORAKS: I would not call that a bad record. I am talking from a knowledge of the game, I have been in this business for sometime. There are a number of plants where there are only fifteen punch press machines and they have four to five accidents a year so I think the average of the American Can Company is very good. They have from 4,500 to 5,000 operators and only two or three accidents a month. When you consider the production of the American Can Company I would not be discouraged at all.

If they did not have the guards they would have, instead of two a month, two hundred. Yes, sir, the American Can Company has done a wonderful job, I think. Their machines are well guarded.

The Continental Can Company employs a large number and they have had the same difficulty. We are never able to entirely cut down the accidents because of the human element, the foolishness of the employees and the damn foolishness of some others are going to cause some accidents and I think we ought to compliment the American Can Company with its 4,500 operators for having only two or three accidents a month.

MR. PUTNAM: Instead of two or three a month it is apt to run up to five at times.

M. A. KROGER (General Motors Corporation, Detroit): We do not make a uniform product and I think the gentleman from the American Can Company has something to throw his chest out about. Just stop and consider the work.

It is just as the insurance man said, we must consider the human element and also consider what Dr. Harry Myers told us about supervision. The foreman must keep constantly after it.

MR. PUTNAM: I am not encouraging laziness but I think our record is poor compared with some others.

GEORGE P. DE MELLIER (Royal Indemnity Co.): It might be interesting to classify the accidents so we would know which were minor and which were major. It might also be interesting to know the number of men and women employed.

MISS STONE: We have about 300 employed in the punch press department; about 100 women and the balance men.

ROBERT H. LUCHENBACH (E. G. Bugg Mfg. Co., Philadelphia): There is also the question of noise in the shop as the cause of accident.

MR. PUTNAM: We were working on a Russian contract and we had some Russians as inspectors. One of them came to me and he looked like a Bolshevik to start with and he came into my office and said, "Mr. Putnam, I wish you would do something about the noise out there. I am afraid it will ruin my musical ear, I am a violinist."

MR. DE MELLIER: I would like to ask Miss Stone if the sweep guard is satisfactory or whether it sometimes causes injury to the arms? Have you had any trouble of that kind?

MISS STONE: No. The force of the sweep guard depends on the pressure on the treadle. The new girl is apt to put a good deal of pressure on the treadle, but the older operators do not. I used one of the machines and I nearly wore myself out I used so much energy that first day I worked on it.

The guard comes down and knocks the arm, and the operator pulls the hand away. It is sort of a reflex.

W. JOHNSON (The Hoover Co., North Canton, Ohio): I would like to ask your opinion of the sweep guard and the screen guard. I would like to know which guard you consider the better, which one is the more successful in preventing accidents and getting production at the same time?

I want you to consider the matter of injury and production in giving an answer.

MR. PUTNAM: I don't think there is any comparison between the two.

MR. PERRY (Dayton, Ohio): I will say we had a sweep guard on trial for three months and we threw it out. We asked the operators what they thought about it and every operator had the same kick. They are sweeping back and forth like that; I would not have one in the department.

MR. JOHNSON: I want to state my question a little more clearly. I referred to the sweep guard that sweeps the hand away and not the swinging gate, or the swinging guard, but the hand sweeper guard; that is the one I refer to.

MR. PERRY: The one that travels in front of a man's eyes?

MR. JOHNSON: Yes, that is the one I mean.

MR. PERRY: There is a home-made one and also a manufactured type on the market.

MR. JOHNSON: Either the standard manufactured guard or the home-made one, it does not make any difference what kind. The guard I want to know about is the sweep guard, that sweeps the hand away when the press comes down, whether that guard is more successful.

MR. KROGER: There is a guard in the exhibition but I think the sweep guard is being condemned all over the country because too many hands and fingers are being lost as a result of its use due to the fact of improper adjustment.

Hands and wrists have been broken in making the sweep. Sometimes the set-up man will neglect to adjust it properly. Due to the desire for production the operator will try to work around it. The sweep can be adjusted so it will not cover the front in one place.

I have had some experience with this having lost a finger in the guard and I think it is a bluff. The guard in itself is meant to do a lot of good but if it

strikes the wristbone in the proper place, with a quick, short stroke, somebody is going to be injured. It does not feel very sweet I can tell you.

MR. BORAKS: I think that is an important question. Many people are prejudiced against a certain guard and I think the question should be, before you get a guard, whether it is adapted to your particular work and the sweep guard would not do where the work has to be held while the press is being operated. In a case like that the sweep guard would not be any good, it is going to damage the man's hand.

You must find out whether you can use the sweep guard at all and then I venture to say that you could only use it a certain percentage of the time. There are a great many operations where the sweep guard is not adaptable, but I can't see where the sweep guard is any worse than any other guards of the standard type.

If you hold the piece, what guard is there that will cover all of the work that you are doing? I don't know of any.

There is the gate guard that comes down and covers the work before you begin the press and that has its limitations the same way. I think if the gentleman wants advice on the subject he had better apply to one of the Advisory Board—not because I am a member—but if he will state his conditions to one of the members of the Advisory Board, they may be able to advise you as to the right kind of a guard for your particular operation. There are several members and they will be glad to help you.

MR. DE MELLIER: After our experience with the sweep guard we have been instructed to discontinue to recommend it.

MR. JOHNSON: We are using all of these things and my idea was to get an exchange of ideas in the hopes that we might get something that would be better, that would be more successful. I am interested in buying something that you will tell me is successful, that was the idea of the question.

I looked over the photographs outside and I was trying to decide on something that is better than we have in the plant. I think that is well worth time and I think this exchange of ideas is well worth time; in that way we can put in something in our plant that is working successfully in some other fellow's plant.

CHAIRMAN HENNING: If you have any more questions I would suggest that you keep them until Thursday when there will be further discussion of this subject.

I think we should express our thanks to Miss Stone for coming here and I would like you to give her a rising vote of thanks.

(Rising vote of thanks given to Miss Stone.)

CHAIRMAN HENNING: We will now hear from Mr. A. L. Kaems, of the Simmons Company.

Discussion of Punch Press Guarding

By A. L. KAEMS

Safety Engineer, Simmons Company, Kenosha, Wis.

I will take up your time for just a few minutes. I am going to talk to you about the small plant. I am not interested in the American Can Company or the General Electric Company or any other large plant. I want to tell my friend from the American Can Company with his five thousand presses that he has nothing to kick about.

We just heard a great deal about the different guards. Now I want to make myself clear about this. We have heard about the sweep guard and all of the others and I want to tell you that I sold guards for twenty-five years and I sold

the best guards that were on the market and when I put the guards in a plant I would have to sit back and wait for the letters to come in telling me that the guards were not working out as they should.

Now take the sweep guard for a left handed man and what happens? He knows how to run it left handed and he goes about it that way and he tries to get around the guard.

I know of a case where a man invented a guard and spent a lot of money on it, and a girl used it and she lost four fingers; the press repeated, and so it goes. We have some good guards that are being made today but we also find people who will find a way to work around them.

As I told you, I helped sell all of these guards and then I came to the conclusion that it was all wrong, because there were accidents no matter what kind of a guard you had. You will continue to have them as long as the man can put his hand in the danger zone.

Take the railroads, they have invented everything; they have put up gates at the railroad crossings, and yet there are accidents because people will go under the gates; and it is just the same with us, we will never stop punch press accidents as long as we must use them.

After giving up the selling of guards I started out along a different line and we have been successful. I went to different plants and worked this thing out. I am with the Simmons Company and we have 700 presses, and if the Good Lord does not throw a wrench into the works we will be able to say at the end of this year that we have not lost a finger since 1919 in our punch press department.

We have not done anything except to just take care. We have just used "horse sense" in our business; that is how we get by. Now to show you how easy it is. You heard Dr. Myers talk about efficiency and equipment; that is all you need, but it is sometimes hard to get. We have to consider the tool maker, and personally I think he is a wonderful fellow. The tool maker must have the imagination to do things, and it is so hard to come to them and tell them what you want as so many times they resent it, because the man feels it is his business and he don't want anybody to monkey with it.

That was the trouble in the beginning. I am going to show you a few little things. Here is a little thing I want to show you. The man had to put his fingers right here where the punch came down and I said "Why don't you slide it in?" and he said "It can't be done." I have a sign in my office which says "It Can Be Done." When this man said to me "You can't do it, Mr. Kaems;" I said to him, "Well, think it over tonight and come back in the morning and tell me whether you think it can be done or not." In the meantime I kept on thinking it could be done and when he came back in the morning and said "It can't be done," I pointed to the sign "It Can Be Done." He said "Well, Mr. Kaems, that may work sometimes but not this time." Then I showed him how it could be done and he has not said since that time "It can't be done."

My wife tells me sometimes that I swear but I tell her I don't. I want to tell you that we have not fallen down yet but we have come damned near it several times. You can see that you can slide it in like this just as easily as can be. I had something in mind about this. I knew it would have to jump this opening and I thought of skis. When a man comes down on his skis he does not land on the snow. Oh, no, they have a platform to allow him to jump, and then they have a slide, and they raise the front of the slide—so that is the way I did it. It is just as easy as rolling off a log. This man I speak of, when he saw that, said "I will never say a thing can't be done again."

We had a job where the man had to lay the part on so that his fingers were always in the danger zone, and I said "Turn the job around." They said "How

are you going to locate it?" I measured it and found the widest part and slid it in this way. Here is another job where the man can slide it in, like this. That material costs about sixty-five cents and it increased the production one hundred per cent.

We have gone on from one job to another. Here was a job where they were making parts for automobiles and the way they did was to put it in one way and take it out the other way. There was an accident, a boy was hurt and the superintendent said it was the boy's fault; he started to run the press and in an hour and a half he met with the very same accident that the boy had.

I was sent there to look up the accident and when I was asked if I could make it safe I said I would try. I took the two pieces home with me and Sunday morning I sat down and figured it out. My wife said, "What have you got there? You are working all week and then you come home and work on Sunday too."

I turned it half way around and cut the end here. Now the gage pin comes up here and the man said, "You can't work it because of that pin." I said "That is how I am going to work it." I put it in like this and when the piece was finished it came out like this. I ran the gage pin from the top down and not the bottom up. When he saw it he jumped up and down and said, "You got it, you got it."

We have equipped every one of our presses with slides, and the accidents on the presses were decreased. You will say "Oh, that is for the big plant, they can afford to do it; we can't do it."

So many people forget the little things that are right under their hands. These things can be done in the small plant where only 10 to 50 presses are employed and where there are a number of operations a day. Everything is ideal and all the man has to do is set it up. If you do this you will stop punch press accidents. If you tell your troubles to one another and talk these things over you will get results just as we have in our plant.

CHAIRMAN HENNING: Has anyone any question to ask Mr. Kaems? I think that is the answer for the small plant. That little piece came from our own plant. We don't make it any more in one operation, we do it automatically now and they are turned out by the millions. Mr. Kaems, I believe you have another matter which you wish to bring up at this time.

Resolution on a Departed Member

MR. KAEMS: It is willed that one of our co-workers whom I have known for twenty-five years, one of the hardest working men in this work I ever knew, an old punch press operator who had lost a finger himself, has passed from us. He gave the greatest of assistance in the work although he never took a very active part.

I therefore, move you that we pass a resolution regretting the death of our friend Herman Schwab, and that his widow be notified of this and that this resolution be spread upon the minutes.

To the members of the Power Press Section in Session.
Greetings:

In as much as it has pleased almighty God, the ruler of all things, in His wise providence, to take from our midst our beloved member, Herman Schwab, who passed from this life on September 3, 1928, a man who labored faithfully and won the friendship and esteem of the members of this division.

Be it Resolved, That we pay tribute to his memory by pausing in our deliberations and stand silent for one minute; and

Be it Further Resolved, That a copy of these resolutions be forwarded to his widow; and

Be it Resolved, That a copy of these resolutions be spread upon the minutes of this section.

Signed:

John Henning
Theo. Meisner
August Kaems
G. S. Thompson.

(The members arose and stood in silence for one minute.)

ADJOURNMENT

October 3, 1928**J. W. HENNING, Chairman****Assistant Superintendent, Personnel and Operations, Automatic Electric Company, Chicago**

The third session of the Power Press Section was called to order at 10 o'clock by the chairman, Mr. J. W. Henning.

CHAIRMAN HENNING: The first order of business this morning will be the Report of the Nominating Committee, Mr. Meisner, chairman.

Report of the Nominating Committee

T. O. Meisner (American Can Co., Maywood, Ill.): The report of your Nominating Committee has been prepared, as follows:

Chairman, J. B. Gibson, Western Electric Company, Inc., Chicago, Ill.

Vice-Chairman in Charge of News-Letter and Publicity, S. H. Slaymaker, Fairbanks, Morse & Company, Beloit, Wis.

Vice-Chairman in Charge of Program, R. G. Marter, National Enameling and Stamping Company, Milwaukee, Wis.

Secretary, C. H. Gerding, Western Electric Company, Inc., Chicago, Ill.

Chairman Exhibit Committee, W. J. Larson, Clum Manufacturing Company, Milwaukee, Wis.

Chairman Engineering Committee, T. O. Meisner, American Can Company, Maywood, Ill.

Chairman Slide Committee, F. J. Mares, Perfection Stove Company, Cleveland, Ohio.

Chairman Statistics Committee, J. E. Walters, General Electric Company, West Lynn, Mass.

Chairman Poster Committee, M. A. Kroger, Chevrolet Forge Division, General Motors Corporation, Detroit, Mich.

Chairman Membership Committee, J. C. MacLagan, J. H. Williams & Company, Buffalo, N. Y.

Executive Committee, The Officers and—

Louis Boraks, Liberty Mutual Insurance Company, Boston, Mass.

W. J. Graves, Michigan Mutual Liability Company, Detroit, Mich.

A. L. Kaems, Simmons Company, Kenosha, Wis.

J. W. Henning, Automatic Electric Company, Chicago, Ill.

E. Roth, Aetna Life Insurance Company, Hartford, Conn.

G. S. Thompson, Detroit Insurance Agency, Detroit, Mich.

G. A. Kuechenmeister, Dominion Forge and Stamping Company, Ltd., Walkerville, Ont., Canada.

J. E. Rockoff, Detroit Steel Products Company, Detroit, Mich.

CHAIRMAN HENNING: Gentlemen, what is your pleasure with regard to this report?

R. W. NEWCOMB (Brewer Tettehener Corporation): I move the Report of the Nominating Committee be accepted.

(Motion seconded and carried.)

CHAIRMAN HENNING: This is the Drop Forge Meeting. I don't know anything about it, so I am going to turn the meeting over to Mr. G. A. Kuechenmeister, personnel manager, Dominion Forge and Stamping Co., Walkerville, Ontario, Canada, who knows all about it.

CHAIRMAN KUECHENMEISTER: I heard a story the other day, that an optimist is a man going out to play golf, and a pessimist is the same man coming back.

Your chairman says I know all about this subject, but perhaps after the meeting you will not agree with him. We want some very frank, free discussion of our problems, and I think it would be a good idea to have a list of all of the companies represented at this meeting.

(Twenty-four companies were represented.)

Most of the companies represented here have a drop forge department connected with them.

This program seems to have been inverted; the paper appears last and the discussion first. I think we should have the paper first and have that lead up to the discussion, so I am going to ask Mr. Rice to present his paper at this time. Mr. Rice will talk on the subject, "The Growth of Safety in the Drop Forge Industry." It is my pleasure to introduce to you Mr. Rice.

The Growth of Safety in the Drop Forge Industry

By L. M. RICE

District Chief Engineer, Liberty Mutual Insurance Company, Chicago

With many of us, boyhood memories can recall the old village blacksmith shop and with all the romance of youth we saw the smithy develop a horse-shoe or a part of a wagon chassis and listen to his anvil music, but I never did learn why a blacksmith must draw a few musical notes from the anvil with his hammer before directing his striker where he was to hit the forging with the sledge hammer.

In later years when we came into the developing of safe practices and safe equipment, along with the increasing demand for heavy forgings and mass production, some of the early song seemed to take on discordant notes as we recall the somewhat dilapidated wooden shack with stacks of worn out horse-shoes piled in various places, old carriages and wagons in various stages of junk scattered around the yard. The old wrought iron anvil, the huge leather bellows, the open fire built in a stone and brick forge, minus in many cases a stack, for it would not be a blacksmith shop if we did not have some means of clouding the natural light so that the smithy could better judge his temperatures, at least that was what our heat treaters used to tell us.

From this setting we have stepped over a period of years to that of the modern forge plant with its fireproof building, high, roomy and with all the light good building design can provide, equipment for the removal of waste heat, exhaustion of smoke and gases, with forge fires enclosed in furnaces and mechanical means provided for loading the furnaces and ejecting the heated stock. When the stock is heavy we find mechanical means for conveying the stock from the furnace to the forge. The old anvil is gone and in its place we have dies and drop hammers.

The dark and dingy shop where the smithy had developed heat color skill in the tempering of his product is no longer a necessity in the heat treating, for our modern heat engineer depends not upon color, but rather upon the metal content specifications, time and pyrometer readings, and we find very little variation in his results.

It is not so many years ago that the forging of a piece of metal of a few hundred pounds was a rather difficult problem due to limited fire capacity and handling facilities, and frequently a lack of men skilled in the production of that class of work. Today, this has been made comparatively simple and easy with our improved equipment.

Our changing economic factors; such as the increasing value of human labor, the changes in modern business methods from the old custom of waiting for

orders to come in and then attempting to fill a requisition for which suitable equipment was not available to the present method of confining ourselves to a product for which the plant is especially equipped, at the same time anticipating the next year's output and going along without excessive pay roll change. The increasing development of mass production, along with various other factors in the trend of changing business methods, has made this change in our forge shop of today, and undoubtedly others will follow in rapid succession as the stimulus of competition urges us on.

With all of these changes potential accident hazards have materially increased, due to the demand for quantity production, heavier stock, heavier equipment, increased shop traffic, the disposition of gases, waste heat and the like.

The span of a comparatively few years has shown a tendency to specialize the industry into product groups, each with its special equipment and each with its process hazards.

Our state and national casualty rating bureaus, under the supervision of the various state insurance commissioners, recognize some twelve or fourteen forging groups so recognized by reason of their special equipment, processes, raw stock and finished product.

The actuarial experience of the various states indicates the accident losses of the heavy or general forging group to be approximately three or four times as serious as that of the light forging groups such as Razor and File manufacturing, depending upon the liberality of the respective compensation acts. Drop Forged Tools follow that of general forging in seriousness with our friend the blacksmith trailing third with the hazards dropping off along the line down to the Razor and File groups, which have the best experience.

It is evident that the general forging division of this group requires the safety engineer's most serious attention, both from the viewpoint of safe practices and safety engineering revision.

The struggle for quality and quantity production has induced the development of both heavy and expensive equipment, which in turn follows with a difficult repair and handling problem because of the weight and severe usage. The investment in the equipment and the loss of use during repair periods rather militates to the advantage of the safety engineer because the production division is more than anxious to make the equipment such that there will be a minimum of breaks in production due to loss of use either of equipment through mechanical failure or man power because of accidents.

Housekeeping

We have all learned long ago that an orderly house is essential to both safety and production and this is particularly true in a forge shop. So it follows that we find our modern shops bending every effort to keep stock moving in a continuous direction toward the final operations with as little handling and parking as possible, likewise keeping the waste cleaned up as that tends to slow up traffic. So we find use being made of buckets and portable stock trestles that can be quickly picked up by the crane or tractor and conveyed to the next location. Automatically this aids in reducing the handling material accidents to both fingers and feet.

Dies

Our old accident records seem to indicate that eye injuries were more prevalent in the die shop than in the forge because of chips and hot metal

burns. The answer to this is goggles and where the goggle idea has been sold and enforced, we have very few cases.

Provision should be made in the die shop for handling the dies, such as holes in the sides for lifting irons, as the weight and shape of the dies are difficult to handle otherwise.

The old system of trucks, rollers, bars, etc., used in setting dies brought the safety man a lot of grief. With the aid of hoists, monorail systems and in some cases a special tractor with provision to set or remove the die in or from the block, both time and accidents have been saved.

Die keys should be carefully selected as improper stock, improper heat treatment means grief. We recall an eye case recently caused by a sliver from a key while the key was being driven to position. Had goggles been worn the eye would not have been lost. It has been a problem to determine just what sort of stock is best adapted or even the proper heat treatment for die keys to stop the cracking, splintering, upsetting or mushrooming that the die key is subject to. Improvement in the selection of stock and heat treatment has helped, but not completely cured the causes. It, therefore, follows that we should make use of goggles as an added precaution.

The die setter should be responsible for seeing that the keys do not project out so far that they will cause injury to the operators. In key setting dies we have gone from the sledge to the dolly bar and sleeve and in some cases the pneumatic ram. Their use, of course, depends upon the circumstances under which they are to be used, some find a preference to the dolly bar with all of its unsatisfactory features, while others are able to get better results from the pneumatic ram, both from a standpoint of efficiency and safety.

Die Storage

Do not neglect the die storage either in the piling of heavy dies or the shelving of small dies. We get a serious accident frequently when the piling is made on unstable ground or where the shelving collapses from overload. It is so easy to overload that it happens before we realize it and while checking shelving see that protection is afforded against dies falling off the shelves on someone's toes.

Operating Methods

From the old practice where the blacksmith was a forger and wood worker, as the case might be, competition has made us specialists. Each of us is now limited to certain operations even in the development of a forging and if we hope to get the most out of a job we find it necessary to develop and adopt methods of operation that not only save material handling, but protect our equipment against breakdowns and above all protect the men from possible injuries.

Rules

General rules of operation are all right in a general way, but to obtain the least friction and the best results, departures and additions must be worked out. If we help the operators protect themselves and get the most out of their time, for after all the operator is a part of our organization, and if we are efficient we are going to draw out his best ideas and sell him on the best methods suggested, if we hope for efficiency.

There are few rules that in general apply to most forge shops such as:

- (A) Before starting work make an inspection of the equipment and make sure everything is in order.

- (B) See that the dies are warmed up before using. You may save broken dies with the subsequent loss of use, and time along with the attendant die changing hazard.
- (C) Provide scale guards and use them.
- (D) Before adjusting scale blowing lines, be sure that the hammer is not in motion and the ram blocked.
- (E) Provide long enough handles on the swabs used in swabbing dies so that the hands of the operator do not get under the dies.
- (F) All stock flash and other extraneous material should be cleared away so that it will not interfere with the treadle or make stumbling hazards.

It is not so long ago that we were experiencing a number of serious accidents by men cleaning scale from dies with a piece of cloth or short handled brush, but I think we are well away from this practice now. If some of us are not we should be, for if practice is continued it means amputations sooner or later.

On the smaller forging jobs we have some of the hazards of men getting their hands under the ram, but it is not nearly as frequently as that of cold work chiefly because the stock is too hot to handle with the hands and tongs must be substituted, and where long handled tongs are used we find less cases than where short handled tongs are employed.

Both types of equipment call for constant safety engineering revision, some more or less general and some special, as for instance, many operators of a few years experience have seen pulleys come off the machine and go on a trip down the shop and in many instances causing serious injury. This can be prevented by use of a suitable guard that will retain the wanderer even if the shaft breaks off.

Then there are other potential hazards that go along with special equipment or peculiar shop practices that exist because of the layout or special process hazards. This is where a good plant engineer and the safety man can work together and eliminate the hazard not common to average circumstances and it seems that most shops have some of these.

Safety Shoes

Like nearly every other safety device, we must first show why they are an advantage. Two shops that I have in mind made accident analyses of their cases and the committee through their inspector and ex-committee men made it a point for a few months to point out what safety shoes would likely have accomplished in each case and found volunteers to start wearing them and now they are being generally worn and it is having a material effect on the lost time cases.

Goggles

Goggles are almost invariably a contested safety device with the result that some shops require that they be worn by nearly every operator, some on special jobs and others not at all. They are without doubt necessary if we hope to save eyes. Some processes are such that eyes are frequently destroyed unless goggles are worn and on others at long intervals. Only a few days ago a blacksmith was holding a hammering tool for a striker when a scale on the center of the hammering tool flew and took an eye out for the blacksmith. This scale was not due to a mushroom head for they do not use that kind of tools, but was caused by the metal scaling under the blow. Goggles would have saved his eye.

Furnaces

Heat very naturally becomes a factor in the forge shop. Radiation of heat from the furnaces and stock in process is apt to become a problem that affects production and induces accidents during the hot season.

Some shops have reduced this factor so that they are not seriously troubled by providing suitable buildings, making use of water screens, chain screens and by the use of charging and ejecting rams and supplementing these with either blower fans or exhaust fans and at the same time keeping the stock moving, thereby eliminating radiation heat from the stock.

Furnaces are sometimes insulated to check radiation, other times by simply using sheet metal where space permits and let the air space hold the heat so that it can go upwards.

The transition from the old open forge fire to the modern oil or gas forge furnace has led us over a trail marked with numerous serious accidents, much of which has been overcome with improved burning devices and education in handling, but we are by no means at the fool-proof stage. If we neglect a safe ignition formula, such as seeing to it that the furnace doors are open, the use of long torch rods, the admission of oil and air in proper quantities and the wearing of goggles, we are sure to come to grief from unexpected flare backs even if we do not wreck the furnace.

It is not presumed that we can cover more than the high spots of all the various phases of the forging process that make accident combinations, but rather to give us a talking start on what can be done to improve our present devices and working practices, and develop ideas for better and improved engineering revision, such as aids in handling stock in process, improved devices on our equipment and the like.

Having done all these, if we have not made arrangements to foster the safety spirit, our accidents will continue and we will lag behind in the safety movement. Some sort of an organization is absolutely necessary; now that may take on the standard form used by casualty bureau standards or it may depart somewhat to conditions that fit a specific plant. You may have a safety inspector who makes the men his co-workers, it may be a small committee of the foremen and it may be the boss likes to make his foremen one committee and have a faculty of keying those foremen up so that they are alert to accident prevention. In any event, they must know all of the details of the accidents and give those accidents enough time and thought to know how to stop them and if this is done you will eliminate your cases, at least you will find yourselves in the front ranks of your contemporaries who have few accidents. But you cannot do it if your reports read—Cause?—Carelessness. There is a cause for every accident.

CHAIRMAN KUECHENMEISTER: Mr. Rice is one of the few speakers who present the subject as he was asked to do it. Very often a subject is assigned to a speaker and he gets up and goes off on a tangent, but I think you will agree with me that Mr. Rice has presented the subject as he was asked to do, and I also think you will agree with me that there is enough material in that paper for us to discuss for a week.

Now, the only difference between the three men who are scheduled to give five minute talks and the rest of you is that they knew they were going to be called upon. We are going to call on them first and then if you do not enter into this discussion I have the names of the companies represented and I am going to call on you to discuss this paper and we will stay here as long as there is anything to discuss.

Discussion by Mr. E. J. Wallman

E. J. WALLMAN (Safety Engineer, Great Lakes Forge Co., Chicago): We have all the problems that Mr. Rice has mentioned. You know that the drop forge department is one of the dirtiest you can mention, and for that reason, I suppose, as well as many others, we do not at the present time always get the type of man we could desire, the type of man who knows how to take care of himself.

As Mr. Rice said, the production today is increasing so rapidly that we have not been able to take the proper steps in safety work, or probably have not been able to keep up to production in the safety work.

The drop forge hammer and drop forging is one of the hardest things to guard. You can use pulley guards and belt guards and guards of different types, but you can't find any way to guard the work in the zone of the hammer and still do your work.

About four or five years ago we were in a rut at our plant. The production was increasing rapidly. In 1920 and 1921 the production was not so much, but 1923 and 1924 went off with a bang and we were unprepared to handle it. We had the same old type machines that we had had in 1920 and 1921. These machines had been used during the war and our company was in a rut in 1924. We had more accidents in 1924 and 1925 than we intend to have for the next five years.

The company, when they got the figures, said we would have to do something about it. I had been with the company for some time and I did not know anything about safety. I got some literature from the National Safety Council (of which we were not members at that time) and the subject was brought before the company and we decided there was only one thing to do, and that was join the National Safety Council; which we did.

I knew Mr. Kuechenmeister was doing a great deal of safety work in his plant and I got the fundamental principles from him; and since that time we have made rapid strides in getting ourselves where the rest of the live industries are in the matter of safety.

The first thing we had to do was to properly equip the plant and the next thing was to organize the foremen. We told the foremen that they were responsible for the accidents that happened in their departments. One of our first steps, and one which I consider the greatest of all, was the universal wearing of goggles.

I believe it was in 1923 that we went out and bought ourselves a lot of goggles and gave them to each one of the men. Everyone had goggles but that did not mean anything and then an accident happened. It happened to one of our best men we had in the drop forge department, a young fellow about 28 years of age. He was working at night; he went to use 110 pounds of compressed air and the compressor was turned on and you know what happened, the hose ripped one man's eye out.

We said at that time, "This will never do"; and I believe it was at that time I got in touch with Mr. Kuechenmeister and he said they were using goggles. This particular drop forge man had his goggles in his pocket so we decided to fix a certain date and put a notice up on the Bulletin Board telling the men they must have their goggles fitted and from that time every man had to wear his goggles, no matter who he was, from the president of the company to the milkman who delivers milk to the plant. They all have to wear goggles when they come into the plant.

Of course, we have done a few other things along this line and one of them is the matter of throwing the belts off. They say that "Necessity is the mother of invention." You know how it is when they are throwing belts off. A man would get up there with a big bar and he would throw the belt off. Sometimes it would go off and sometimes it wouldn't and one day the belt did not come off and the

man used a hammer in pushing the belt and it was a lucky thing that he was not hurt, but nevertheless it might have been serious; so we kept thinking about it, this throwing off of the belts. The man would shove them off with the bar and then a belt man of ours thought of this idea and it not only saves time in throwing off the belt but also saves the contact point and we do not have accidents.

(Mr. Wallman here described a belt remover.)

We have had accidents and I suppose we will continue to have some but there are several things, we find, that have helped. We do not trim the forgings cold, we trim them hot, and if you do that you will not have the punch press accidents. We do not make the forgings one at a time and in that way the man does not have to get his hand in the danger zone. That has eliminated most of our punch press accidents.

As Mr. Rice said, the accidents are mostly in the die shop, but we find they have decreased considerably since we have worn the goggles. About 80 per cent of our accidents were in the die shop, but now the tables are turned and there are only about ten or twenty per cent. It takes so much high pressure air to blow the scale off that it comes hot, and even if the man has goggles on, sometimes they do not fit as they should and the scale enters behind the goggles. I think that's all.

CHAIRMAN KUECHENMEISTER: There is one thing Mr. Wallman spoke about that I wish we had put more emphasis on and that is the belt remover, because I know something about that belt remover.

There are three terms used in civil government that we might very well use in our work—Mal-feasance, Mis-feasance and Non-feasance. Mal-feasance means doing a wrong thing; Mis-feasance, doing a thing in the wrong way; Non-feasance, not doing the thing that ought to be done.

We had an accident a short time ago and a man suffered a severe dislocation of an ankle. He was injured in throwing the belt off and I considered myself at fault because I did not do the thing I should have done. One year ago I heard of this development of Mr. Wallman's. He showed it to me at the convention and gave me the blue-print and I showed it to the superintendent and he said it was a mighty good thing and we talked it over with the foreman; but they all said, "That is all right for some one else but we never have anyone but an experienced man throw off belts and there is not a possibility of an accident."

A month ago a green man did it and suffered this dislocation, and I believe it is my fault that that man was hurt. I did not fight to have the belt remover used; but I started to fight after that. I wrote to Mr. Wallman—not to send me the blue-prints, but to send me the belt remover, and I got it. I gave it to the foreman and said it was to be used, that a man had been hurt and I felt responsible for it because I had not fought for it a year sooner. I said, "I wanted this used a year ago and you told me that nobody but an experienced man ever removed the belt, but here was this accident a month ago, and I consider it was my fault because I did not fight." The men are using the belt remover and I want to say right here that you will save yourself a lot of grief by using it. I know what I have gone through this past month and you will save yourself that if you will get the belt remover and make them use it. It will prevent accidents. Mr. Kroger is the next speaker.

Discussion by Mr. Kroger

M. A. KROGER (Safety Engineer, Chevrolet Forge Division, General Motors Corporation, Detroit): When I received the request some time ago to speak for five minutes on this subject, I thought how impossible it would be to discuss this subject in five minutes.

You have heard what Mr. Wallman has said; he has told you about the belt remover and several other things about safety; but when I received this request

I began to think of a five minute talk and it seemed like a very limited time to me for this subject. I realize you want to be fair in the matter, but I am from a large drop forge shop and I feel I could tell you very little about what we are doing in five minutes.

But I do want to tell you men who follow the drop forge racket—we will call it that instead of game—in the fifteen years of time that I have spent in the drop forge work, I have seen men come and I have seen men go.

In 1926 we had a very, very interesting talk in the Power Press Section on the education of our employees and we got them to go along this line for the Drop Forge men. We had no Drop Forge Section and we kept pounding and hammering and last year the Drop Forge sessions were started.

Drop Forging had been overlooked for so long and it is one of the oldest in the industrial game. It originated with the blacksmith shop, but it has been almost entirely overlooked by the National Safety Council.

As I have said, I listened to an address several years ago that interested me very much. I don't remember who gave the address but it was about educating the employees and I went back to the plant and immediately undertook this educational plan.

You know how the old journeyman used to do his work, I think we have a wonderful opportunity to do educational work; and there is no better place to start than in the employment office. We have the different classifications; the hammer man, the man for the heat treating and the die room and one thing we have got to consider is the question of labor turnover. A man comes to the employment office and is asked where he worked before; and he says, "The Blank Company, I worked there for two or three years and it is a wonderful shop." He is employed and sent into the shop.

Now the way I think you should do is to take the man and instruct him in the way you want things done. It is not a hard job, take him right from the employment office. The fact that I am trying to emphasize is that if this can be done in the biggest drop forge shop in the world it can surely be done in the others. We work with the individual employee and if we can do it, why can't the smaller shops do it?

Many of you have in mind that you cannot do this because you have not the time and the equipment to educate men, when you have hammer men, drop forge men and others; but I say to you that without a possibility of doubt you can accomplish this. Regardless of the number of hammers and the amount of labor turnover I still maintain that it can be done, it has been done and it will be done.

CHAIRMAN KUECHENMEISTER: Mr. Kroger has brought another angle in his discussion and I think he is perfectly right. You can instruct the men in the drop forge shop, probably more so than in some other sections, because of the apparently few classifications of men that you have. I know what Mr. Kroger is doing at his shop. I know the size of his shop and I know that if he can do it the smaller shops should be able to do it also.

The next man in this discussion is Mr. J. C. MacLagan.

Discussion by Mr. MacLagan

J. C. MACLAGAN (Director of Personnel, J. H. Williams and Company, Buffalo): It is a most encouraging thing this morning to see so many drop forge men here at this session. I think there are more here this morning than there were last year. Drop Forge sessions are young and we have got to grow, but it is encouraging to see that we are making progress.

I would like to tell you a story first before I go on with my discussion, as I think it applies to our attendance at these sessions. Some people went to visit a wonderful garden and they picked up some of the seeds and placed them in their pockets

and when they got home they planted them and got beautiful plants in their own yards. Now would it not be possible at this convention to gather the seeds that the various speakers give us and place them in our pockets and then at some future day they may bear fruit and help us with the work that we are doing?

We have come here this morning to listen to the speeches and exchange ideas, but I wonder how many of you men are going back home to use the things you have heard discussed? Do you get some neighbor or some man whom you consider as a competitor to come into your office and check up with him what he is doing about the things that are troubling you?

We have had some troubles and I have talked to other men and find they have, too. We have had trouble with pins falling; so we have developed a screen which fits over the operator's head and extends back to the wall. This can be opened at the top, it is placed on hinges so that the man can open it when he has to make any repairs, he can push it out of the way. We have had some of these made and it is just in the experimental stage at the present time. We don't know whether it is going to work or not; but we have had this trouble and in the discussion I would like to know if any others have had this trouble and how you are handling it. I think everything has been interesting this morning and I am in hopes we will have a great deal of discussion.

CHAIRMAN KUECHENMEISTER: Now before I throw this open for general discussion I want to tell you something that happened recently. A man was using tongs and the tongs kicked back and struck him in the abdomen, and the only reason that he is alive today is that the end of miracles has not come yet. At first the doctors thought he would not survive until morning but he is alive today, after having had peritonitis and pneumonia.

We got the story of the accident and some of the fellows said, "He was a damned fool, all he had to do was to stand to one side and it would not have happened." After we investigated the matter we found the true story to be this:

The foreman in charge of making tools for the upsetters told one of his men to make a hollow punch by beginning with a $2\frac{1}{2}$ inch diameter and taper it at a 7 degree angle. When the tool was almost completed the workman realized he was not coming out right and spoke to the foreman. It was then discovered that the diameter should have been $1\frac{3}{4}$ inches instead of $2\frac{1}{2}$.

The punch was laid aside and a new one begun. The foreman in charge of the upsetters needed the tool badly, so after discussing the matter with the tool room foreman they decided that the mistake would not ruin the hollow punch and that because of the large hole a vent hole was not needed.

The tool was put into the machine and soon after a forging stuck in the punch. Just as a helper was about to tap the stuck forging with a sledge to loosen it, it shot out of the punch and drove the end of the tongs into the operator's abdomen.

None of the foremen believed it possible to get enough compression in the hollow punch to cause the accident, but after trying out a few more forgings it was found that such was the case.

A vent hole was put into the punch and there was no more trouble.

Since then we have heard of similar cases in other shops and I want to warn you that if you are using hollow punches without vent holes, look out for trouble.

Now, I am going to ask for volunteers to enter into this discussion and if you don't volunteer I have the names of the companies represented here and I am going to call on you. We have forty-five minutes and we want a lot of discussion.

R. E. NEWCOMB (Brewer Tetchener Corporation): I would like to know how many new men he handles in a day.

MR. KROGER: It would not make any difference. You can handle anywhere from 15 to 200 men a day. We do that in the drop forge department. When it comes to instructing the men, it is no harder to instruct 200 than it is to instruct

50. We get them together in the morning and they are given a physical examination and then somebody from the employment department brings them into the shop.

I want to say to you that you can hire 150 men a day and you can take 75 in the morning and 75 in the afternoon and have them take the physical examination. I am emphasizing the fact of the physical examination because I think that is a very important thing and should not be overlooked and then you want to take the men and give them their instructions and inject just a little safety talk. I don't see why you cannot handle 50 men as easily as you can handle ten men. Does this answer your question?

MR. MACLAGAN (J. H. Williams & Co.): I don't think you can handle 50 men as well as you can five or ten. You get to know a man personally. I have never hired that many men at a time and I would not care to. I would not want to handle more than 20 men at one time.

MR. KROGER: You don't often get 50 at one time. They come to the employment office and then they are examined and they are then brought to the department. I don't remember a time when we had 50 all together. Not more than 18 at a time, and that would be for the day and night shift and they would be taken separately.

I would not attempt to address 50 men and expect to get over the idea as thoroughly as I would with 18.

MR. NEWCOMB: I do not know whether I made the question plain or not. We had a sudden continuous employment of men. We had one shift and then we put on a second shift and we are going to put on a third shift. We have all of these new men coming in. They are not all hammer men, some are in the drop forge shop and others are going to other departments, but they are coming in all day long.

They go to the employment department and then if they are taken on they go to the doctor's room until they are released by the doctor and if I tried to talk to all of them I would not be able to do anything else for a month, that was the point I wanted to bring out.

MR. KROGER: Well, you are hiring all of these men and you said they take a physical examination, didn't you?

MR. NEWCOMB: Yes.

MR. KROGER: You are hiring them all day long?

MR. NEWCOMB: Yes. From morning to night.

MR. KROGER: After they are employed, what becomes of them?

MR. NEWCOMB: They are examined and then they are sent to the foreman and he turns them over to the shop instructor.

MR. KROGER: Is there any possibility of curtailing your employment?

MR. NEWCOMB: No.

MR. KROGER: Well, I don't know the size of your shop or the number of hammers you have, or your production, but it is mighty hard for me to see that this cannot be done without much trouble.

I would suggest to you that you arrange your employment period so that it will not extend over the entire day. You notify your employment man just what your needs are and have the men sent to you in groups of three to five.

I want to ask this question: have you a safety office?

MR. NEWCOMB: Yes.

MR. KROGER: Then I believe it would be the safety man's job to spend a certain part of his time with these men and the rest at his desk and elsewhere.

You cannot spend all your time in the employment office, you have to go about the plant.

Our plant covers twenty acres—I don't think your plant is that large—and you

could not cover the safety work of such a plant and hire men, or attend to these men who are hired all day.

CHAIRMAN KUCCHENMASTER: Does the foreman instruct them?

MR. NEWCOMB: He sends them to the instructor.

CHAIRMAN KUCCHENMASTER: Does he give them a safety talk?

MR. NEWCOMB: He is not a safety man. He is a production man, he instructs the man to operate the machine.

CHAIRMAN KUCCHENMASTER: It seems to me he should instruct them how to operate a machine safely.

JOHN J. O'CONNOR (Chicago, Ill.): There are a number of things to consider about the man who is coming into the shop to work. The first thing he thinks about is what kind of a foreman am I going to have? What kind of a place am I going to work? I think it is well to place in the hands of the new employee a book of rules. This may be on safety or general cleaning, or something of that kind.

He can look this book over and he will remember what he reads; but in going into a new place where everything is strange, the employment man, or the safety man, tells him a lot of things and the chances are that he will forget most of them.

The foreman can tell the man things that he will pay much more attention to than if they were told him by someone like the safety man, or someone else. That is the point I want to make, that the man will pay more attention to the foreman.

We expect our foremen to pay as much attention to safety as we do to production. Our foreman tells the men under him about the safety rules and we also have talks by the safety inspectors.

When a new man comes in the safety inspector takes him out and shows him his locker and the place where he can get his lunch, etc. I really think you can get results when the foreman becomes interested in the safety work and regards it as a part of his job.

MR. NEWCOMB: That might be all right in a small plant but I do not see how you could work that out when you have 150 men coming in in a day.

CHARLES E. FOUHY (Willys-Morrow Co.): It is hard for the safety engineer to get into personal touch with the employees and attend to their education and do the many other things he must do. The foreman knows the men better, he is in closer touch with them and he should instruct the new men in the safety work and tell them all about the accidents, minor as well as major.

When there is an accident they notify my office and I investigate it, whether it is a minor or a major accident. If I am not in my office the girl gets in touch with me and I go and make a personal inspection. I go to the hospital and I think that is the best way to handle the safety work.

If the doctor finds there is a skin eruption, a dermal disease of any kind, he notifies me and I investigate it. He sends me a report every morning and I go over it and notice if one department is having more accidents than another; and if there are more accidents than there should be, that means they are slacking up and need a little bit of supervision; so I get busy and caution them and I get hold of the foreman and get him back in the old safety track.

We have had wonderful results. It is impossible for one man to get in touch with 13,000 employees personally, so we have got to place the responsibility upon the foremen of the departments. I have found the greatest help of all in safety work is personal contact day by day with the foreman of the various departments.

They have got so now that they call me on the phone to help them out, and I believe if the safety engineer will get in constant touch with the foremen, with the men who have charge of production, that you are bound to get mighty fine results.

THOMAS LAW (Oneida, N. Y.): I have never had the problem of hiring 50 men in one day or one month; the most we have hired at one time was four. We

always have one experienced man for each four in the drop forge room. I tell the management that I do not want more than four or half a dozen at a time and in that way you can check up the work.

There is no question in my mind that when you take green men into the drop forge room or the press room you have got to stay with them for two weeks, they have got to be supervised.

GEORGE THOMPSON (Detroit): This is all very interesting to me because it happened to be my unhappy experience to have supervision over a plant that increased its employees from 9,000 to 21,000 in three weeks. That is a complete increase of much more than 100 per cent. The labor was nondescript and they were taken on to do work of a highly skilled nature.

It would have been impossible to have the men go from the employment department to their respective departments. This plant is a mile long and five stories high and 800 feet broad and everything is manufactured in it.

In a case of that kind the personal contact would not be expected, but you know if you look through a ladder you can see as well as anybody. Some of the men were sent to the departments and were rambling through the plant and I found them on the roof. You know how it is in a plant of that kind. Some of the fellows thought they were being smart when they directed these new men to go right up a certain stairs which took them up to the roof. They thought it was a wonderful joke; but it was not a joke long, because these fellows got up there and did not know how to get down, as there were fourteen different entrances on the roof to take them down and they did not know which one to take.

After we had had some of these experiences we said "Here let's get organized." So we decided to handle them every hour. They were taken to the safety department and given their instructions, as many instructions as we could in a general way, and they were then turned over to a guide and that guide took them to the departments they were intended for, he would give them to the different foremen.

What was the result? Before this plan had been put into effect we had had four broken legs and three crushed feet, they did not know where to go and they got in the way of trucks, they did not know the reason for stepping out of the roadway into the passage way and the truck hit them.

After putting this plan into effect we had no broken legs and no crushed feet. If a foreman wanted men he put a requisition in for them and we sent them every hour. They wanted us to make it every half hour but we refused to do this. You can instruct the men in the fundamentals of safety in five minutes.

We worked from six o'clock in the morning until eleven o'clock at night. We kept the night men separate from the day men; we hired them and then told them to report at such and such an hour and we took the night men in groups of one hundred to three hundred.

This plan may be just the one the speaker needed. With regard to foremanship work; the man gets his instruction from the foreman. He explains to him how to run the machine and I want to tell you that if you put the responsibility on the shoulders of the foreman he will assume them and be glad to do it, because he knows he is going to get a better and more efficient workman if the man is interested in him and he knows just what he is going to do.

CHAIRMAN KUECHENMEISTER: I think this whole matter is one of organization. Most of you heard Dr. Harry Myers speak Monday afternoon and he talked about the fundamental principles that you have got to deal with, and they apply whether it is a big plant or a small plant. The method of applying these fundamental principles will vary according to the size of the plant. You must remember that the workman is human and you have got to keep after him, you have got to prod him to see that he is adhering to the rules, and then you should also realize that the foreman is the boss of the department in every way.

In our organization the foremen are absolutely sold and have been for the past four years but they must be "pepped" up every so often.

We must arrive at the fundamental principles and this matter of safety is the foreman's job. We make him responsible and it is up to him to teach the men.

I will say this: it is the foreman's duty to get out production but when we ask him to do that we don't expect him to run around and get the material and all that is needed to get out production. We have auxiliary departments to help him, and we believe it is up to the Safety Department to provide the material to help the foreman do his safety work.

L. M. RICE (Liberty Mutual Insurance Co., Chicago): This discussion has brought to my mind an experience that I had in 1914. We were running three plants and had 9,000 men employed and we had been working along this line of getting production and teaching safety and we knew we would have to spend a lot of money.

I remember at the time I talked to one of the foremen and he said "Well, one thing we can do and that is to better instruct the old men as well as the new ones." We went over the accidents and found there were only a few in each department and then the suggestion was made that perhaps the man who met with the accident would have met with it if he had been outside of the shop and it was suggested that each foreman should bring out and feature those things where the men might be hurt, and accordingly this information was given to us, these things that were essential, and it was my job to get that information.

We had rules printed and put up on posters; they were written in different languages. We followed this for two or three years and after checking up we found there were fewer new men getting hurt. We got the foremen to take care of getting data and observing the men because it is impossible to be all over the plant.

I think we should have the rules, it is a courtesy to the men we employ and we owe it to ourselves, to have him properly instructed. I thank you.

MR. NEWCOMB (Brewer Teteheuer Corporation): Did the men get the rules?

MR. RICE: We made the rules up on cards and the cards were given to the sub-foremen.

MR. NEWCOMB: Did the card cover all the problems?

MR. RICE: Yes.

MR. NEWCOMB: They gave the proper instructions you wanted them to give to the men?

MR. RICE: Yes. The foreman observed the men under him and noted the things on a card and it was turned into the timekeeper's office. When there was an accident he would tell how long the man had been there.

MR. NEWCOMB: Did the foreman do the work himself?

MR. RICE: It was generally done by the sub-foreman and he generally had an old employee sign it, or supplement what he had said.

MR. NEWCOMB: This was an advantage to the employee, himself.

MR. RICE: Yes, the fellows were always glad to sign.

MR. NEWCOMB: Our company is planning to have goggles worn by everybody they employ and I would like to have the experience of the gentleman here this morning with regard to that particular subject.

A man will put on ordinary lenses and he will say he cannot stand them. In many cases we have tested the man's eyes and found them to be better than the standard required. Now what are we going to do with that fellow? Are we going to get prescription glasses for him and exact a nominal charge from him?

Has anybody any experience along that line? I would like to add that we plan to charge two dollars a pair for prescription goggles.

JOHN J. O'CONNOR (Chicago, Ill.): I will tell you our experience. A man comes to us and says he has to have prescription glasses. We have his eyes

examined and if it develops that he has to have prescription lenses the company pays for them. We pay for the time he takes to go to the doctor and back and then we get the goggles and give them to him.

MR. NEWCOMB: You give them to him?

MR. O'CONNOR: Yes, they are no good to us.

MR. NEWCOMB: Then if he leaves you he can go to the next shop and he can take them with him.

MR. O'CONNOR: The Pullman Company has a department and they have a young man take care of it. He knows all about "plus 4" and "minus 4" and he will get the prescription from the doctor and put the correct lenses in the goggles. They are then examined by a doctor and given to the new man.

We have not done that. The majority of men who have had corrective lenses take them away with them, it depends on the individual.

MR. NEWCOMB: We thought they should pay for them.

CHAIRMAN KUECHENMEISTER: I hope you can arrange to let them have them for this reason, by doing so you can often spread the idea of wearing goggles.

I know of a case where a boy left us and went to work in another town several hundred miles away and he wore his goggles, he refused to work without them and a few days later the boss came in with an armful of goggles and put them on every man in the plant and today every man in the entire shop is wearing them.

We have been trying for years to spread this gospel of goggles.

MR. O'CONNOR: Six thousand had to have corrective lenses and the safety man tells me that only three men returned their goggles. I met a man who had been with us; I met him about three or four weeks after he had left.

He told me he was the only one in the new shop where he had gone who was wearing goggles but he said "I learned my lesson, I wear mine." Sometime later I met him again and he told me that about 75 per cent of the men were wearing goggles because he had established a precedent.

THOMAS D. LAW (Oneida, N. Y.): Does anybody have any experience in equipping the men with goggles who light the oil burner furnaces?

MR. MACLAGAN (Liberty Mutual Insurance Co., Chicago): What type lighter do you use?

MR. LAW: They go down there early in the morning and they get the furnace going. There are twenty-eight or thirty of them to light up. I don't know all about it myself.

Now the man goes in there and he is supposed to stay there until it is lighted, but one morning the man was in there and he had the torch and it was lighted. He had not put the light on but something happened and you can imagine what the man's chances were. I was wondering what you would do in a case of that kind.

E. J. WALLMAN (Great Lakes Forge Co., Chicago): We use torches that are five feet long and we have an arrangement on the end made of a coarse, heavy wire, about nine inches square. We have about half a dozen of those things and we keep them in a barrel of kerosene and they are put in the barrel when they are not in use. They go in and get them in the morning and light the torch in the furnace before they turn on the valve, and in that way they very seldom have any accidents in going around the furnaces. We had one accident but the man was not badly hurt.

MR. NEWCOMB: We have a piece around the burner and there is no flare-back. It spreads in every direction as it leaves the valve.

MR. MACLAGAN: Don't you get the flame from the side?

MR. WALLMAN: You will have trouble if you use the open goggles.

MR. NEWCOMB: Well, we thought it well to start this way, to wear the open goggles, because we think if you start with the closed goggles you will have so much trouble in getting the men to wear them, so we thought we would start with the open ones.

M. A. KROGER (General Motors Corporation, Detroit): Mr. Chairman, it is not a question of open and closed goggles, it is not a question of the men wearing them, it is a question of starting right and the type you need to meet different conditions.

I know there are a lot of men who do not like the cup goggle; now I am not against the cup goggle, believe me I love them, I think they are all right, I think they are fine, but there is a place for them and the place is not in the drop forge shop.

I think it is well for you to use the open goggles first and then lead up to the closed goggles, the cup goggles. If you start off with the cup goggles they will not go across, the fellows will say they can't wear them, they steam up, they get swaty, but if you can get him to wear the open goggles first and then lead up to the cup goggles, show him how they will protect his eyes you can get it over and the men will use them.

Start with the straight goggles and you will find that the men are putting something in the sides to keep things out of their eyes and then you come along with the cup goggles and say "Look, this is what you need." In that way you are going to sell the idea to that man and the others also.

That is my idea; I know a lot about this goggle question, some of the gray hairs I have come from worrying over them. I am sold on the proposition of the cup goggles but you have got to sell the idea to the men and sometimes to the management. It is a hard proposition in the drop forge heaters because the cup goggles get so intensely hot.

CHAIRMAN KUECHENMEISTER: We get men from all plants and they come in and they are wearing goggles and we say to them "Buddie, you must wear the type of goggles we wear." The man will say "Well, I wore this kind over at such and such a plant," and then we say "Yes, but we are three years ahead of them. You must wear the cup type here."

I want to tell Kroger that he has got a lot of men who are willing to wear the cup goggles because some of his men come over to us and they wear them in our plant.

I want to tell you of a case that we had. A fellow came back to us who had worked for us a few years ago; his brother was the last man to lose an eye in our place. This fellow came back to our plant from Kroger's and he did not want to wear the cup goggles. The first time I saw him wearing the open goggle I said "You damn fool, you ought to know better than to wear that type goggle. You know you have to wear the cup type." That man is wearing them today.

I will agree with Kroger that it is a lead-up proposition. We led up to it. It is all right to lead up to them but don't wait too long to get the cup goggles.

You may have some complaints about the goggles steaming up, etc., but when the goggles get to the same temperature as the room you will not have any trouble unless you go into a different temperature, and if they do steam up a little let them wipe them off. Tissue paper is the finest thing in the world to use and we have an unlimited supply of it for the men to use.

I am very enthusiastic about this subject of goggles and I want to tell you to insist upon the men wearing goggles and the type of goggles with side screens that are best suited to the work he is doing.

MR. MACLAGAN: I can sympathize with Mr. Putnam, of the American Can Company. We went through such a period this summer. It was necessary to hire a lot of new men and it is a hard proposition to get experienced men, and we went through this period and it was very discouraging.

MR. WALLMAN: With regard to this proposition of goggles; I talked it over with the general manager and he said if it was a question of production or goggles, that goggles came first.

We had a big Swede there, and there was not a job in the plant that he could not do, he was a wonderful producer, he was one of the best men we had in the plant but when we started to put in the goggles he objected to wearing them and we let him go because he would not wear the goggles. Now that happened right in our plant and that is what we would do with a man if he did not wear the goggles in the plant.

This rule applies to the foremen as well as the men, and it applies to everyone around the shop. If the President of the concern goes into the shop, as he occasionally does, if he forgets to wear his goggles he will go back to his office and get them. He would not think of going through the shop without his goggles on.

MR. MACLAGAN: What type do you wear?

MR. WALLMAN: Well, we had the same experience as Mr. Kroger. We used the open goggle first but now we use the enclosed type.

About six months ago we had an increase in the force and we had to put on some of our experienced men as assistant foremen, on both the day and night shifts. They took the new men and handled them.

We had our safety rules and we started these men right. I just want to tell you one little instance that came up. About a week ago a foreman came into my office and said "You remember that man we hired, that hammer man we hired the other night." I said "Yes, I have been waiting to see his name on the report." The foreman said "Well, I had him setting the dies and I went over there and everything seemed to be all right and then when I turned my back he was setting the dies without the block under it." I said "What did you do?" He said "He is not running the hammer, I took him off of that job and made a heater out of him."

After three or four weeks setting dies we will give him a chance to run the hammer because we feel he will have had enough experience.

We don't hire 50 or 100 men a day but some days we hire as many as ten. We don't want to put on a lot of new men on the hammer job or the drop forge job. We are making a quarter of a million forgings a day. We have been making small forgings, they do not run much over two pounds.

We have tried to work out our difficulties and we have the special instruction for the new men and we feel in that way we can build an organization that we can be proud of.

JOHN J. O'CONNOR (Chicago, Ill.): I would like to ask Mr. Wallman about that belt remover. Have you any literature about it?

MR. WALLMAN: I have one of the belt removers here with me and some photographs. I will be glad to show them to anyone who wishes to see them.

I want to say that we had some trouble about the men getting hurt in placing their hands under the dies. One man was hurt and he nearly lost his hand. I talked to the foreman about it and then everything went along all right for a while and then the same thing happened again. The foreman said "Just let the man go." I said "All right." Then we put another man on the job and the same thing happened again. I talked to the foreman again and I said "John, we can't keep firing the men, we will have to get something that will enable the men to get out production without putting hands under the die."

One of the boys made this little automatic arrangement.

CHAIRMAN KUECHENMEISTER: Did that help your production?

MR. WALLMAN: It increased our production about 200 per cent.

CHAIRMAN KUECHENMEISTER: Will you send that to me also?

HAROLD MOORE: We used to use 75 pounds air pressure and we found that was not needed and we cut the pressure down to 25 pounds. The engineer and the mechanical division worked it out and the general manager told me the saving in air mounted to three thousand dollars a year as well as a saving in accidents.

ADJOURNMENT

October 4, 1928

J. W. HENNING, Chairman

Assistant Superintendent, Personnel and Operations, Automatic
Electric Company, Chicago

The fourth session of the Power Press Section was called to order at nine-thirty o'clock by the chairman, J. W. Henning.

CHAIRMAN HENNING: I want to call your attention to the *News Letter* which you will find on the chairs. I am going to ask you to take them home and read them. Vice-President Slaymaker has put a great deal of work into this and I think it would be appropriate to give him a vote of thanks for his work and I will now entertain such a motion.

J. B. GIBSON: (Western Electric Co., Chicago): I make such a motion, Mr. Chairman.

(The motion was seconded and adopted.)

CHAIRMAN HENNING: I want to take this opportunity of introducing to you our new chairman for the coming year. Mr. Gibson, please stand up.

(Mr. Gibson stood up and the members applauded.)

CHAIRMAN HENNING: I am going to make him do all of the work this morning, that is what he was elected for. I will now turn over the meeting to him.

(Mr. Gibson in the Chair.)

CHAIRMAN GIBSON: I would like to express my appreciation to the committees connected with the Section. I met the members of the committees during the past year and I anticipate much pleasure in working with them during the coming year.

In any successful accident prevention program the safety engineer has to rely to a very large degree upon the cooperation of the supervisory force if he expects to obtain the best results, and in safety work as well as other industrial problems, the human problem becomes most important.

In saving the most important thing to the last—the training and the teaching of the foreman—we are fortunate in having with us a speaker who is designated on the program—Mr. M. J. Kane—because of his experience which covers several years in training men, foremen and supervisors, as to their jobs.

At the present time Mr. Kane is associated with the American Telephone and Telegraph Company, as plant engineer in charge of training. It is with considerable personal pleasure that I present to you Mr. E. J. Kane.

Training the Foreman to Be a Teacher

By M. J. KANE

Engineer in Charge of Training, Plant Department, American Telephone & Telegraph Company, New York City

Training as it appears to me can be expressed as:—

"The *development* of an ability consisting of ideas and action which, when combined, result in doing that which is desired, in the way that it is best to do it."

The training of a foreman as a teacher is covering only one phase of foremanship where training would be profitable.

The foreman, of these days, should be trained in many things. I believe training him as a teacher will help other features of his work that are not seen at first glance, or connected with teaching as such.

Nearly any dictionary will define the word "teach" as follows:

"To impart knowledge to others by lessons; to give instruction to others; to

guide by precept or example; to train by practice or exercise; to impart skill or facility."

Synonyms for the word "teach" are found to be:

"Discipline," "drill," "enlighten," "inform," "train."

The same dictionary will define "teacher" rather tritely as "One who teaches, specifically, one whose occupation is to teach others."

If we say a teacher is one whose sole occupation it is to teach others, obviously we are not defining a foreman. If, however, we say that any one who has to teach, as the dictionary defined the word—whether it be his sole occupation or only part of the occupation—is a teacher, then we must admit that the foreman qualifies as one.

The synonyms for "teach" prove this. The foreman must drill, enlighten and inform the men who report to him. It is true that this is not the whole of his occupation and in some respects, not the most pressing part of his occupation. Whether a foreman will recognize it or not or whether the organization of which he is part, believes it or not, he is, of necessity, a teacher.

Teachers Can Be Developed

If the ability to teach was of the same inherent character as the color of eyes and the shade of hair, not capable of change to any marked degree, the selection of foremen would be limited to those people who are "born teachers." Fortunately, this is not true.

Teaching ability can be and has been built up and improved in individual cases. We do not wait for a man with *all* the qualifications required before appointing a supervisor, because some of these can be developed. Teaching ability is one which may not be in evidence prior to appointment to foremanship. However, there must be a certain level of proficiency in teaching which must be developed and maintained in the case of foremen. Before we condemn and throw out any foreman who apparently is not up to the required proficiency as a teacher, it is better economy to attempt to develop in him that particular art. It is usually only necessary to supplant wrong conceptions with right ones so far as the foreman as a teacher is concerned to make remarkable reformations.

How Can This Be Done?

The answer to this is quite simple and sound. It is to have one who is capable of developing a teacher work on the foreman in an attempt to develop this teaching ability. We know, that if it was thought necessary for a foreman to have first-hand knowledge of methods used by some other foreman, he would be sent personally to observe such methods in actual operation. If a particular practice has been modified in a process careful attention is given to getting this information into the hands of the foreman. We do make quite a considerable effort in a number of supervising activities to give the foreman at least an even break on matters which will affect his foremanship. It is not unreasonable to suppose that the same practice will be productive of good results if it is extended to include the field of teaching that the foreman covers.

There is one feature that will bear emphasis in this connection. We do not send a foreman to observe methods where there is uncertainty and unfamiliarity with these methods on the part of the man using them. When we issue new instructions, drawings and changed specifications to a foreman, we do not make use of an individual who is not familiar in every respect with the specifications and instructions. In each case we choose an expert for him to work with. To properly develop his teaching ability we should follow the same common-sense practice. In selecting

the individual who is to train the foreman-teacher we should look for ability and knowledge of the teaching art.

Good Teaching Saves Time

It is a mistake to believe that effective teaching takes longer, in point of time, than the usual or casual method of letting a man learn for himself or by simply telling him something in an off-hand way. The question is not so much whether telling constitutes teaching as it is one of how this telling is done. It is quite possible to learn by being told a thing. Many of us have personal evidence of this. It is also equally possible to be told things and not to learn that which was expected to have been conveyed.

We have personal evidence of this, too. It is in the actual certainty that definite pieces of information are really learned, that the teaching art bears fruit. It will take less time, to impart, train, instruct, etc., using sound teaching methods than it does to utterly disregard these and to place the full burden of self-teaching on the man who must know these things. The only extra equipment that will be required for the foreman to do effective teaching will be mental on the part of the foreman himself. The everyday work offers the best laboratory in which training can be done. The tools, material, equipment and condition being real are by the fact, the most effective. The mental equipment of the foreman will be an appreciation of the common-sense view of what teaching really is, and some drill in a different use of abilities he already possesses.

Definite Principles Underlie Good Teaching

The principles and fundamental practices of teaching are of such a nature and kind that it is fruitless to expect a foreman to acquire them without some attempt being made to aid him in his direction.

Just as was indicated in the case of the changed engineering practices, or the new methods, the need is for an expert thoroughly familiar with the practices. It is not good business to attempt to substitute enthusiasm and willingness for technique and ability as a trainer of teachers. We very definitely say in the training of people for a vocation that the first requirement made of one who qualifies to do the training is that he personally know the practices and the technical information of that branch of the vocation in which he professes to do training.

Naturally, if we apply this same thinking to the man who is going to train teachers, we will find that the first requirement is that the individual know teaching practices. He must know the fundamental teaching principles and have actual teaching experience enough to assure the people being trained a proper appreciation of these methods and their uses.

This particular teacher training technique cannot be acquired over night. The fact that the fundamentals are easily stated and because they are easy to comprehend, has misled many people to undertake to apply them without the background of their use which is the most essential part of any teacher training program.

In addition to the right selection of man to train foremen as teachers there are several other features to bear in mind when setting up this work.

The first error commonly made is the attempt to do this training work in too short a period of time and at odd intervals. As a concrete illustration, many attempts of the following nature have been tried:

A group of foremen meet with a leader who usually is without much teaching background himself, for one hour or possibly two hours, once a week. A conference method is attempted without a clear notion of its fundamental use.

It has been very definitely demonstrated that on a conference basis less than

eighty hours of training for a foreman as a teacher is almost wasted in point of effectiveness. It is not difficult to compute the length of time in months necessary to qualify the individual at the rate of one or two hours a week. A more practical way to equip the foreman to teach is to use an intensive full-time period for training. This gives the best results not only from the view of the quality of teacher training but, by equipping the foreman to *apply* the teaching ability during the time which is still devoted to preparing him on the one-hour-a-week basis a sound economy is achieved. The benefits of this are so apparent that no mention need be made of them.

In order to effectively train foremen as teachers, there are four steps to bear in mind.

First: Select as the one who is to make teachers of the foremen, a man who has taught, who knows the practices and principles of teaching and who has had experience in bringing others to a stage of perfection as teachers.

Second: Select a group of about twelve to whom teacher training is to be given on a basis of their having a definite need of it on their present job.

Third: Set the training up away from the regular work and isolate the group for a period of about four weeks, devoting full working-day time to their training as vocational teachers.

Fourth: After the group training period, some means of supervising the teaching done by the foreman in its actual application must be provided for.

How Far Should the Training of a Foreman Go?

Agreeing to prepare a foreman to do teaching opens the question of the extent to which the theory and detailed practices of teaching are to be introduced in his training course. The field of teaching being a broad one does cover more ground than will be called for on the part of a foreman in his activity. We only ask a foreman to impart knowledge affecting his product; this knowledge he now possesses. There will be little, if any need, for the consideration of the nicer points in pedagogy or the introduction of some phases of psychology and other studies which a candidate for the teaching profession must cover. A foreman will carry on teaching that is limited in that it applies to particular people in the work that he is responsible for. This is not the same problem as one whose sole occupation is to be that of teaching, faces. Such an individual must prepare to successfully meet with many situations which differ very widely from each other and deal with people of very wide range in mental abilities and possible future activity. A foreman covers a much more restricted field and has a more specific problem. A practical setup for the teacher training which could be given to a foreman is outlined in the following way:

Part a. *An appreciation section covering the determination of the need for training.*

- I. The evaluation of the present state of training.
- II. Conclusions on what must be supplied to make improvements.
- III. Realization of how this can be supplied under the present conditions.
- IV. His definite responsibility and need of aid in meeting it.

Part b. *An introduction to the teaching practices.*

- I. The teaching-learning process.
- II. Lesson planning.
- III. Discussion and appreciation of methods which must be used.

Part c. *The analysis of that which is to be taught.*

- I. Determining what *must* be taught.
- II. Set up a complete content of *required* and *related information* to be included.
- III. Determining the factors along which progress is expected.

- IV. Organizing a series of jobs in an order which will make for rapid progress along these factors.

Part d. *Drill on lesson planning.*

- I. Layout of the step which precedes or ties up the new ideas.
- II. Layout of the step which presents the new ideas.
- III. Layout of the step in which corrective criticism is carried on.
- IV. Layout of the step in which a definite test of the teaching is carried out.
- V. The utilization of lesson plans covering a complete assignment for a job requirements.

Part e. *Supervised practice in teaching.*

- I. The teaching of primary lessons, both group and individual.
- II. The teaching of secondary lessons, both group and individual.
- III. The preparation and effective use of lectures as such.
- IV. The use of conference fundamentals with a group.
- V. Carrying out a program of training on a particular job.

Part f. *Deals with records and reports.*

- I. Training records.
- II. Justification records which determine effectively the value of the training done.
- III. Individual or group reports.

This would equip a foreman with the essentials of the following:

What he is going to teach, *when* he is going to teach it and *how* he proposes to make certain that the man being taught has the ideas which it is desirable for him to have.

Some Faults Which Are Found in Training Programs

There is a tendency, once education and training have been accepted, to run ragged on the subject of teaching and on the things which it is felt desirable to teach. It is not unusual to find in a course two or three entirely different phases of training and education, combined to the detriment of each. The phases are more easily understood by considering the following:

Vocational Training means that ability and knowledge which is *essentially* part of a particular work activity. There may be little or no culture attached to that requirement.

General Training, which supplies a background that may ultimately aid the individual on his job or probably make him more appreciative of causes. Probably makes a man better for future work.

Technical Training, differing from the general phase in that it has a specific application and has a bearing on the vocation concerned. Differing from Vocational in that one can get along without it on a particular job.

The first one, Vocational, should be the one which is of interest to the foreman.

For Vocational Training then, let us first make sure that we have included in the course, those ideas and that practice which *will* make the individual a more capable worker on the job assigned him. Afterward, if there be time, we may add some of the general and technical features; but only as a supplement to the essentials. There is no profit in giving a supplement and expecting the individual to gather the essentials or fundamentals himself.

Training of foremen as teachers if properly done makes sure that the training course is one which covers the essential things. No one is in quite the same position to say what is required as is the foreman. Training him to organize this knowledge is productive of almost startling effects.

The question of where the actual teaching is to be done may lead to a discussion of Centralized vs. On the Job Training. Centralized training in schools,—on the job training,—out of hour training—all have inherent advantages under particular conditions. The teaching methods and practices apply equally to any of them. Train the foreman to teach and the place to teach in will soon be decided upon by local conditions.

Can the Foreman Do Teaching in Addition to His Regular Work?

This question is very often presented and at first glance by the foreman offers only one answer and that answer is "no." If an actual check is made of the items or details expected to be covered by the present-day foreman, it would be almost physically impossible to add a new one. This certainly is true—the foreman has plenty to occupy his time without attempting to add new activities to that burden.

This whole question dissipates itself when we consider that the foreman now has his teaching to do and now does it in some fashion or other. If a foreman does effective teaching, many of the activities which occupy the greater part of his personal time are eliminated. Where he can prevent errors which must be undone later he saves his own time and energy. One ounce of prevention is worth much more than several pounds of corrective methods which must be applied after the fact.

This does not only apply to his dealing with new men but presents itself numberless times with seasoned forces. If the foreman has a means for reviewing the probabilities of error and misunderstanding and he sees that enough informing or instructing is given to the man *as the work is assigned*, many regrettable, expensive, and irritating conditions will be avoided. This has a particular application to safe practices. Doing the work safely is just as much a part of the job requirement as doing it in conformance to technical specifications. Investigation in connection with accidents indicates plainly that most accidents that are attributed to unsafe conditions or practices could have been very easily avoided if somebody had only thought a little bit or had only planned a little more.

Most of the serious and fatal accidents do not occur on what is obviously hazardous work or under very apparent unsafe conditions. The very nature of a man working under such conditions causes him to be a much more careful person if the danger is quite apparent or if the conditions are particularly unsafe. The answer to the paradox of grossly unsafe conditions being safe is that when conditions are alarmingly out-of-line with safety, there is more attention paid to planning and more thought given to the performance of a given individual. It is with conditions, that have become very familiar to workers that unsafe practices or work habits are found. No one can deny that if a right-habit formation has been carried out, the normal performance will be much safer. Habit is the result of training—good training, good habits—poor training, poor habits.

The *best way* to do a particular piece of work which is the *safe way*, is invariably the *easiest way*. I do not mean that wrong habits cannot be made to appear easier than the right ones. A safe and correct method which insures quality and quantity thus making it the best way to do a job is by that very fact the easiest way to do it. There is no better medium for having the best way an habitual way than by beginning from a person's very first application on through the growing experience of a worker to definitely train in the use of that way. If this is done, then the best way will be the natural way and it will be exceptional when variation from safe practice presents itself.

We are not adding to a foreman's activity when we ask him to do some teaching in connection with training. We are handicapping him severely if we fail to equip him to do this teaching in a manner which makes it effective and economical in point of his time in achieving the end. It is unfair to ask him to equip himself

for this task; it is the management's definite province to equip the foreman to this end. Just as the organization cannot afford to allow the foreman to equip himself with a knowledge of methods, engineering practices, policies, etc., they cannot afford to have it rest with him to prepare himself to do this important part of his job.

Inasmuch as the requirements of the foreman's job call for ability in teaching, we cannot afford for an economic reason, if for no other, to wait until he, by his own effort, brings himself to a stage where the teaching he does, is as effective as he, personally, can make it.

On this basis, then, it is not a sound idea to expect him or even to demand of him that he put in his own time, out-of-hours, in an attempt to get this particular feature, the lack of which is handicapping his everyday performance. It needs only good, common sense, to realize the value of getting him to a stage of improved teaching as rapidly as can possibly be achieved. Some are deterred from this teacher training of a foreman on the basis of cost of training. It is a mistake to figure that the money saved in not training the foreman as a teacher, is a clear gain. Against this probable money saved must be checked the everyday cost and the losses which are directly attributable to his failure as a teacher.

Again, this is strikingly manifest, in considering safe practices. It is unfortunately, too late to do much of any instructing, after an employee has been seriously injured. No one knows when or where the lack of specific information or habit-perfection will cause a serious accident. If this be true—and it is—it is poor policy to neglect to equip a foreman to a point where he can effectively prevent accidents by taking action in advance of a situation which might through ignorance or wrong working habits cause one.

CHAIRMAN GIBSON: I am sure I am expressing the thoughts of this group when I extend to Mr. Kane our appreciation for the very complete and interesting paper which he has presented to us this morning. I am going to ask you to stand up and give Mr. Kane a rising vote of thanks.

Mr. Arthur L. Mann, Superintendent of Industrial Education, State Educational Department, Albany, N. Y., had agreed to lead the discussion on Mr. Kane's paper, but as Mr. Mann is not with us I will throw this subject open for a general discussion.

CHARLES H. FOUHY (Willys-Morrow Co., Elmira, N. Y.): I would like to take issue with Mr. Kane in regard to his statement about the conference method. I am rather sorry that Mr. Mann is not here because no doubt he could more ably cover this subject than I can, but I can't help thinking that Mr. Kane is telling us about the ideal foreman and the ideal situation in the conditions such as he has outlined.

I wonder how many men here have had just those conditions. As I look back on the history of my own plant and think of this matter of the training of foremen I find it is a difficult proposition because the majority of foremen have been away from school for a number of years; and to take a man out of industry and put him back into the schoolroom, ask him to prepare lessons, ask him to analyze certain materials and subjects for discussion is a difficult proposition.

I think you would fail for the reasons I have given. We have been conducting courses for the past three years. We have found that when we have asked a foreman to present some ideas, some explanations of a particular subject, when we have asked him to bring it before the group for discussion he is not only seriously embarrassed but at a loss to get together his thoughts, and present an argument that does justice to him; notwithstanding the fact that the foreman has the qualifications to do the work and a mechanical understanding of the matter;

but when he is asked to get up in the conference room or to prepare a lesson he is at a loss, you might as well ask him to swim over Niagara Falls.

There are very few men who are holding positions as foremen in the average industrial plant of the country who have the proper ideas of the policy of the company. The conference method gives you an opportunity of getting these policies properly before the men and we find the men are willing to answer questions that you put to them personally, or that you put to the group, that they will answer them much more readily than if you ask them to get up and prepare a paper on a certain subject. They will answer the questions and will give a logical, reasonable answer, but I can't conceive of a group of foremen working along the lines Mr. Kane has given us.

I think we have as high a type of foremen in our plant as in any plant in the country and I cannot conceive giving them an intensive course of training that Mr. Kane speaks of. I don't believe we have reached that stage as yet.

You could take the college and university graduates who are coming out this year and train them to be foremen, train them the way Mr. Kane suggests, and that may be done at some time in the future; but at the present time we are dealing with the foremen we have in the plant, we have to take the material we have right at hand and to try to give them an intensive three weeks' course I believe would be a failure.

I believe in the conference method, I have worked at it and we are training the foremen, the setup man and the assistant foreman. We have our meetings every week and we are getting results but I can't see how we could get results if we took those same men and put them through an intensive training course where they would have to respond to questions and prepare lessons, etc.

We have an ordinary conversational conference, they don't have to prepare lessons. This is my conviction and if it starts an argument that is the purpose of my being on my feet.

MR. KANE: I did not think there was anything in my speech to indicate that I did not advocate the conference method, and if I gave anyone that impression it is untrue. I don't know anything that will help you more in this work than well conducted conferences. There is this method of intensive instruction, as I outlined, but it was not my intention at all to discourage the conference method. You will remember I said to take a group of twelve people and isolate them and the training is to be given on the basis of their having a definite need of it on their present job. You would take the present situation and endeavor to improve it, give them a realization of their responsibilities. If that is not the subject of the conference method of handling the things, I don't know what is.

I was not thinking of an ideal foreman; I may have in mind an ideal course that we may sometime come to, but I am thinking of the garden variety of foreman, giving him this intensive three weeks' course, and you will find that it will not result disastrously but will give you excellent results as it has thousands of other groups.

It has been very effective in my own experience. I know of 1,200 foremen who went through with quite a measure of success. The one thing to consider about the conference method is that it needs a good leader, a man who knows how to handle the conference method. You can get certain activities in the conference that will look well, that will give the appearance of quite a constructive meeting, but when it is all sifted down you will find you are not getting the proper results. There is one specific feature I want to mention, you must consider whether you are training the foreman as a teacher or training him in the proper appreciation of foremanship which would include the policies and many of the other ramifications of foreman work that ought to be done in addition to training him as a teacher. Training him to be a teacher being a specific feature calls for a modified use of the conference method.

There is the informal conference where each man contributes to the general fund, where each draws from it what he needs. There is another type of conference, an adjusting conference where they are widely diversified and must be integrated. Because of these two types of conference it is difficult to hold discussion in one or the other that will interest all of the foremen who have to attend the conference, it is difficult to adjust the smoke and thunder and there is bound to be some hard feelings. It takes an expert in the conference method to handle it properly. If you could give this intensive training to the foreman in a cut and dried, academic lecture, it might work out, but if I gave any one that impression from my talk, I gave you the wrong impression.

You can't take twelve foremen of the ordinary variety and expect to get results unless you know how to handle this proposition, but if you do know that you can get results, because I have gotten them.

WILLIAM SHAPIRO (Syndicate Tavo Novelty Co., Newark, N. J.): The speaker passed over very lightly the point of vocational training. I have been working in a small plant for six years and my work has taught me the necessity of training the foreman. They have to be told the right way of handling the material and the correct method of operation. I have used my method successfully in foot press and power press work.

I have analyzed the work and find they do not use their hands right in order to keep them out of the danger zone. As I said before I am sorry Mr. Kane did not put more emphasis on the vocational method of training John Henry Foreman. I don't disagree with the things that Mr. Kane has said but I wish he had given this supplement to his talk, the vocational factor. I think there should be some one in the plant whose duty it would be to analyze the various jobs and learn the most effective way to do them. John Henry Foreman could find out the way his best operator does the work and then use that as an example.

MR. KANE: I certainly agree with you. John Henry Foreman knows, or should know the proper operation, and if he does not know he has got to have some one tell him. If you have a very good operator your foreman can watch him, as you have said, and teach his method to the others. I agree on that.

MR. SHAPIRO: I did not hear you say so in your talk.

H. H. TUKEY (Western Electric Company, New York City): I was interested in the comments of the first gentleman who opened the discussion and before entering into any further discussion of this paper I want to congratulate Mr. Kane. He has given one of the strongest, most spirited and most emphatic explanations of the fundamental principles of training the foreman as a teacher that I have ever listened to in my fifteen years' experience in this sort of work.

The question has been asked as to whether or not the average foreman can grasp this sort of thing. I have yet to find the average foreman who has not grasped it readily and utilized it and made it his job, and by so doing I have seen a remarkable saving in production and improvement in cost—I should have said improvement in production. There has been a marked improvement in the efficiency of the man, and to my mind the crux of the whole situation rests squarely upon the shoulders of the man who is leading the conference, training the foremen as teachers. This man must know his job, he must know what he is trying to put over and he must know how to put it over, he must be a super-teacher. Now that may sound somewhat academic but it is not intended so, for among the men that I know who are doing that sort of thing many of them have had a very broad background of industrial experience.

Some of them are former teachers who have come from the public school, but there are many who have had a practical background of industrial experience and they have acquired the knowledge of how to teach in industry. This fact Mr. Kane made very clear to you. I am sure that Mr. Kane does not think of an ideal foreman, but as he has said of an ideal course, but that course is not so

ideal as to be impractical. This work has been done many, many times, and I want to tell you from my own experience that we have trained a number of foremen and within a month we will start training some seventeen hundred and fifty or two thousand more.

We will put them through at least ten days of intensive work, full time. In the past we have had them as long as four or five weeks off the job. Then we reduced it to three weeks, and now by cutting out what appears to be frills, non-essentials, we have still further reduced it to two weeks or possibly ten days. Those foremen are not bored in that ten days or two weeks time, they are by no means inactive; their activity is very frequently so great that they do not wish to quit on time. There is a great deal of improvement during these conferences, as Mr. Kane has told you, it is truly remarkable, it is highly interesting to see how these men evolve from their job that they have been doing into a developed mental job.

These men learn to think, and to my mind one of the greatest features of this work is the developed mental feature. It does train these men to think, it makes the foreman a thinking foreman and that is what you want.

There is one other feature; we think of the foreman more and more as a personality and it also helps him to become a personnel man, and I don't know of any method that is better for training a personnel man.

If we look back to our younger days we will remember those from whom we learned most and best, those people who most strongly influenced us. We were attached to them, we liked them. Now the workman is attached to the company through the foreman and if the foreman is a good personnel man and a good teacher, this personal contact that he has with the workmen will be productive of good results.

J. A. MCCARTHY (Assistant for Industrial Education, Trenton, N. J.): Mr. Kane has presented a very able and forceful paper, one that I think should be of great interest to every one who is interested in the training of foremen. But I feel he is setting up an ideal situation with an ideal organization. It is not always possible to get that ideal situation. It has been our experience in the training of foremen that we have not found these ideal conditions, the foremen have not developed up to that point.

We would like to move the hands of the clock ahead and reach that stage. It will be reached eventually but I feel not at the present time. We must remember there are a number of small industries where there is a great deal of competition and I think it would be impossible for them to take twelve or fifteen foremen out of the plant at one time and give them this training for ten days or two weeks. The management realizes that it could not afford to do this, they could not afford to have the foreman away from the plant at all, and in those cases this work has to be handled in a different manner. I think we must consider that there are two distinct phases to this work. We have the conference work which Mr. Kane has explained. This particular type has to have a leader.

We have the situation where the contributions come from the group. The other type is more of an informal discussion. Mr. Kane emphasized the fact that you have to have a man who can readily impart information to others, he has to give them this informational matter. I think that is one thing we should bear in mind, that there is a great difference between the informal conference and the formal conference, where you are training the foremen to be teachers.

T. G. PATTERSON (New Jersey Manufacturers' Association, Trenton, N. J.): I would like to get Mr. Kane's ideas on the subject of the small plant. The talk here this morning has been generally about the large manufacturer, but when you get the small plants in New Jersey and near New York where they have to meet the New York competition it is very difficult to give this training.

I would like to ask Mr. Kane how it would be possible to go about this education

of the foremen in the small plant without any loss of time and without three or four weeks of preparation? Those are things that the small manufacturer cannot afford to pay for.

MR. KANE: You can handle the small group just as well as you can handle the large group. It is merely a question of getting the number of hours in. If the firm cannot afford because of economic conditions to give the full time intensive training, then you have got to take the next best proposition that would fit the needs of the company. I have tried out this proposition on nearly every basis that it could be tried on. We have had the lessons for one hour a week at night, but it takes a long time and there is a great deal of lost motion, but if that is the best you can do that is the thing for you to do. I have tried two hours a day twice a week, that is better than one hour a week at night. If the economic conditions make it necessary to do it in a way that takes so much longer, that is the way you will have to do it because any activity you carry out in this line is better than no activity at all. The course that I have outlined is an ideal one and if we cannot afford to have that then we must come as closely to the ideal as possible.

I would encourage anybody who is making an effort to put this thing on. If you do have a course you will find it is much better to give the man the intensive training, and while you may not be able to do this in the beginning, you will come to it eventually. It is a case of selling the proposition, it is largely a state of mind. This is not only true of the smaller plant but of the larger plant as well. I will simply give you these features, I think I stressed them in the paper, but I am going to repeat them. It is a pretty good selling device if there is any possibility of having this intensive training, and I think it is possible in all but the very small plants, it should be done.

This matter has been greatly over emphasized. They spare them for vacations, they spare them at certain periods when they are ill and they can spare them for this intensive training. This is a very good selling argument. You can tell them they can't afford to wait until some time later. They should do it now and collect for it later on.

I certainly would keep fighting for results, and these results will come as soon as this step is taken.

C. H. DAVEY (New York Telephone Company, New York City): There is one other point I wish to bring out. Mr. Kane, do you think the man with an industrial background, a practical background will get better results than the teacher?

MR. KANE: You are speaking of the qualifications, the background that is necessary for the man who is going to undertake this teaching?

MR. DAVEY: Yes, I mean the man who is training them.

MR. KANE: I think I can give you a pretty good picture of that. There are certain essentials and the first is teaching experience. You cannot know teaching methods without having used them. You want a practical teacher, one who has taught, not a theoretical one, one who has never done it. That answers your question I believe.

I think you should have one who has a successful background in industry if you can get him. Now what I mean by a successful background in industry is this. There fortunately are several—I might say a number of men who have demonstrated their ability as foremen, or workmen. There are men who have come to a point where they are particularly skillful, but perhaps he knows nothing about teaching, perhaps he knows nothing about how men react. You want a certain combination, a man who has taught, preferably in industry and a man with an industrial background who knows industry, who knows how men react. You want a man who is not so fixed in his views that he will not yield; you want a man who has breadth enough of vision to see that this foreman quite possibly is right in this particular instance. You do not want a dogmatic man.

You want a man with an industrial background and of that certain type of temperament who will draw men out and get them to unfold and who will not dogmatically force something on them. I don't know whether that answers the question as you wish it or not.

MR. DAVEY: Yes, thank you Mr. Kane. You believe in having a practical man?

MR. KANE: Yes, a practical man is the best, there is no question about it. When I spoke of vocational training, I emphasized the fact that the man must have actual experience. Now it is true we have found people who can teach without knowing how to do it but they are exceptional. It is also true that people will learn in spite of the teacher; that has happened a number of times.

You want to include some technical features that are desirable, but most of all you want a practical demonstration.

MR. TUKEY: I want to ask you about the follow-up, or supervision of this teaching work after the conferences are over, whether you think that is an important part. I think that has been advised in some of the small organizations. We have to consider this matter of the training of the foreman as a teacher and then the supervisory process, or advisory perhaps is better. To me it seems that that is very important. You can have your conference and the foreman is supposed to go on and teach the men, but if there is not some supervision you do not know whether he is doing so or not and I think that is a mistake. There must be a follow-up in order to get the best results.

CHAIRMAN GIBSON: Our time for adjournment has come. I think this has been a very successful session. I would like to express my appreciation to all who have contributed to the discussion and who have helped so well to round out Mr. Kane's paper. This is the last meeting of the Section for the present Congress. We have had the most interesting set of papers and the largest attendance that the Power Press Section has ever had, and I only look forward to meeting the same group somewhere, sometime, in the year 1929. I hope I may count on your support and cooperation in the months during which we will have to build up the program and during which I would appreciate it very much if you would let me have either suggestions for papers, as well as names of speakers, and anything else that you wish to bring up.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Public Utilities Section

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October 2, 1928

C. J. RUTLAND, Chairman

Safety Engineer, Texas Power & Light Company, Dallas, Tex.

The first session of the Public Utilities Section at the Seventeenth Annual Safety Congress was called to order at nine thirty o'clock by the chairman, C. J. Rutland, Safety Engineer, Texas Power and Light Company, Dallas, Tex.

CHAIRMAN RUTLAND: Gentlemen, the Public Utilities Section of the National Safety Council has had what your Executive Committee feels is a very successful year. There has been a marked increase in the safety movement. Many companies are putting safety on the same plane of operation as any other department in that company. Safety is gaining ground and I don't know but what we should bow our heads in opening this meeting in memory of the 500 employees of the electric light, power, gas, telephone and telegraph, and water industries who have lost their lives by accidents, and thousands of others seriously injured. We should dedicate our work this coming year to a more concentrated action along the line of humanics in safety work. I think those who are giving closer study to accident prevention work year by year believe firmly that management has accomplished 80 per cent result of all that it could put forth in the carrying on of safety work.

There is a distinct need for safety men to provide the channel of soliciting safety cooperation from the employees themselves, and I hope, as we discuss these talks that are to be made to us these three mornings, that you will take them all to heart and feel keenly your responsibility in connection with accidents and deaths to employees in your respective companies. We have what we believe the best array of speakers for our sectional meetings that has ever been had at a Public Utility Section.

We have a number of new members this year. We extend a hearty welcome to new members, as your chairman and Executive Committee note with sincere interest the attendance of the new members. We are glad that so many are here, and we hope that you will get much good out of these programs. Before we begin I would like Mr. Brown, Mr. Oldfield and Mr. Thorn to collect the attendance cards.

The Executive Committee felt that your pulse strings needed to be touched in carrying on safety work. I don't know where the Executive Committee could

have gone to get speakers to fire the opening guns of this Congress better qualified than those gentlemen who will speak shortly. Dr. Grafflin, Religious Work Secretary, West Side Y. M. C. A., New York City, I suppose has spoken to hundreds of thousands of people in all walks of life, from highest to lowest. One man told me of meeting him at a meeting in North Carolina talking to some 400 or 500 people. He started late in the afternoon before the sun had gone down and people became so interested they forgot about the time, and it was long after the stars had come up that the meeting closed. I know he has that kind of message this morning.

First Principles

By DR. SAMUEL W. GRAFFLIN

Religious Work Secretary, West Side Y. M. C. A., New York City

When the historian writes of this age he will say several things. He will describe it as the age of the "Political Opportunist." He will call it the age of the "Decadent Home." Doubtless he will name it the age of the "Industrial Readjustment." He will criticize it as the period of the "Somnolent Church." Without question he will say that it is the age of the "Care of the Bodies of Men."

Never before in the history of the world was as much attention paid to the care, protection and preservation of the bodies of men, and never was this care more needed. I am not sure but that some of this is injurious to the race as a whole. Loving children and loving men as I do, I can see no reason for the preservation and care of the imbecile and the hopelessly unfit. We would not have been half as far as we are as a race if the primitive peoples had preserved their unfit.

Today we are facing a situation that calls for genuine interest, good judgment and rare technique in the saving of the thoroughly worthwhile in society, and I am here to speak for just a little while on "The First Principles of Progress" along any line of undertaking. I shall name seven.

The first is the **COURAGE TO PIONEER**. It takes real courage.

When Mr. Howe walked into that little meeting that day and announced that he was going to take the eye out of the stern of the needle and put it up in the bow and make the sewing machine he was promptly put in the hoosegow for observation. Men said, "For ten thousand years we have had the eye in the stern of the needle and here comes a nut who is going to put it up in the point. Lock him up!" And when Mr. Morse, America's greatest scenic artist, said that he was going to send a message around the City Hall in Baltimore, inasmuch as they could not lock such a great artist up they sent him to the city hospital for observation. It has taken *courage* to do what ever was worthwhile in the way of progress.

"Was the Mayflower launched by cowards,
Steered by men behind their time?
They were men of present valor,
Stalwart old iconoclasts,
Unconvinced by axe or gibbet
That all virtue was the past's.
But we make their truth our falsehood,
Thinking that hath made us free;
Hoarding it in moldy parchments,
While our tender spirits flee
The rude grasp of that great impulse
Which drove them 'cross the sea.

"Point those tracks toward past of future
That make Plymouth Rock sublime."

The second of these great First Principles is the **WILL TO INVESTIGATE.**

One of the hardest things in the world is to get people to look into new things. Recently the son of one of my oldtime friends, now deceased, was in financial straits. His little business was not paying. Thinking to help him out of the hole without seeming to do it I sent him a man, another friend, who had a mechanism to make that would have saved the situation as it would have fitted exactly into his machinery and methods. But he would not look into it and today is in the hands of the sheriff, where he should be.

When God got ready for the biggest single piece of enterprise in the history of the world, the bringing of the children of Israel out of Egypt, the first thing He did was to give a man forty years of education; then he gave him forty years of reflection under good leadership, and then set him a regent's examination. I hate to think what the Regents of the State of New York would have done with poor Moses. But all Jehovah did was to set a bush on fire off to one side of the desert. The other shepherds doubtless said, "Come on, sheep; don't get burnt!" But Moses said, "I will now turn aside and investigate why this bush burns and is not consumed." And God said, "Take it; you are ready. A man of eighty years who is still alert enough to investigate the interesting and unusual is ready to take charge."

But you say, "That is a Bible story. Don't tell any more." All right: hear the story of what I consider the most tragic thing in the history of the industrial world.

George Washington records in his diary: "While I was scouting in the valley of the Ohio I found a spring that apparently ran pure grease. I believe that stuff will burn." But not a pint of it did he retrieve. Not a can of it did he bring back.

At the very hour when George Washington turned his back on running petroleum that was not drilled for in Pennsylvania until one hundred years later, at the very hour when this young and alert soldier-scout left the great burning fluid to trickle down the mountain, Benjamin Franklin, the founder of this country, Benjamin Franklin the investigator, Benjamin Franklin who was rubbing pussy's back at the fireside and watching sparks jump from the fur, said: "All I have to do will be to have a big enough pussy and a fast enough hand and then I can make that stuff." If Mr. Washington had brought one pint of that petroleum to Mr. Franklin, saying: "Will it burn?" we should have had the internal combustion engine in 1800 instead of 1900; the industrial revolution would have centered in petroleum and not in coal (which should never be taken away from the mouth of the mine except as non-smoking coke) the oils, gases and power being piped and wired to the place of use right from the mine. If Mr. Washington had given it to Mr. Franklin the airplanes would have belted the world fifty years ago and much of the grime and grind of our last hundred years of industrial life would have been avoided. But all this was sacrificed because one man did not have the *will to investigate.*

The third of these underlying principles is **CAPACITY FOR NEW TRUTH.** The most of us have not capacity for old truth. Two of the great businesses of this country at the present minute have been able to buy out their competitors through the simple matter of looking into the absolutely new and apparently impossible phases of their business, in one instance the manager losing what he thought to be a lifetime position because he had turned down a young man who possessed a long-sought chemical formula that enabled them to eliminate one of the most costly elements in their business.

The fourth rung in this ladder of progress is a **TOLERANCE OF YOUNG MEN WITH RADICAL IDEAS** while we hold steady. I do not want any settled young man around me. May heaven save us from dissatisfied old men and satisfied

young ones. The young man that is down on the ground at twenty will never go up, and the old man that is up in the air at fifty will never come down.

In the fifth place, there must be a SENSE OF RESPONSIBILITY—responsibility for the thing that has been committed to our care, responsibility to society, responsibility to God, if you please.

In one of his rare sea tales Clarke Russell tells of a young mate of a sinking ship, to whose care the long boat with the women and children was committed. Said the captain: "I have two lanterns and two compasses. I am giving you the best of each and will take the smaller boats and the men with me. Take these women and children, this compass and lantern. One hundred and fifty miles due south of you there is a little island. On it there is food and water left there every three months by the British Government for shipwrecked men. If you miss that island there is nothing but open water for fifteen hundred miles and you will see these women and children shrivel up and die under your eye." And then he added with deep solemnity: "For God's sake, Madison, don't miss that island!"

And then the young mate tells the story of how all that late afternoon and all that night and the next day until three in the afternoon he sat with tight ropes and strained eyes trying to keep "due south," and how in the late afternoon a woman lying on the apron of the boat said: "Isn't that land ahead?"

Responsibility is a great thing when it is assumed in a great way. Most of us are like the father of the little boy who said, "Fader, der captain says der ship is going down." To which the father replied: "Vat iss dot to us, my son? It don't belong to us."

The Story of a Christmas

There is, as I said, a great responsibility to God, if you will, for, after all, responsibility is a moral question. Let me tell a story to illustrate what I mean.

It is the story of the first Christmas in which we were not broke; indeed, if I remember correctly, it was the last one. I had great difficulty in convincing my good wife of that fact because it is an unusual thing. I have always sympathized with Mr. Stanley Mitchell's famous story of the man who was dying, who sent for the minister to make the final arrangements for his funeral. "Who will you have for your pall-bearers?" inquired the dominie. "I guess the local bankers will do," was the reply. "They have been carrying me all my life anyhow. They might as well finish the job."

However, having convinced the good lady that we owed nothing and had a hundred and twenty-five dollars, we were promptly informed that she needed clothes. "That is what Eve said," was our answer. But we trimmed her out in fine style; then we asked our oldest daughter what she would have. She asked for a little set of books. We asked our second daughter, whose request was for fruit cake, sponge cake, pound cake, apples, oranges, doughnuts, candy and something to eat. Then we asked Don. Running true to form, (for he is one of the kind who, if he fell down a sewer, would come up with a gold watch in one hand and a diamond ring in the other) he said: "I want a little store with bins and things to sell. I want a little cash register and I want a little horse and wagon with which to deliver the goods."

Came Christmas morning, and after early church and breakfast the parlor was opened and the abundance of presents displayed. Everybody was happy; but it was not five minutes before the children were dashing back to inform me that Don was not giving them the goods. He was selling them. I knew that; and so I divided my small change, all that was left, equally among them and business began. Time and again he sold out the little stock, finally looting everyone's Christmas stocking and his mother's cooking jars. As the neighbors' children came in he sold the very cubes of sugar from the bags in the pantry.

About eight that evening there was a great quiet in the parlor,—a quiet that could be felt. We rose from where we were reading, my good wife and I, and walked to the portieres and parted them. I wish you could have seen the picture. Ruth in a big morris chair, her little shelf of books before her, head down, in the middle of Adam Bede, read out, all in. Dorothy flat on her back, sweating like an ice pitcher, full as a tick, but happy as a lord and sound asleep in the middle of the floor. Everything that she had, had perished with the using, but there was no question about her having had and having enjoyed it. And Don, the little horse in the stall, sold out, his arm around the store, his left hand literally leaking pennies, nickels and dimes.

We stood and looked at the picture for a few minutes and then I took Ruth's little set of books, set them back on one of the library shelves, carried her up stairs and her mother put her to bed. Then I carried Dorothy, eats and all, up and laid her on her bed and her mother put her to bed. Then I came back and took Don's little store and stood it in the corner, placed the horse in the stall, emptied his hand into mine, put the money in my pocket and carried him up and put him to bed.

When I returned, my good wife was seated by the student's lamp, not reading, but with moist eyes. "What is the matter, sweetheart?" "Nothing," she said. "Did you see that picture?" she asked. "Oh yes," I replied.

All life is just like that. God gives us books and banquets, stores, cash registers, nickels, dimes and pennies to play out this little thing which we call "Life." And some day we are going to fall asleep and the Great Father is going to come to the parlor door and look us over; and He will come pretty nearly knowing how we play the game by the way in which He finds us.

A Set of Great Convictions

And then there is a set of GREAT CONVICTIONS. Men do great and worthy things consistently, persistently from conviction, and conviction only. Men will do things occasionally because of their emotions: occasionally from hate; jealousy, irritation, for revenge; but there is only one reason why men do things persistently, and that is from *conviction* that those things are vital.

And in the last place, there must be a SACRIFICIAL PERSISTENCE.

Some time ago while delivering a commencement address in a Western city we heard this story that has gripped us as few stories have done. It seems that during the war, in one of the detention camps of continental Europe, there was a Y. M. C. A. secretary in charge of a group of Russians. Food was scarce, equipment lacking, but he had a boundless enthusiasm for baseball and a patriotic fervor that made such an impression upon his charges that when the Armistice was signed they "hopped to America" in a body. Twelve of them reached this middle Western town and went to work in one of the great industrial plants. They began to perfect their English and education in a night school and the teacher, a fine young Christian layman, asked them if they would not like an interview with one of the strong Christian business men of the town. They said, "Oh yes!" And he came, giving them a ten-minute talk that aroused their interest and apparently won their hearts.

"Now," said he, "would you like me to give you an hour some evening?"

"Oh yes."

"Where?"

"Your office."

"When?"

"Next Tuesday night."

"At what hour?"

"Six to seven o'clock."

He waited from six to seven. Not a Slav showed up. He went back to them.

"I missed you last Tuesday night."

"Oh yes, we will be there next Tuesday night."

He waited the next Tuesday night. Not a Russian came.

Ten more Tuesday nights he waited from six to seven and not a Russian came.

On the thirteenth night he saw one fellow peeping round the corner of the door, ran out and caught him, brought him in and gave him a wonderful hour. On the next Tuesday night there was another, a different one. And so week by week they came until each had had an hour with him alone. On the twenty-fifth night twelve young Russians dressed in their best, shaved, shoes shined, walked into his presence and said, "Here we are, sir. We have been here, all of us, every night. We were here, all of us, those first twelve nights. We have been here, all of us each of the other nights. We did not believe you on that first night when you said that you cared about us. We came from a land whose rulers were tyrants, whose priests were hypocrites and ignoramuses, and we did not believe in you or your God or your country. But now we believe,—we believe in your God and your country because of you."

The Result of a Personal Influence

And on the next Sunday he placed every one of those men in some Christian church. Each had applied for citizenship, each had accepted Jesus Christ,—and all because one Christian business man had given five and twenty-hours of Sacrificial Persistence in the interest of twelve men whose names he could not pronounce.

If in these days of dearth, unrest and low morale, we would carry forward to great achievement the cause and work of Jesus Christ we must have the COURAGE TO PIONEER, the WILL TO INVESTIGATE, CAPACITY FOR NEW TRUTH, a TOLERANCE OF RADICAL YOUTH, a SENSE OF RESPONSIBILITY TO ALMIGHTY GOD, a SET OF MORAL CONVICTIONS, crowning all these with a SACRIFICIAL PERSISTENCE.

"Greater things than these shall we do" because He has said so.

CHAIRMAN RUTLAND: It is characteristic of American people to need a shot in the arm every once in a while to awake them to action and I think we got it this morning. Sometimes we get in a rut. As safety men we think we need no new ideas of safety. On the other hand, if we check up, if we call our own conscience to account, we will find that we are responsible. The Doctor delivered a wonderful message for which we are duly thankful.

For the past two years, the Public Utilities Section has felt that some sort of visual education was helpful to safety men, foremen and others engaged in accident prevention work in getting over safety thoughts and messages to workmen. The Council has been making investigations in various ways in which this could be done. Mr. C. P. Ryan, Chairman of the Public Utilities Section's Film and Slide Committee and Safety Director of the Indiana Electric Corporation, Indianapolis, Ind., has developed a set of slides with an accompanying lecture which can in the future be secured from the Slide Committee or the Council, and if you don't feel like this particular subject will be applicable in the carrying out of your own problems, it will at least give you an idea of how it can be developed. Mr. Ryan will show you this set of slides this morning and in the future if you want to secure a set you have only to write him or the Council.

MR. RYAN: Owing to some impediment in my voice, not being used to this atmosphere, I have asked Mr. B. B. McCulloch, of the Bureau of Safety, Chicago, to present this matter with the assistance of Mr. Burns. Mr. McCulloch will read my paper.

The Use of Slides in Promoting Safe Operating Practices

By C. P. RYAN

Safety Director, Indiana Electric Corporation, Indianapolis, Ind.

It would probably be appropriate to first call your attention to what is meant by the subject of this paper—**FILM SLIDE SERVICE**. This service is now composed of individual pictures that may be shown to groups of employees through a stereopticon, which is supplied by the National Safety Council to all members at a very small cost, such pictures being devoted almost wholly to safe practices and supervision.

It is now proposed to enlarge on this service by creating film strips containing anywhere from 25 to 100 pictures, arranged progressively so that they will be educational to such groups and will offer a field for discussion as to ways and means, as shown by what others may do in other parts of the country under similar circumstances.

Let us assume that those assembled here are giving some thought to ways and means of preventing accidents in the various properties of the public utility industry and that they at intervals call employees or foremen, or both, together for the purpose of discussing safe practices where necessary hazards exist. What do we talk about? What interest do we inject into such meetings and how do we do it?

It may be said that we can not meet perpetually for the purpose of discussing care—being careful is one thing and knowing all about our job is another. One can not be charged with carelessness who does not know, or has had no opportunity to know, about the hazards involved.

Today it is thought that care among utility employees is much higher developed than the knowledge of operating practices and it naturally follows that those of us who seek new ways and means for the promotion of efficiency, which includes accident prevention, are anxious to know how our work is done elsewhere. Sometimes we read of these distant activities and gain the wrong impression and abandon any idea of change in our methods.

A few years ago we could depend on the transient workmen for this information and this type of workman was a God-send to our national industrial evolution. He carried from place to place a vivid description of new ways and means of operation and practically standardized effort in this country.

It is probably true that the industrial magazines assisted in this standardization scheme but these publications seldom reached the man in the field. The day of this transient workman is almost gone. Education has taught the employer and the employee that turnover in men and turnover in jobs is damaging to both. Employees are now realizing the importance of choosing a "life work" and clinging on until the day comes when promotion or pension is in order. He has found that the old adage that "a rolling stone gathers no moss" is true.

The employer has likewise learned that the constant turnover of employees has affected his efficiency and he realizes that occasionally in employing men, both the employee and the employer make mistakes and that there are some misfits but in the great majority of cases, an employment is a permanent tie between them.

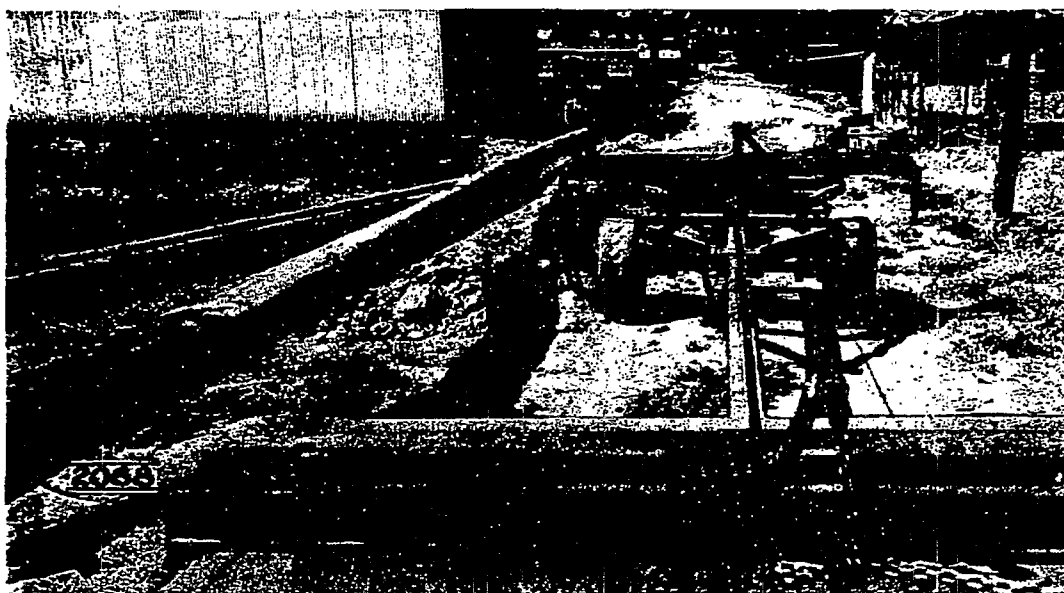
Then comes the job of training. It has long since been evident to employers that training of employees is expensive. Such training covers a large field but training of men to use care and training them to know their jobs, is somewhat difficult unless special means are provided and with this thought in mind the National Safety Council is attempting to provide a means of carrying the latest ideas from one part of the country to the other on any subject of utility operation by the use of these film strips, so arranged that any phase of utility operation may be shown in a group of pictures on any particular subject.

It may be true that the pictures as shown may not be the last word in proper

operation, or in fact, these pictures may show incorrect methods but along with the film, it is proposed to point out such incorrect methods and also to call attention to the advanced methods in a lecture that would accompany each film.

Even this lecture may not be correct or might be improved upon. If so, the Council will request such information, as they may at all times keep such lectures, as nearly correct as possible, so that they will be beneficial to those interested in such subjects.

It may always be noticed that pictures illustrating the thought that an accompanying magazine article is intended to convey, receive the greatest attention of those concerned and the effect of them is to correct any idea obtained from the article itself.



Slide 2068—Two men loading poles on truck and trailer (rear view).

Our own institutions are careful to preserve by photograph the many new ways of doing things and usually such institutions will gladly furnish such information to others. If these photographs could be supplied to the Council for use in these film strips, they can be made of inestimable value to a great many institutions throughout the country.

If it would be true that, as some state, accident prevention depends 90 per cent on education and 10 per cent on mechanical correction, it is apparent that 90 per cent of our efforts should be made on educational matters. Such film strips are intended to be of educational value.

It is not difficult to realize the many different subjects that should be covered by such films when we realize that the various phases of the industry must be separated into their respective groups and that such films must be built up on the sub-divisions of these divisions, or, as we see it, the light and power, railways, telephone and telegraph, water, gas and ice industries, would each have their

respective groups of films and these films would be sub-divided into departmental films, in which event a film suitable for discussion before any group of men could be obtained from this library, together with such information as would be beneficial from the efficiency and accident prevention standpoints.

It should be understood that the National Safety Council can not provide the pictures from which such film strips would be made. These must be secured from the industries themselves.

This is a picture-taking nation and very few public utilities operate without occasionally being proud of some of their ideas or methods of construction, and as a consequence of this pride, they take pictures as a permanent record of their



Slide 2074—Tractor type—hole digger and pole setter.

achievements. It would be very simple and would be offering a contribution to mankind if a copy of such pictures could be sent to the Council with an explanation of the new idea or thing involved and these pictures could then be placed in these films for the education and information of other utilities.

The Film Slide Committee in this year has in a measure been successful in producing two films on two subjects of the light and power division, one being the "Pole Problem;" the other, "Distribution Line Maintenance," each with 30 pictures of the various phases of this work, which, as may be realized, could not completely cover either of the subjects but with the cooperation of the various utilities, that Committee hopes to build up these films to at least 100 pictures each, showing the many adequate and inadequate ways being used by various groups in the various parts of the country.

We have also been promised a full set of pictures by a Water Works Company

and in due time this series will be completed but as you understand, that series will show the method used by that company and it is hoped that other Water Works companies will also provide some pictures to be included in this film, which, as you understand, will give the various ideas from which we may all gain some knowledge.

There may be some doubt in the minds of some as to the value of such a scheme. We must admit that the idea is somewhat new and like all other new ideas, must prove itself but it is realized by those who advocate such a scheme that after a number of meetings of men have been held for the purpose of discussing safe practices, it becomes quite difficult to provide a program that will maintain that interest so necessary to success. It is the thought that these films may supply a want in this respect, in that they will elicit discussion of the various ways and



Slide 2080—First operation; setting pole with truck.

means. It is also thought that by this method standardization will be improved throughout the country as a whole.

With your permission we might demonstrate this matter somewhat by showing you the nucleus of the "Pole Problem" film, a subject that should in time, with your cooperation, show all of the latest practices as well as some practices that have been so disastrous in the past.

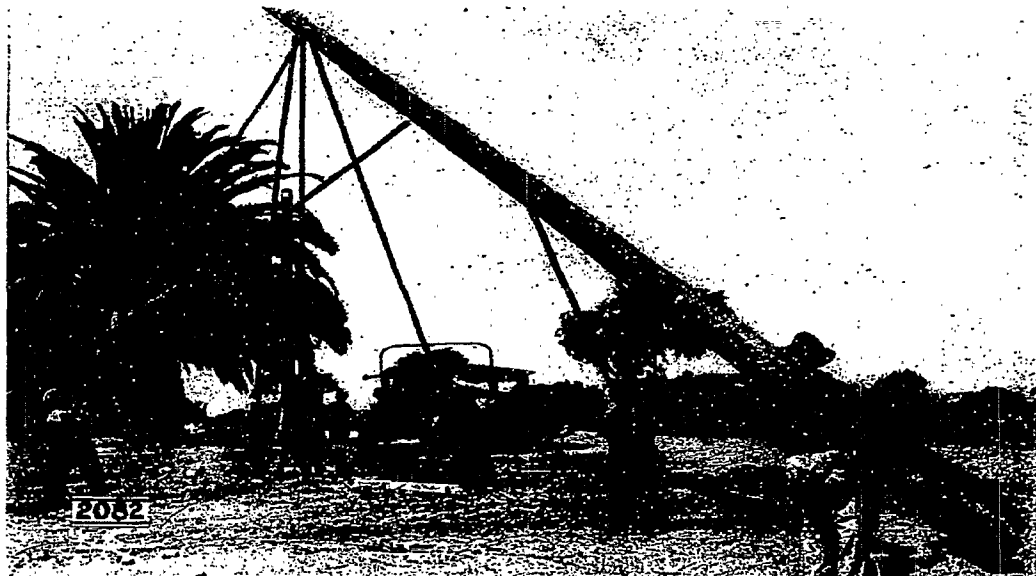
The contributors of the photographs included in this film are announced, however, it is presumed that in the future this policy can not be followed as it is hoped that the Council will receive photographs from so many sources that too much space would be taken up with announcements.

"The Pole Problem"—What a problem that has been to a great many of our institutions. It represents losses from injuries and damages to the extent that in every Light and Power Company, it is worthy of consideration. We have contended with everything from improper loading on railroad cars to improper use of pike poles, all representing losses. Improper loading is usually beyond our control and we must offset these hazards by extraordinary good judgment and care on our part.

Unloading poles from cars has resulted in a great number of fatalities and cripples scattered throughout the country. There was something wrong in nearly

every case, something overlooked, or some lack of knowledge of the job at hand and then some lack of care. So frequent and startling were these occurrences that some companies have made a study of this phase of the work for the purpose of stopping them.

Let us consider the result of the study by the Northern States Power Company. They have pictured the car loaded properly and conforming to railroad standards for loading, consequently we can not show you an improperly loaded car. We need several of these pictures so that this phase can be considered. This load



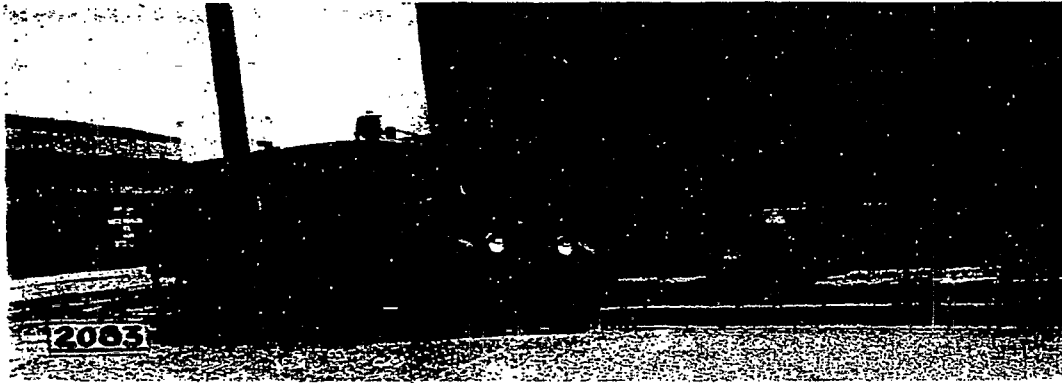
Slide 2082—Setting pole by hand.

stands erect or is not leaning, however, safeguards will be shown that will eliminate hazards where loads are leaning.

Ready to unload. The letters shown in circles represent an explanation of what we should find in connection with a properly loaded car and preparation for unloading, such as (A) blocking car to prevent moving, (C) skids properly supported to prevent breaking, (D) cables to support load after stakes and binding wires are cut, etc., all of which will be explained in a lecture accompanying the film.

There are other pictures in this film and others should be supplied which would show other conditions and means of efficiently unloading poles safely.

After unloading, poles must be moved to the place where they will be used. The following pictures show one way of handling them by two men. We all know that all companies do not have and can not afford such up-to-date equipment, yet they must move poles in various ways. Can we supply photographs of every known way of transporting them for the benefit of those who must occasionally



Slide 2083—Arriving on location. What's wrong here?

handle them and while doing so must combat the potential hazards accompanying each pole.

The erection of poles is another phase of the pole problem that in each year causes all of us more or less concern. This film at present contains only nine pictures bearing on this subject when all of us know that at least thirty-five might be shown to advantage.



Slide 2087—Raising transformer. What's wrong here?

Most of us here have in the past made some investigation of accidents of a more or less serious nature that have been caused by the handling of poles and after such investigation, our individual employees are encouraged to avoid similar occurrences in the future.

The Film Slide Committee are now requesting that photographs of conditions that existed at the time be provided for this film, together with an adequate description of the overlooked cause, so that this film may be built up to the extent that it will record every hazard experienced by all of us for the benefit of all of us, together with photographs of new ways and means of promoting efficiency in such matters.



Slide 2098—Soldering, with the second man in peril.

The other subject that has been partially prepared is "Distribution Line Maintenance"—a great subject. Many of us will aver that the maintenance of electrical distribution lines carries with it our greatest hazards and contributes more fatalities than all the other phases of effort in the Light and Power industry: What can we do about it? A great many things have already been done—standardization of equipment with their numerous provisions for clearances and location of conductors, guying, insulation, grounding and numerous other rules have been provided by engineers who have conformed generally to provisions laid down by the United States Bureau of Standards, all of which has tended to make this industry less hazardous to employees and the public.

Various companies have formed rules based on these standards but rules must be brief. A great deal of reading and studying required of some men is a decided shock to them and usually produces very little actual results and in a great many instances creates erroneous impressions unless the matter can be discussed with others.

Some might go so far as to advocate that all that is needed is to require the use of care in the handling of electricity and in case of a lack of care, a resort to penalties for failure to do so. Correct in some senses but let us suppose that I am to be employed as a lineman just as soon as I can, by some means, in the use of climbers, get to the top of a pole and return again to the ground with no injury to myself or anyone else. I am told to be careful as carelessness is penalized by my employer. What would I know about the many things that might injure me at the tops of those poles? What do I know about where I would, or should, find the higher voltages, neutrals and grounds? What would I know about con-



Slide 2107—Encouraging strains.

necting transformers, rubber protective devices and the thousand and one things that I should know before I can be careful?

It is for these reasons that we advocate the use of educational means for the purpose of eliminating the mysteries of electricity in the minds of those whose daily duties require them to come in contact with it. Will these pictures assist in this matter? If not, what can be done that will?

Let us look them over. It should be remembered that these pictures were posed for by an operating crew that is noted for complying with rules and they have very graciously attempted to show some of the common mistakes as well as correct methods.

What can be said of the first one? First, the truck is parked on the wrong side of the street, violating a law of some states and creating an unnecessary hazard to the public in all and in addition, shutting off free access to a fire plug.

Material has been unloaded for the work to be done on this pole and it is entirely incorrect to allow any material to encroach upon the rights of the public

without protecting against accident and injury to them. From the appearance, there was no occasion to lay these cross arms in this position and allow them to remain so without adequate protection.

Raising transformer with one man in a position that if something should break, this weighty object would seriously injure him.

Holding to arm braces has injured so many linemen that it is common among companies to make this act against the rules. If the habit is developed on new equipment, we will, of course, carry the habit to the old.

Two linemen ascending at the same time, one above the other, was a common occurrence until several of the lower ones were injured by the upper sliding down on them or some of their tools striking them. Against the rules now: The second man starts up when the first has secured himself with his safety and then usually on the opposite side of the pole.

These are just a few of the pictures in this film and we are briefly stating some of the things that might be said concerning them and the film covers only a small part of this subject. What would your line-foremen, linemen and groundmen say about these? Could a discussion be obtained in a meeting by presenting a film of 75 to 100 such pictures? If so, would this discussion be of value in clearing up some minds as to the reasons why we have some rules governing this work, which are sometimes considered a nuisance?

We think it should be remembered, as stated before, that our greatest effort should be made in promoting a greater knowledge of our duties rather than to attempt to correct our misfortunes by mechanical means and it should also be remembered that it is almost useless to attempt to improve our accident record by assuming that all accidents are the result of carelessness.

Lack of training and knowledge of the job at hand has been a more direct cause of accidents than all other causes combined.

In conclusion let us again beg of all branches of the industry that the Council be given some support in preparing these educational films for the use of those concerned. The expense and effort in providing photographs are of small consequence. The expense of the Council in reducing to film form is of considerable expense and trouble but if they will adequately serve those who are seeking information for improvement of their efficiency, the combined expense and trouble will be of little consideration as compared with results.

CHAIRMAN RUTLAND: This, I think, has been very practical. I wonder if there are any questions any one would like to ask?

MR. RYAN: It is proposed to have along with each of these films a lecture. I expect the 30 pictures would be sufficient for possibly an hour's discussion but there is not enough variety. What we are appealing for is pictures from other parts of the country. You will remember, these came from Wisconsin Power and Light Company. The Council needs photographs taken on distribution line maintenance, the pole problem, or gas operation. Send them in to the Council with your own story. I think you can go into the realm of supposition quite a bit by supposing that this or that would have occurred in your picture. That is what you want to do. You think those things out. It is too much to expect of the Council or any member that they can make the story. It is impossible for any man or group of men to become well posted on all lines of the Public Utility industry.

MR. DOUGLAS (Philadelphia, Pa.): We have used slides for years. We use several machines and we found we had to show them rapidly. Must this machine be shown rapidly, too?

CHAIRMAN RUTLAND: Mr. Burns will answer that.

G. E. BURNS (National Safety Council, Chicago, Ill.): If you will allow me just a few minutes I will tell you something of the construction of this machine. Inside here, we have the various lenses for condensing the light. We have a 200 watt lamp in what is known as a ray filter. You can hold that film there five minutes, five hours, or five weeks, as long as the lamp will last. Should the ray filter crack, it would scar your film. It meets all fire regulations. There is nothing flammable about it. As a matter of fact it only weighs four and one-half pounds. We did have a machine that had to be used rapidly, but you can hold this as long as you wish. There is no limit to the size of the picture but there is a certain volume you can get from the 200 watt lamp. Of course, the sharper your picture, the more detail you will get. This particular machine has a two and one-half inch lens. Now, it is possible to get a lens in any size. You could condense your focus but you would not have power enough with a 200 watt lamp. This is the largest made in the portable size. All the manufacturers have standardized on the 200 watt lamp. This machine sells for \$60 completely equipped, carrying case, extra lamp and slide containers. It has a simple slide attachment. All of the slides have individual carriers; you could carry 50 of them in your pocket. It is not any heavier than the film strip. There may be times when you don't want to show the entire pole problem and you can stock the slide catalog and select any one and we will send them free of charge—no cost whatever. If you don't care to purchase this outright you can rent it for one dollar a day and return it.

H. B. HARMER (Safety Engineer, Philadelphia Electric Company, Philadelphia, Pa.): What is the cost per film?

MR. BURNS: Fifty cents, roughly, which does not include the art work. We have to retouch every photograph we get to bring out the detail, but 50 to 60 cents is the rough figure for a frame.

The Council makes this proposition: If we have material submitted such as this in a series, we will share the expense with you fifty-fifty and put it in service so that other members can use it. We do that because some members have sent in a series of pictures and they are of no use to the section as a whole and they have to stand the entire expense, but, if you can send in a series of pictures, acceptable to your committee, we are willing to pay fifty per cent of the expenses.

H. A. MOTT (Illinois Bell Telephone Company, Chicago, Ill.): I would suggest that you go into the unloading of poles more thoroughly. Also, where people have joint poles, electric light on top and telephone beneath, show two men working on a pole, because some times you have what is known as a joint job where both companies have to be on the job at the same time; and it seems to me that a picture of that sort would be a good idea. Also where the high tension electric wires pass through trees, where a man has to get up to clear the telephone wires or electric light wires, etc. If they would take up the unloading of poles proposition, I would supply the picture of what I have described, the joint work and also the electric light and telephone wires going through the trees. Now, will the ordinary photograph answer?

MR. RYAN: A sharp photograph. It should be as sharp as possible. A photograph, anything five by seven or larger, will be all right. When they get down below five by seven they don't reproduce very good. Smaller pictures are not as good.

MR. MOTT: I will see that you are supplied with the pictures I spoke of. We had seven men killed this year while unloading poles.

CHAIRMAN RUTLAND: I would like to break in for a minute to have a report of the Nominating Committee of the officers and committee chairman for this Section for the ensuing year. Mr. Charles B. Scott, Bureau of Safety, Chicago, is chairman of that committee and the members of that committee have deliberated quite carefully in their selection of men for recommendation to you. I will ask Mr. Scott to read the report to you.

Report of the Nominating Committee

Chairman, H. F. Webb, The West Penn Electric Company, Pittsburgh, Pa.

Vice-Chairman in Charge of Electrical Interests, Ivan L. Scott, Electric Management & Engineering Corporation, Asbury Park, N. J.

Vice-Chairman in Charge of Gas Interests, E. S. Beaumont, Peoples Gas Light & Coke Company, Chicago, Ill.

Vice-Chairman in Charge of Telephone and Telegraph Interests, J. L. Vandergrift, Chesapeake & Potomac Telephone Company, Washington, D. C.

Secretary, G. A. Doeller, Dayton Power & Light Company, Dayton, Ohio.

Poster Committee Chairman, John J. Barada, The Laclede Gas Light Company, St. Louis, Mo.

Publicity Committee Chairman, E. J. Kreh, Duquesne Light Company, Pittsburgh, Pa. (American Gas Association).

Film Slide Committee Chairman, Roy M. Godwin, Philadelphia Sub-Counties Gas & Electric Company, Philadelphia, Pa.

Fire Protection and Prevention Committee Chairman, H. M. Keller, Northern Indiana Public Service Company, Hammond, Ind.

Engineering Committee Chairman, H. B. Harmer, The Philadelphia Electric Company, Philadelphia, Pa.

Statistics Committee Chairman, C. P. Ryan, Northern Indiana Power Company, Indianapolis, Ind.

News Letter Editor, N. L. Devendorf, Consumers Power Company, Jackson, Mich.

Councillors: C. J. Rutland, Texas Power & Light Company, Dallas, Texas; B. B. McCulloch, Bureau of Safety, Chicago, Ill.; George C. A. Opp, The Detroit Edison Company, Detroit, Mich.; B. Frank Day, Philadelphia Electric Company, Philadelphia, Pa.; Harry M. Webber, Illinois Bell Telephone Company, Chicago, Ill.; W. L. Loyd, Alabama Power Company, Birmingham, Ala.; and C. R. Beardsley, National Electric Light Association, c/o Brooklyn Edison Company, Brooklyn, N. Y.

CHAIRMAN RUTLAND: Mr. Webb, will you rise and face the audience? I want them to see who you are. Thank you, Mr. Webb.

Gentlemen, you have heard the report.

MR. HARMER: I move it be accepted and the secretary cast one ballot for unanimous election.

(The motion was seconded and carried.)

CHAIRMAN RUTLAND: First I want to call on Mr. Vincent Wakefield, of the City Ice Company, Kansas City, Mo., for an announcement regarding the Refrigeration Section.

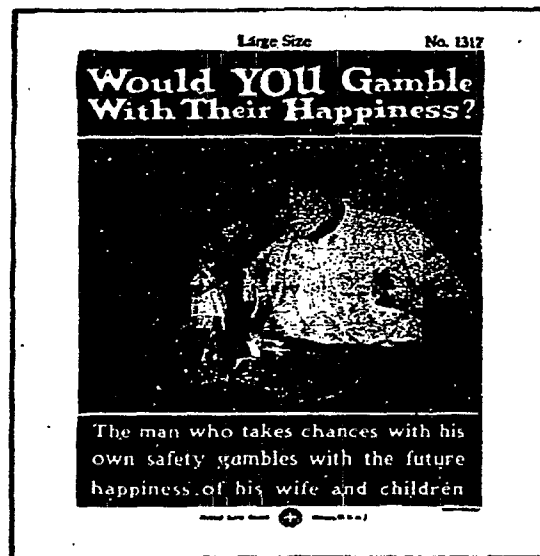
VINCENT WAKEFIELD (Chairman, Refrigeration Section, National Safety Council, and Treasurer, City Ice Company of Kansas City, Kansas City, Mo.): Mr. Chairman, Gentlemen: Some of us have felt the need in the National Safety Council for means of studying refrigeration in exactly the same way and manner that you gentlemen are studying various problems that emanate from the utilities in which you are engaged. Most companies that I know of have become largely interested in ice properties; and feeling the neglect and lack of information relative to refrigeration and to the ice business and allied industries using refrigeration, some of us have organized a Refrigeration Section. With the courtesy of your chairman, I want to draw attention to the fact that this Section will meet at two o'clock this afternoon in Parlor 1 on this floor. I want to call attention also that the opening address will be made by one well loved by you and your own member, Mr.

Charles B. Scott. I would appreciate your taking occasion to attend our meeting if it is at all possible.

CHAIRMAN RUTLAND: Thank you, Mr. Wakefield.

At this time I want to ask Mr. Burns of the Council to tell you of the regional conferences held in the various parts of the United States during the past 12 months. He will tell you of their purpose and some features of these conferences which I think you will be interested in because they are trying to be located in certain sections where you can attend.

G. E. BURNS (National Safety Council, Chicago, Ill.): I don't know what I can say that you have not already said, Mr. Chairman. You told it all in a nutshell. In the past year, we have held 22 conferences throughout the states. As. Mr.



Rutland expressed it, the purpose is to reach the foremen and those interested, who because of time and expense cannot attend the National conferences; so we attempt to bring the conferences to them. Public Utilities as well as other Sections have cooperated more than 100 per cent, if that is possible not only in promoting these conferences but in contributing to the program and speakers. Our mutual friend, Carl Rutland,—well I should say we overworked him. I had him at New Orleans, I should not say "I"—the boys invited him, but I was responsible for his being there; also at Birmingham, and various other places such as Oshkosh. Those boys in Wisconsin try to outdo everybody else when it comes to regional conferences. They put on young congresses. We started out by having small, sectional meetings and gradually took in more territory and then it became a miniature congress and they have gained in such proportion that the city cannot accommodate them.

The one point I want to make is to ask the members of this Section to send their men in their particular territory, or canvass their men and get them to attend these regional conferences for your own good. In Wisconsin they have it so well organized, it is not a question of the staff or committee doing anything; they sent

their men out in various territories like Oshkosh and the Public Utility group there, and they knew exactly how many men they could expect on that particular day and they were all there. That was true of other industries, too, not only public Utility.

I am rather stumped about talking about regional conferences. I don't want to attempt to tell you how to run them. We have prepared a pamphlet on the "Why and How of Regional Conferences." There is one point, don't be frightened at the words "regional conferences." If you have a group in your city and wish to put on a miniature safety meeting, don't hesitate to write into Headquarters and we will send you the pamphlet and will even help you to get speakers. If



you want a certain speaker we will try to get him whether he comes 50 miles or 500. There is no expense involved in 99 cases out of 100.

CHAIRMAN RUTLAND: Gentlemen, we are very fortunate in having here, our beloved National Safety Council President, Mr. Homer Niesz, and I would like for him to say a few words.

HOMER NIESZ (Pres., National Safety Council): This is a real pleasure for me to be here and I feel most at home. This is my own business and I like to meet with the members of this Section. My duty as President, unfortunately, prevents me from being here long or taking part in your proceedings. I retain and always shall, the deepest interest in Public Utilities and wish you every success in the continued growth of this Section which has been so phenomenal.

CHAIRMAN RUTLAND: If there are no other questions to be asked regarding this slide practice, we will pass on, but I want to give you plenty of opportunity.

MR. DOUGLAS (Philadelphia, Pa.): I do want to say that I have in the Philadelphia Gas Works several hundreds of slides along the lines the committee seems to want to consider and copies of those slides will be gladly submitted or furnished and I hope they will be of some use.

CHAIRMAN RUTLAND: Thank you very kindly.

H. B. HARMER (Safety Engineer, Philadelphia Electric Company, Philadelphia, Pa.): So we won't go away with the idea that these are all the slides we have, will you ask Mr. McCulloch to tell us something about it.

CHAIRMAN RUTLAND: Will you tell us something about the slides available at the National Safety Council Headquarters?

MR. RYAN: Gentlemen, it is probable that all of you have received this catalog. If you have not received it, notify the Council. This contains a list of slides galore. You can order any number you want of what you find in this book; and in addition to that we expect to have, some time, a list of films to be placed in here, a library, in fact, all Sections analyzed into departments of the various utilities of industry. I am very glad that some of you have already made up your minds to help this Committee to develop these films, if they are going to be developed. If they should not be, now is the time to know it before we encourage the Council to spend a lot of time and money.

ADJOURNMENT

October 3, 1928

C. J. RUTLAND, Chairman**Safety Engineer, Texas Power & Light Company, Dallas, Tex.**

The second session was called to order at nine forty-five o'clock by the chairman, Carl J. Rutland.

CHAIRMAN RUTLAND: Gentlemen, our first speaker on this morning's program is William Johnston, Jr., Vice-President of the Twin States Gas and Electric Company, Boston. He has had considerable interest and activity in promoting safety work in his company and has produced some very marvelous results. I am happy to have him here from an executive standpoint to tell you what his good company has accomplished.

How I Accomplish Reduction of Accidents in My Company

By WILLIAM JOHNSTON, JR.**Vice-President, Twin States Gas and Electric Company, Boston, Mass.**

At the time my subject was assigned to me I had no idea that it was going to take the form of English that it has. From that subject you can readily deduct that there might creep in a sort of egotism and so I am going to switch that a bit and speak for the moment on why we have not reduced accidents of the company I represent. At the outset, I must inform you that you are not going to hear anything new. After all, there are just about so many rules affecting our every day conduct, so many rules affecting the governing of our every day life. One hundred odd years ago, a group compiled the Constitution of the United States. We all can attest to that document and the wonderful piece of work which they did. That document has stood the test of time and it has outlined the conduct, the path, which our Government has taken from that time on.

We have in the conduct of our social lives, ten commandments which were handed down and have stood the test of time. We know that adherence to those principles or precepts will keep us out of jail and will insure for us the benefits of our future well-being. And so in the question of safety we have certain rules which, if followed, we know will insure our keeping out of the hospital and similarly take care for our future lives.

We get back to fundamentals in all cases, and if in the company I represent we have had trouble back a few years ago in reducing accidents, it is because we did not know the fundamentals. True we have been operating under safety rules and holding safety meetings, but we did not have the fundamentals properly cared for.

I wonder if any of you folks have ever seen a football team that has gone stale—a football team at the middle of the season that has just seemed to have lost its edge? If so, you can readily see that it was of great importance to the coach and managers of that football team that they go back to the fundamentals, retrace their steps and pick up those things which they should have learned at the first of the season or at the start of their work.

I feel that the safety work in any organization, large or small, sometimes is in great danger of going stale. It used to be a sort of by-word of our companies that every safety meeting we had was the best safety meeting that had ever been held. Month after month, reports came in that it was the best safety meeting we ever had, and month after month there came in an evergrowing list of accidents and so we got back to the fundamentals. We began to read our ten commandments, if you

please; we began to feel that it was not a question of written English, that it was not a mere jumble of words, but that it was something of the nature of a heart-to-heart task. It was a question of getting close to the industrialists and not having them appear as automatons that just went through a mumble of certain words or motions.

Placing the Responsibility

What are the fundamentals from an executive standpoint? I think the most important fundamental is the question of placing the responsibility for accidents, the question of having some one responsible for the accident. I often think of that phrase and tie it up with the story of the gentleman who was a little under the weather who went into the bakery shop. He wanted some doughnuts. He went to the lady behind the counter and said, "I guess I'll have a dozen doughnuts." She took the doughnuts and put them in a bag and handed them to him. He sort of half turned at the door and saw some nice frosted cake in the glass case and it arrested his attention and he said: "No I don't want the doughnuts. I think I'll take that cake instead." So she tied up the cake in a package, handed the cake to him and he returned the bag of doughnuts. He turned to go out and the lady stopped him; "Sir, you have not paid me for the cake." "Well," he said, "I gave you the doughnuts for the cake." "But," she said, "you did not pay me for the doughnuts;" and his rejoinder was, "but I did not want the doughnuts."

Now comes the question of placing responsibility for accidents from the executive down to the man who has the accident. I firmly believe that if executives would realize that every accident which occurs on their property is one for which they are responsible, that we would soon see an improvement. The safety director, similarly, should feel the responsibility of accidents, the line foreman, the distribution superintendent and what not should take unto themselves the responsibility of accidents. The investigation of accidents, we found, is a fundamental issue. I sometimes feel that, when we investigate accidents, reports are received, filed and forgotten. I sometimes feel that as a result of accidents, there is quite a bit of sympathy due the man who might have been the cause of the accident. The injured man is forgotten and I feel there must be a more or less hardboiled attitude, tempered with mercy to be sure, but we must not overlook that some one has made a mistake and again might make a mistake if proper procedure is not followed.

The mental attitude toward accidents, I am sorry to say, in the part of the country I come from, is that "Accidents will happen anyway." It is an attitude that you are apt to get disgusted with. It is an attitude that in my estimation is one of the most deplorable things in this industry. We know that accidents don't happen. We know that in practically every accident you can put your finger on the cause and say that at this point something was done that should not have been done, or at this junction another method should have been used. And so we get down to the question of caring for the mental attitude toward accidents.

Careful Selection of Employees Important

The question of hiring new employees, of course, does not need to be touched upon at great length. Its importance is realized without any doubt at all. It has been our experience that minors under 21 had a very bad accident record. Their lack of experience in one case was the reason. Their unsettled frame of mind in another sphere accounted for it; and so I say we get back to the question of careful selection of employees.

The question of disciplinary measures we found to be one of importance. Discipline and the enforcement of safety rules, I firmly believe, must be cared for by executives of companies but I don't feel you can set any definite rule whereby men

will be punished. I feel that industrial cases warrant the passing of judgment, but I feel that there should be some discipline, some method of caring for careless workers, some method of caring for men who continually have accidents.

Five or six years ago, we considered safety—not a side show exactly—but we did not consider the importance of it, and the company, having some 600 odd employees, showed it. You see I am making a sort of a confessional to endeavor to throw out certain thoughts whereby a constructive program can be followed to cut down accidents. We, at that time, as I say, did not fully realize the responsibility of safety. The safety work was conducted by our merchandise manager. It received attention when the ranges were not going so good or when the vacuum cleaners were not selling, and we found that one of the most important things that we did was to put the safety situation on what I might call a real, honest to goodness basis by having a man devote his entire time to safety. I don't mean by having the safety man take care of claims. I don't mean, having him take care of industrial things like taxes or any other allied part of the functions of utility. The safety man's job is to take, think and act safety all the time. Perhaps you say, well, claims are part, you might say, of safety. It is an outcome of accidents to be sure, but I feel a man who has safety on his mind at all times is better fitted to carry through his program.

Perhaps you will say there is an economic reason for a combination. In response to that I would say we are always glad to state we don't consider the cost of these accidents. We don't like to think of dollars and cents when speaking of saving human lives and yet I venture to say we have a great many companies who were in the same predicament as the company I represent, and so I repeat that I don't think safety work is a combination of jobs and I feel that any company with 300 employees, or 200 employees, can find enough work for a safety man to keep him busy at all times.

I am strong in the opinion that the minute they put that man on safety work, the next minute they will see their safety work coming up to the standard it should. You get out of safety work just what you put in. That old adage was never truer and so I would leave with you this thought that we have got to get back to the fundamentals. Those of you who went through the service knew that every fourth week, every Monday morning, there were read certain articles of war, simply to bring home to you a certain gospel. I feel the same way about safety. We have got to go to that well and take from it safety knowledge, keeping it in mind and ever-dwelling on the thought that the fundamentals of safety are the things that we continually have to strive to stay with.

CHAIRMAN RUTLAND: Thank you, Mr. Johnston. I am sure the audience enjoyed your address.

I am glad to see so many present and when you think of the men who come from all over the country it is a remarkable attendance. An evidence of the continued growth of this Section is the expansion of its activities. The fundamental wish of industry in the accomplishment of safety work is to get down to the bottom rock. That means that the safety engineer must build up his prestige in his own organization without egotism or without the desire to obtain a lot of credit. He is after the answer, and if he can come in contact with the engineering organization of his own company to the extent where he has sold himself on safety rather than on personal desires, then, I think we will get much further ahead. Sometimes it looks as if the result some safety men should obtain, is to go out and counsel with the men themselves instead of going through the organization—go to the superintendent and the foreman, and sell them safety. That is one angle. Another is the contact this body of men represented here today should have with the Accident Prevention Committee of the National Electric Light Association and the American Gas Association, I am very glad this morning we have Mr. Beardsley and Mr.

Dobbin with us. Mr. Beardsley, will you tell some of the activities of the Accident Prevention Committee of the Electric Light Association?

It is unfortunate that some of the publications of this wonderful body do not ultimately get to you men. Sometimes these reports are included in the proceedings of the N. E. L. A. They contain a lot of valuable information. This morning we have Mr. Beardsley to tell of some of the reports his Committee has gotten, what they contemplate doing, and how his Committee can better cooperate with us in the future toward safety work. I take great pleasure in introducing Mr. Beardsley.

Address

By C. R. BEARDSLEY

Chairman Accident Prevention Committee, National Electric Light Association

Your chairman not only gave me permission to change my topic slightly but said I might take as much time as I wished, in his usual generous way. He has given me that opportunity and therefore instead of reading a set paper, I would like to talk on some of the aims of accident prevention and lead from there to where we may find an opportunity for close cooperation with the Public Utilities Section.

I remember in the days of real sport, in 1892 or 1893, the great joy that was occasioned in our neighborhood, when somebody undertook the building of a residence. It was an average neighborhood, an average town.

I presume the observation I make on the character of the boys I trained would represent largely what we get throughout the United States. When they started excavation, we started operation and the battles would begin, sand battles and then rock battles. We even dug trenches in open lots and we had some very effective mortars and catapults. We had quite exciting battles. Our fathers, in the difficulty of earning a living, did not give us as much time as they might, but as soon as we made a few direct hits we had attention good and plenty. I remember one poor lad who reached the stage of making a battleship and in his adventure-someness dropped two stories and paid with his life. That stopped us for a while but then boy nature asserted itself and we went back to the same old game.

The developments of the Y. M. C. A., the Boy Scouts and other organizations, have broken up the rock and sand battles, but boy nature has not changed since 1892. What is the difference between that boy and the man we all meet in our personnel in Public Utilities organizations? I think education and training and growth of experience, greater wisdom of years, have placed a veneer over that boy nature and the thing we have to deal with is the breaking of that veneer. It is nature to forget once in a while, just the same as boys forget their parental instructions. I commend Mr. Boyd Fisher's book on Mental Causes. I have read it and reread it.

Accident prevention work has taken the slant of a number of different methods of approach. We have the school which believes solely in the training of a man, the educating and habituating of him to better methods of work and better continuous caution. That is all to the good. It is the most fundamental thing we have. Then comes the man who wants to make rules and enforces rules by punishment, sometimes that punishment being vented on the poor fellow that is hurt. I don't hold with that method. Sometimes a repeater might have to get some kind of a suspension or a more effective lesson than simply a talking to. Some think it should be on the foreman or supervisor. The Union Pacific has the best record of all railroads and that is far better than we can boast of accord-

ing to the exposure and hazard in our industry. The steel industry, likewise, has done a lot better. The Union Pacific makes some pretty severe suspensions. They go pretty well up the line and a man who has a wreck or serious accident pays heavily. That method, I believe, is not so much used by public utilities as it might be.

Another method is the establishment of all kinds of mechanical safeguards. That is increasingly important. It stopped a lot of accidents and as engineering methods change that will become still more important. That is one of the lines that is being given considerable note. Fifteen years ago it was really crystallized in the formation of the Accident Prevention Committee of the National Electric Light Association. If I speak of the supposed shortcomings of that work I want it understood that it is in no sense criticism or lack of appreciation of the fine work those men did. I hope to say they were up against a good deal of difficulty which we are trying to break down at the present time.

In those days (Mr. Harmer, Mr. Van Brunt and Mr. McLane will correct me if I am wrong) I believe there were so many difficulties in design and operation and other phases of our work, developing some other phases that other fellows were having trouble with, that accident prevention was crowded out. The man who attempted to get his hearing was only a cry in the wilderness. What could he do? There was only one thing for him to do and that was to look to the individual, train him to such prevention as the industry could apply. That may have been unfortunate but it was quite fortunate too, and I think that is the fundamental point of accident prevention. They did a darn good job, if I may say that, and I have here some evidence of the amount of work put out, their operation for several years back and some later reports gotten out within the last two or three years.

Recently systems have become complex. They concern the engineering phase and the opinion has been given that the engineering phase has been over-emphasized. I don't know whether Chairman McKinnon and myself have been referred to. We have emphasized that in our own construction work. However, whether we were intended or not, I will take upon myself the answer of that point, that engineering is being over-emphasized.

How many of our companies continue to operate disconnect switches that are not in any way interlocked from being wrongly opened? How many cases do you know of in which two switches of one circuit and one of another have been left alive? I have heard a number of such accidents recently, serious ones too, where men have been hung up on all kinds of voltages because of no preventative measures; that is one of the things we can try to prevent by getting the foreman's activity more effectively, and we do find that men make the error of getting on the wrong circuit.

We might compare engineering devices somewhat to grade crossings. When there were nothing but horses the grade crossing was the rule rather than the exception; and when traffic became congested, gates were put in with a tender and that was effective in that stage of railroad and ordinary street traffic. When automobiles came in and we find human nature is not much of an improvement over horse nature; they ran into the gates and so they changed the gates to steel to prevent a fellow from passing; and then they made over and underpasses, but they were not designed with a view to present-day traffic and changes have been found necessary. I know of a place in Wallingford where a particular abutment caused many accidents so they changed the roadway so that the approach was not a sharp angle and made a large swing and that is being done in many cases. Underpasses are being straightened out so that cars coming in the opposite direction can be seen, and so that they can see each other under the pass.

The present cautions which our company has put in, in the matter of preventing men from getting hung up on circuits, involves the expenditure of money. I have

been sympathetic with this idea that we should approach accident prevention work without consideration of the dollar. It is a humanitarian matter before a dollar matter. After you get so far you must find out how many you can get by with. Furthermore, sooner or later, the Board will say, "What will you get for it?" You must say, "Accidents have been reduced, lives saved," and you may have to reinforce it by a statement of what the consequent damage may be. I have one particular accident in mind in which a man was seriously hurt on a short circuit of 2,700,000 volts. He came out and is all right. It was simply a burn case. He was well protected, but the consequent damage ran up into the \$20,000 figure. There is some reinforced argument we can use when we get on this border line of opinion to find out whether the added equipment is of profit or not, so I believe that engineering analysis of what these various pieces of equipment will do will be an increasingly important phase of our considerations.

There is one particular phase of our work this year that is of interest and that is the local hazards. In the Engineering Association Meeting, 203 cases were clipped from the newspapers in four months. I believe there will be an increasing exposure due to the use of cheap electric appliances, such as poor lamp cords and such causes which we should get after. We appointed a committee, headed by E. W. Gorry, a very effective man. He will look into it and we hope to have this improved by his doing a lot of educational work.

We have a big problem in getting people to understand that they must not use these defective appliances, the cheap toasters, etc. The second phase is how to prevent this stuff from getting on the market and how far we should go with that prevention. That is a big economic problem. You might say the Ford should be taken off the market because it is not as good as the Rolls-Royce, but the Ford car is very valuable to our motor transportation even though it is a cheap device. We must study to see whether these cheap devices can be improved, whether the money cost is a measure of their defectiveness, or whether they can be improved or controlled so that when they get on the market they will meet standards. That is a big problem. We ought not take a thing immediately off the market because it is cheap. We have different viewpoints in the N. E. L. A. which you possibly don't have to consider. I think you will agree that more elements of industry can be brought behind our work and if that is done the better it will be for the work we are trying to put across. If we go about our work without consideration of the other fellow's, he will not be ready to back us up as he would if we got his viewpoint, not as a criticism, but observation.

In public utility we have not done enough in the past. Mr. Johnston referred to it in getting the other group's interest. I don't think we should stop the educational work of safety men or employees but we should draw in executives and operating men. If they can be made accident prevention men and we can get their interest, our work will go ahead with great strides. I was told yesterday of one company that had not done a bit of accident work and one of the executives attended a committee meeting and became impressed and now they are doing great work. That is one of the main things of the committee, to get companies interested and to reach those who have not yet become interested in the work.

In Re Statistics

We had informal meetings to discuss this matter. The Public Utilities Section and the Accident Prevention Committee have parallel work, overlapping to a certain extent. We should prevent duplicating. We are trying to get together and make this work effective by an exchange of information. How, I don't know. A joint committee will be appointed and later we can report on that.

We had intended to have a sub-committee on refrigeration because many com-

panies operate refrigeration plants but we decided not to duplicate the effort when we found out there was one in the National Safety Council.

In the Matter of Posters

Mr. Johnston or Mr. Rutland referred to the fact that the publications of the National Electric Light Association had not possibly reached all you people. I may say that neither do the publications of the National Safety Council reach all our people and we could derive much benefit out of a greater exchange or circulation. After this meeting we will post on the board prepared for it, some of our information. I would like to suggest for your consideration and invite you to send your display down to the Accident Prevention Committee Meeting at Philadelphia so we can get it across there to the men who don't get it. If you approve of that I will be glad to appoint a committee to arrange it and see that it is done—a couple of fellows to do the dirty work, in other words.

As to the type of poster, circulation will reach far larger acceptance and extent if the information given is given a little restraint. I believe most people in the electrical industry would not be alarmed by a statement of the seriousness of electric shock; however, there is another viewpoint, the psychological viewpoint. Mr. Bennett told me that when he was in France observing action of men under fire they were instructed to do certain things and were told of the dangers of certain things, shrapnell for example, and they went back under fire. The psychology of prevention of accidents has caused people to think we should not play up to the terrible results of an accident but carefully stress the correct methods of doing things. We might give a slight degree of warning of what might happen but should not emphasize the accident. That would be more constructive on these posters. If that may be taken into consideration I think you will get a further use of your publications. The National Safety Council, through city channels, has access to a great many groups that can be approached, the Rotary Clubs, Kiwanis Clubs and Public Schools, which seem to me can be very much better attacked through the National Safety Council than through our activities.

Some 35 lines of publicity are open to us whereby people at large can be reached in an effective manner. We are not at liberty to give out the names or avenues of reaching the public but I think we may be able to exchange such news and have better effects.

I want to mention a few reports: The Accident Prevention Committee has had a Committee on Resuscitation. The Prone Pressure method of resuscitation has been under development; there have been discussions which culminated last year in the acceptance of this standard method by a number of different bodies of power. The American Gas Association, the Red Cross, the American Telephone and Telegraph Company, the Bethlehem Steel Company, the National Electric Light Association, the Safety Council, the U. S. Army, the U. S. Navy, and the U. S. Public Health, nine of them, have all given approval of the resuscitation method which is the basis of this pamphlet. The chairman of this committee got the approval of all these, even though there was some difference of opinion as to the best method. This pamphlet has reached a circulation of a quarter million, schools, firemen, policemen, as well as others.

There is an accident prevention case for lineman. One of the publications placed on the bulletin board will give an indication of the work for a number of years past. I commend to you the exchange of this information. We can gain by it.

In closing, I believe that while we possibly have reached a less rapid growth in our preventions, that is, diminishing accidents at a less rapid rate, there is still a great field for us, and certainly if we work together and put our shoulders to the wheel as that poster indicates, we can accomplish a lot and I feel that we will have a great advance and a great improvement in our records.

CHAIRMAN RUTLAND: Mr. Beardsley, I want to thank you on behalf of the membership here for the wonderful talk. I think there is a lot of room for improvement in our contact with your committee and I have just suggested to the new chairman that a consultation be had for an exchange of ideas. This is a good place where the Accident Prevention Committee can have direct contact with the men on the firing line. It is a wonderful opportunity for them to come in contact directly with you.

I will call on Mr. Dobbin, chairman of the Accident Prevention Committee of the American Gas Association. I don't know whether he will be the new chairman but at least he will cover the ground of the past year's work during his administration.

Address

By E. R. DOBBIN

Chairman, Accident Prevention Committee, American Gas Association

It is with a due sense of appreciation that I come before you this morning as Chairman of the Accident Prevention Committee of the American Gas Association to tell you of our activities and how the committee functions.

I am sorry that I cannot tell you in full of the past year's work, nor present the printed reports as promised in your program. This is due mostly to the fact that our annual Convention has not been held and issuing of reports previous to the Convention would be ill advised. However many of you will be with us in Atlantic City next week where full report will be made and printed copies available. Members of the Association will receive these in due course and I have no doubt but that Headquarters will gladly supply others of you who may concern.

Having been interested for some years in Accident Prevention work and having served, to the best of my humble ability, upon your council committees I have had exceptional opportunity to watch the growth of this Public Utility Section from a mere handful of enthusiasts to the wonderful gathering here at this session—everyone a willing worker eager to learn and to apply—all that preventable accidents in our great industries may be kept to a minimum both in number and severity. To this end it seems fitting that all organizations working with this in view should contribute their mite into this great melting pot—the National Safety Council—where the results of our labor can be used to such very great advantage.

It seems proper that this section should include, as it did this last year, the chairman of the American Gas Association and the National Electric Light Association Accident Prevention Committee among your councillors—thus establishing a direct point of contact—that I am sure will prove of service to all concerned.

During this last year the Natural Gas Association joined forces with the Manufactured Gas or American Gas Association. This meant added problems and added responsibilities—but it also brought to us a group of capable men anxious to learn and anxious to serve. Theirs was a very welcome addition and I am sure it will contribute much to our Accident Prevention program as a whole.

Our committee is drafted from the member companies of the Association and usually numbers 20 men from the four points of the compass skilled in their line and anxious to keep the Gas Industry in the front ranks as regards the prevention of accidents—not only to employees but to the public. The prevention of property damage—both plant and public—also comes in for a fair share of attention for we realize that property damage—especially in our industry—often carries with it its full toll in the matter of accidents to human beings.

Under the supervision of Headquarters and through a chairman—regular meet-

ings are held—and the general committee broken up into sub-committees each under its own chairman. Each sub-committee is assigned special work and accounts for its work in general committee session—where if satisfactory to the majority it is passed on through the Secretary to Headquarters and the Executive Committee for approval or disapproval, finally reaching the industry as a part of the General Committee report and printed in pamphlet form.

Now that you have a set up of the committee I will carry you along with me into sub-committee work—particularly this year's work.

The "Statistical" sub-committee gathers from the Association members data relative to number, class and cause of all accidents peculiar to the Industry as well as obtaining such special data as may be needed for special work. This is a progressive work added to year after year. It is both an indicator and a guide serving several important purposes.

The second sub-committee, "Safety and First-Aid Devices" examines, tests and renders a report on all devices, of the nature indicated in the title, which are referred to it. If the report is satisfactory to the General Committee—approval or disapproval is voted and this action becomes a matter of record for the guidance of any interested. Until lately this sub-committee has had to carry out tests where and how and as best it could. Now the Association Laboratory in Cleveland gives assistances and renders a report much more complete and final than we formerly could hope to secure. This enables us to pass judgment from the results of Laboratory tests as well as results from practical field tests.

The third sub-committee, "Bulletins" prepares and submits posters dealing with Gas Plant and Gas Distribution Hazards. After approval by the General Committee these are routed to the National Safety Council for printing and distribution. The report this year will show 22 such posters.

The fourth sub-committee, "Safety Practices in the Industry" has endeavored to utilize material gathered during previous years but finding itself faced with technical matters—has in joint session with a special committee from the Technical Section—confined itself to the solving of some few specific safety problems. It is pleasing, however, to build the foundation of a Safe Practice pamphlet which builded upon and added to for the next two or three years should prove a complete and trustworthy treatise on Safe Practices. Truly such a treatise is badly needed.

The fifth sub-committee, "Occupational and Catastrophe Hazard" is presenting a progress report in as much as it is impossible to complete an exhaustive report within the short time of one committee year.

The sixth sub-committee, "Safety Hints for Customers" prepares, as its name indicates material to be used as envelope stuffers or on the back of consumers bills in a continuous campaign to educate the consumer to use gas appliances efficiently, and in most cases efficiently used appliances means *safely* used appliances.

Sub-committee seven, "Medals," passes judgment on all applications for McCarter medals as well as recommends the award of the Addicks medal. This last is awarded to the employees performing a very outstanding heroic act and is known as the American Gas Association Meritorious Service Medal. Only one such medal can be awarded each year. The committee will recommend this year the award of 71 McCarter medals which is proof indeed that the adoption and teaching of the Prone Pressure Method of Resuscitation is bearing fruit. In 1924 only 5 applications were received—the number increasing each year up to this year's record number of 71.

In this convention I wish to let you know how elated we all are with the adoption by the many organizations concerned of the Prone Pressure Method of Resuscitation. For years the N. E. L. A. and the A. G. A. have *labored* and *loved* and all but *lost*. Now we are coming into our own—one method—broadcast to all the world. There may be some little variation in technique—and time may

bring a better method—but now—*right now* we are teaching and preaching *one* method. This with the McCarter medal in the Gas Industry, the Insull medal in the Electric and the President's medal taking care of those outside give us cause to rejoice. So let us be thankful and make the most of our opportunity.

I have given you only a brief outline of the work of this committee. I have not endeavored to give a report but have endeavored to show how our activities link in closely with yours and how willing we are to share with you the fruit of our labors and how so long as results are obtained we can go on happily each contributing to the other's welfare.

CHAIRMAN RUTLAND: Thank you, Mr. Dobbin and Mr. Beardsley. Now you gentlemen know how desirous these men are of your cooperation so I want to suggest that when Mr. Beardsley and Mr. Dobbin have arranged the booklet, that you take the names and write the committees direct for such reports as you desire; or, if any other questions arise from time to time, please feel free to write them direct and if it is handled diplomatically a safety engineer can build up his own prestige in his own organization, by getting a report such as this or some other report that has been gotten out on a like problem. It lets the engineer know that the safety man is coming to him for help or suggestions as the case may be.

Mr. Beardsley mentioned the voltage hazard and I am going to suggest to the incoming news editor that he consult with Mr. Beardsley as to how these leaflets may be procured and include that in the first *News Letter* or the next one, so you can in reading these *News Letters*, be acquainted with where you can get these leaflets and order a few of them and decide on whether you want to use them. The price can also be included in the *News Letter*.

Now, gentlemen, in industry today there is a very close tie between normal training and accident prevention work. The next speaker I am going to introduce to you is Mr. M. J. Kane, Engineer in Charge of Plant Training, American Telephone and Telegraph Company, New York City. Mr. Kane is closely associated with action of this kind and has been for some time. He has a national reputation as an authority on industrial training. He is now building within the telephone industry, a line of educational activities among men which will involve, when completed, more in the line of training than any university in the world. While Mr. Kane claims he is no teacher, those who know him know he is responsible for the tremendous amount of analytical training of hundreds and hundreds of men in the telephone industry. He is very competent and I am sure if you take some of his thoughts and put them in your own organizations that they will prove of decided advantage in safety work. I take great pleasure in introducing Mr. Kane.

The Foreman as a Trainer for Safe Practice

By M. J. KANE

Engineer in Charge of Plant Training, American Telephone & Telegraph Co.
New York City

I would like to tackle the subject in a manner a little different from its ordinary treatment. We have been talking a lot about foreman training. I would rather forget that now and begin at the beginning of our whole problem. Public Utilities, in particular, must find a special significance in safety matters that differs a little from other industries. It is always important in any industry, but particularly so in public utilities, and that applies to any sort whether communication, lighting, gas or transportation. Maybe I can point out some of its particularly impressive features that make it significant.

Effect of Public Opinion

One is your depending upon public opinion, and that can affect the success of your organization tremendously. Second: your men, or the working force, operating as a group. One man in a group out of line on safety measures can quite seriously affect the well-being of others in that group. A third feature is that your workers are almost invariably performing before an audience. The work is done in such fashion and under such conditions that the public is pretty much, at least in part, the audience viewing the work done. It may be small or large.

Another quite significant feature of safety, particularly the result of unsafe practices, is that the public is dependent upon you for the particular product that your public utility offers. They have seldom any choice. They are dependent upon the particular service you supply.

Let's take these as features. Let us see if there is any common denominator we might apply in accident prevention. I would like to make a distinction between accident prevention and safety work.

Accident prevention seems to me to indicate the rescue on the brink of the precipice. Safety seems to be something well worked out to prevent the dangers of coming to the precipice. Let me cite a few cases. These are taken at random, not applied to public utilities alone. Try to think what you would determine as the cause as they are being presented.

How Accidents Happen

In a fairly large manufacturing plant, large enough to require electric crane service to serve some of the heavy, mechanical work, the crane, while the operator was out of the cage, ran wild, got started down through the room, and a swinging lock on the take-up injured several people severely, not fatally, and wrecked a storeroom by getting caught and yanking it out. What do you think the cause of that was?

Another case, a little different, is this: A wireman, feeding in a pair of number six rubber covered wires through a wooden partition in the basement, did not know that on the other side was a power shaft and the end of the wire caught in the pulley, came through the partition hole much faster than he had planned, injuring him, destroying the partition and destroying the wire. That is another case you can decide for yourselves what the cause was.

Still a third I would like to present, which differs radically from the other two to this degree: There was a process used in a certain manufacturing establishment of treated fabric, I believe for airplane work but I am not certain now, but it required the use of a heavy, metal vacuum tank. The operator had the task of removing the heavy bolts which held the cover and operating a power crank for taking it off, taking the yards of fabric out afterward. Having worked at it successfully two or three months, he was rated as a good, careful worker. One day he attached the crank handle to the hook in the cover after having removed the bolts which held it at least partially, and without watching the vacuum tank, attempted to lift the cover up and pulled the whole outfit out by its roots. It did not hurt him or anybody else but it wrecked \$3,600 worth of equipment in the wink of an eye.

I am certain that if I could take a vote as to the cause of each there would be several varieties of causes, carelessness on the part of the man, negligence on the part of this, that or the other thing. Let's not think of causes. Let us see if there is a common source of control, which I think is a better way. Where could control have been applied in each of those cases so they could have been prevented and hence never have been entered in the books as an accident? Let us see whose job

it is to control situations so we do not have accidents, so we have safe conditions, keeping in mind the distinction I made between the two features formerly.

Active Supervision Necessary

I have a particular bias in my mind probably which gives me the answer so quickly that sometimes I am impatient if I don't get immediate agreement. I maintain the source of control is the supervisor, and I do not mean the supervisor who is in an office and gets out into the field only occasionally; I mean the line supervisor. I don't care what his title is, sub-foreman, line leader or what it is, but he is the source of control. I think it is commonplace to say to this group or any group that has thought much about industry in this connection that supervision, proper supervision, gives almost perfect control, not only of accidents, or rather of safe conditions, but of others, that it is surprising that we don't do more about it.

If you will bear with me a short time I will try to outline a thought for supervision that to my mind justifies getting a foreman equipped to supervise. If I were to ask you, as I have had the good fortune to ask many actively engaged in directing operations, what you supervise, when you supervise, I am quite certain I would get nearly the same answer at first. You supervise everything in general, of course. As a matter of fact, that is not true. You can't supervise everything in general. You must supervise something in particular. Either you do supervise this particular thing or you don't. If you do, it is taken care of. If you don't, it may come back as a boomerang. The things you do supervise, these particular features are small things, very insignificant details if viewed by themselves. I believe if you go back to the illustrations I used or any others parallel to them, you can see that, as one speaker indicated previously, there is a point where something went wrong. That is a point where supervision was not applied. You can always find some apparently trivial thing which is the cause.

I believe that the control is farther back than the cause. Let me see if I can make it a bit plainer. I am recalling in my own mind now some of the controversies and some of the arguments in properly setting forth the cause of an accident. In a particular instance it would be said that the man was negligent. All right. Maybe that was the cause. In another case it might be said that the man deliberately disobeyed instructions. That may be a cause too. In another case it might be said the foreman was busily engaged some place else and was not in a position to give instructions and the work was being carried on as well as it could be, and as a result something went wrong. Maybe that was the cause.

Probably you can take every cause set up, even to the mental conditions of the worker, and tie them up to the accident, but back of these causes there is or there should be a control. It may not be infallible. We know that accidents classify themselves generally under two heads, mechanical or material failures. I don't know whether we can get a clear cut distinction, a clear cut case. In any event, the number of that class in public utilities is small. We do have fairly good control of mechanical or material features. So that as a problem, that particular group can be quite easily isolated and quite definitely treated on an engineering or scientific basis. These mechanical improvements are easily handled when proper engineering attention is centered on them.

That is not true of human failures. The best safeguard of mechanical devices can be so handled by a human operator that the safeguarding features are nullified, and on the other hand very unsafe. Almost all extra-hazardous conditions can be taken care of if the human failure is eliminated. Probably that sounds a bit ambiguous. I mean, no matter how dangerous conditions are, if the industry working under those conditions cares to and is aware of the danger, it will avoid accidents. Most accidents are not on extremely hazardous conditions.

With that particular feature, thinking of the control, the source of control of accidents due to human failure,—I believe supervision is the most effective control.

Let me see what other devices there are to help get this control. I would like to be plainly understood in this connection as not finding fault with the devices I mentioned.

Effective Safety Devices

Now, some of the very effective devices used in safety practices are the use of posters, bulletin board material set up in poster fashion. We make quite an extensive use of that. Another device that is used is the practice of having, periodically, talks before groups who are engaged in the activities and having impressed on their minds the probabilities for accidents and mediums used for overcoming them. We have another feature of this nature. We have special safety men, full time safety men. We do use that and quite effectively, too. In addition, we use a little closer tie to actual productive work and I don't like to be misunderstood in that either—a tie in activity only and that is a special methods man. He is a little different type of individual than the purely safety man. He devises means to be used in getting out safety work and a safety man gets the organization of the field in such a fashion that results are as expected. All of these are good.

Everyone has a particular place in a safety program. My own opinion is that all of these are simply nullified if the proper first line supervision is not applied. I don't care how good your safety man is, your methods man is, how effective the speakers are that give the inspiration of talks or how striking the posters, if you do not get the first-line supervisor to control those conditions, you will continue to have bad accidents.

That may seem as though the supervisor was the universal panacea. The ideal supervisor, I think, would be. We are not dealing with idealisms. We have to face practical features. Let us try to look at this improved supervision on a practical basis. Can the first-line supervisor by himself take this activity under his wing and carry it through successfully? No, he can't do it. Behind the first and second (mind you I am counting backward now) the third line supervisor is the man on the firing line. The second and third and fourth are backing up toward the general manager or the plant executive or whatever title is assigned to the highest supervisor. The first and second can't do that but maybe the first, second and third in conjunction can do something but you will get better results if the whole line is working toward that end. Each one has a functional part. Each one is responsible.

When I say supervision I mean the whole line functioning in the particular sphere that the responsibility assigned them calls for. That simply makes a preface for a statement that while it is true it is sad news in many sections of the industry. The foreman just cannot equip himself to do anywhere near this idealized supervising. Somebody within the organization must help him so he can do the sort of supervising that will avoid hazardous conditions resulting in accident.

Helping the Foreman

That simply brings us to a point of consideration of what can be done to help this foreman. He is expected to supervise details, whatever agency is made use of or whatever devices are inflicted upon him. It ought to make him more aware of the significance of details and particular application of these details to safe practices. He must realize that doing a job safely is of as much importance and in some cases of more importance than doing it economically or in conformance with standard specifications. That is a new thought to a lot of first line supervisors. He is not to blame for it being a new thought. The evolution of our

practice plainly traces the evolution of those higher in the organization so that many of them are just orienting themselves into that real thought.

Safety is not a fad. Accident prevention is not a beautiful suggestion. The beautiful feature of that situation is this: The safe way to do work is always the best way and the easiest way to do it. This is the first premise, I believe, in the mind of the foreman. He is not pleasing a safety man or a personnel organization when he gives occasional thought to safe practices. He is taking care of an important assignment on his own job and if he does not take care in the march of progress he will be eliminated.

Now, having gotten that particular conception in his mind, it is not fair to leave him there. You don't gain anything by saying to the foreman, "You must do this work safely. It is part of your job." He is definitely entitled and is perfectly within his rights when he says to his superiors or his supervisor, "Well, how am I going to do it? In what fashion can I control these conditions?" The organization must be in such a position that some device which he can use immediately is placed in his hands. Again, fortunately, that is not a difficult thing to do.

The Importance of Analysis

The detail that I spoke of which is the sum total when you consider the whole feature of supervision simply indicates that foremen should be given a device which will let them know those details. It is only a step from that to the conclusion that analysis, much as we hate that word (most of us) is the answer. Now analysis has been worked to death as a term. We all like to talk about analysis but none of us like to analyze. It is hard, gruelling work.

The first line supervisor is not a bit different from ourselves. Among the devices to help him in this analysis should be one in which he can overcome the natural reluctance he has to analyze on a basis which is more or less selfish in its motive. I would not analyze just for the sake of analyzing, nor would you, but I would analyze if it were going to make my work particularly easy. If I could find a way to save time that is so valuable to a first line supervisor, I would listen eagerly and go through some grief to get the benefit of it. I believe that particular feature in the training of a foreman in safe practices is a worthwhile venture.

This is a simple attack on analysis which isolates and emphasizes small features in each of these various operations where there is a possibility of accident for one feature. Now, supervision can be definite in a sort of grand sense this way: to know what is being done in detail; to know what the limiting features are that might cause failure; to set up a plan which eliminates as nearly as they can be eliminated those limiting features; and then to give it attention to see that no deviations are creeping in. That is an ideal supervisor.

Sometimes we ask a first line supervisor to do one or the other of these but seldom ask them to apply all of them. We say, "You should have seen that in advance." That is true. "You should have had some plan to avoid that." That is true. But, as a medium of helping him you must have a device to cover all four.

Now, as a medium of analysis, it is a common sense one which applies the analysis or analytical thought for the particular progress for which the first line foreman is responsible. If he pulls it apart to minute details he can plan to offset the limiting features and he can plan to take care of that particular activity subsequently so deviation does not creep in. That in itself is the essence, the backbone of any training of a supervisor in promoting safety practice. If you do that, you can trust the foreman to apply the pretty good common sense that he must possess to get the job in the first place, so results will be fairly satisfactory and increasingly so as he becomes more familiar with the practice of analyzing and has the background of experience in eliminating these features.

I want to express again, first get in his mind a realization that doing the work safely is of much importance, and sometimes more than doing it economically and in conformance with specifications. If he believes that, you have a good start. If he does not you won't get far with that premise. Give him training in analyzing the particular job so he can build up a plan which anticipates conditions and prevents their occurring rather than waiting until an accident has occurred and then after discovery try to remedy the fact.

CHAIRMAN RUTLAND: Mr. Kane has led us down a very interesting highway in discussing this problem. It is fundamental in our business.

I want to ask Mr. George Opp to make an announcement to you in reference to one or two requests in regard to holding conventions in other cities.

CHAIRMAN RUTLAND: Gentlemen, we still have a few minutes, the luncheon does not begin until 12:30, so I would like to introduce to you the members of the Executive Committee and have them make brief reports of their activities during the past year.

Mr. Ivan L. Scott with the National Electric Power Company, New Jersey, will make a report as Vice-Chairman in charge of Gas Interests.

IVAN L. SCOTT (Vice-Chairman, Gas Interests and Safety Director, National Electric Power Company, Asbury Park, N. J.): Mr. Chairman: As Vice-Chairman in charge of Gas Interests during the past year, there are only two accomplishments really made by this office. One of the things was to secure a paper written by Ralph Gilman of the U. G. I. Company on the subject of the human side of the gas business. It was turned over to our Publicity Committee and was published in the *National Safety News* and other publications.

The Vice-Chairman in charge of Gas Interests also was successful in securing *The Gas Age Record* of New York to donate a trophy to the winner of the gas group sponsored by the Public Utilities Section, and that will be awarded at the joint luncheon this afternoon. As chairman of a committee to prepare an exhibit of safety rule books, various accident report forms and other literature, I want to take this opportunity to thank the companies who so willingly submitted that material to us. We have what we think is a very good display, and I think a good deal of commendation and credit is due to the New York Edison Company for the manner in which the material was prepared. I hope you will all take an opportunity to look over the material. There are some things of value to everybody. I believe that is all that was accomplished by myself as Vice-Chairman during the past year.

CHAIRMAN RUTLAND: These men are all rather modest. They won't tell you of the hundreds of details they have accomplished during the year.

Next I will call on Mr. H. F. Webb, West Penn Power Company, Pittsburgh.

H. F. WEBB (Vice-Chairman, Water Works, General Safety Division, West Penn Power Company, Pittsburgh, Pa.): I will read the report of the Publicity Committee.

Report of the Publicity Committee

Following a precedent set during the previous active years, your Publicity Committee has consistently secured worthwhile manuscripts all of which were accepted for publication in both safety and Association journals. Altogether seven manuscripts were received, all of which have been published in such Journals as the *National Safety News*, *N. E. L. A. Bulletin*, *American Gas Association Monthly*, *Safety Engineering*, and *The Literary Digest*.

The work of securing articles for publication proved rather difficult in the past, since it was frequently necessary to write a large number of safety advocates before locating one who would be willing to devote the time necessary to the fabrication of a suitable article. However, your Committee hit upon a new plan

of action during this past year which produced results with little or no effort on the part of the Chairman.

In brief, a selected subject was assigned one of our Executive Committee members who in turn farmed it out to either someone in his own organization or one known to him as having ability along this particular line. In this manner we were able to provide the above named publications with seven excellent articles as follows:

SUBJECT	CONTRIBUTOR	PUBLICATION
The Lineman's Best Friends.....	R. V. Pickett, Constr. Supt., West Penn Power Co.....	National Safety News
The Human Side of the R. V. Inman, United Gas Gas Industry.....	Improvement Company.....	National Safety News
Training Men for Industry.....	J. L. Vandergrift, General Plant Employment Supervi- sor The Chesapeake & Po- tomac Telephone Co.....	National Safety News
Stopping the Accident Leaks in Water Works Opera- tion	A. F. Porzelius, Supt. City Water Co. of Chattanooga.....	National Safety News
Standardization for Safety.....	Stanley Green, Meter Engr., Indiana Electric Corpora- tion	National Safety News
Executive Interest in Acci- dent Prevention.....	Fred W. Bagnall, Asst. Supt., The Detroit Edison Com- pany	National Safety News
How to Keep From Getting Hurt	O. O. Paugh, Northern Indi- ana Power Company.....	Safety Engineering The Literary Digest

Your committee would like to express its appreciation of the cooperation on the part of the author contributors listed in this report as well as that of our fellow committee members, Messrs. Ivan L. Scott, H. L. Meade, C. P. Ryan, and Geo. C. A. Opp, and recommend the continuance of the Publicity Committee as a definite part of the Sectional activities.

CHAIRMAN RUTLAND: Mr. Webb worked hard in his activity during the past year and we appreciated his untiring efforts. We will now have the report of the Chairman of the Poster Committee, by E. S. Beaumont!

E. S. BEAUMONT (Chairman, Poster Committee, Public Utilities Section, National Safety Council): I don't like to listen to long reports any more than you do so I will apply the Golden Rule.

Report of the Poster Committee

The work of the Poster Committee for the past year has been split into sections and handled by groups representing each of the several utilities.

Mr. W. E. Hughes, Rochester Gas and Electric Corporation, headed the Gas Division. With the assistance of Mr. M. B. Hile of the Citizens Gas Company, Indianapolis, and the Poster Committee of the American Gas Association, of which he was chairman. Mr. Hughes submitted material for thirty posters. Most of these were found useful by the Poster Staff.

Mr. Robert N. Klinge, of the Alabama Power Company at Birmingham, headed the Electric Division. He was assisted by Mr. C. W. Chiles of the C. I. P. S. Company, Mr. Johnson of the Tennessee Electric Power Company at Chattanooga, and Mr. F. B. Stiver of the Union Electric Light and Power Company at St. Louis. This group also turned in a great deal of useful material.

Others who rendered great assistance are Mr. H. F. Webb of the West Penn Power Company at Pittsburgh; Mr. H. L. Meade of the Ohio Bell Telephone Company at Cleveland; Mr. H. M. Kellar of the Northern Indiana Public Service Company at Hammond; Mr. E. J. Kreh of the Equitable Gas Company at Pittsburgh; Mr. A. R. Gray of the Peoples Natural Gas Company at Pittsburgh; Mr. J. F. McCurdy of the New England Telephone and Telegraph Company at Boston; Mr. H. L. Brown of the Northern States Power Company and yourself.

In all, more than a hundred poster ideas have been submitted. A few could not be effectively used and some have not been used because we have been unable to get suitable pictures or sketches to accompany them.

The excellent cooperation of all those named and any whom I may have by chance overlooked was greatly appreciated and made this rather dreaded job an easy one.

CHAIRMAN RUTLAND: Thank you, Mr. Beaumont, for your untiring efforts.

The next man I want to introduce is Mr. N. L. Devendorf, Consumers Power Company, a man to whom a lot of thanks is due for his work this year in editing our *News Letters*. He spent a lot of time in getting the material together, and he received a letter a short time ago from Mr. Cameron and Mr. Keefer advising him that in their opinion the *News Letter* as published was the very best of any Council Section and I take great pleasure in introducing Mr. Devendorf.

N. L. DEVENDORF (Consumers Power Company, Jackson, Mich): I have a very brief report to make. Instead of the 12 letters scheduled I have been able to get out eight. There was plenty of material and I had excellent cooperation during the year. They have gone out as fast I could get them, in connection with the work I was obliged to do. This is one point I would like to bring up. I want more material from the Gas, Water Works and Telephone and Telegraph Companies because letters this year have been heavily burdened with electric light and power. If we can get more material the letters will be well worth while this coming year.

ADJOURNMENT

October 4, 1928

C. J. RUTLAND, Chairman

Safety Engineer, Texas Power & Light Company, Dallas, Tex.

The third session was called to order by the chairman, C. J. Rutland.

CHAIRMAN RUTLAND: I take great pleasure in introducing to you Mr. H. B. Harmer, Safety Engineer of the Philadelphia Electric Company, who will address you.

Housekeeping for Power Houses, Substations, Storehouses and Other Public Utility Properties

By H. B. HARMER

Safety Engineer, Philadelphia Electric Company, Philadelphia

Housekeeping for power houses, substations, storehouses and utility properties in general, embraces many and varied elements that cover a surprisingly large field of activities. The importance of this subject cannot be too strongly emphasized. Good housekeeping is fundamental to maintaining continuity of service and is essential to successful and economic operation of utility properties.

There are two outstanding features of good housekeeping—orderliness and cleanliness. These are never accidental but are the results of planning, system and supervision. Then comes the most important element—inspection. Intelligent, earnest study of inspection methods plus hard conscientious work by every person in the organization is necessary to secure the best results. A system of inspections should be started and maintained.

Written plant inspection reports covering buildings, equipment and contents should be carefully made, kept and checked until any hazardous conditions have been corrected. These reports should cover fire hazards, maintenance of fire fighting equipment, installation of equipment and apparatus, storage conditions, cleanliness of buildings, cleanliness and upkeep of yards and adjoining properties. This routine should have a tendency to develop a sense of good housekeeping among the employees and should result in better cooperation of the working force.

Buildings, grounds and outdoor structures require constant supervision to maintain them in a proper state of repair and in satisfactory condition. Without this constant supervision unhealthy conditions of the physical properties will arise. Prolonged neglect will surely result in such dilapidation as to require replacements in many cases when comparatively simple and inexpensive repairs made at the proper time might have prevented deterioration. Both the inside and outside of building structures should be rigidly inspected and any defect, no matter how small, should be given immediate attention. This attention to detail insures that the structure is thus maintained in a creditable condition, and produces a favorable reaction in the mind of the operating force and tends to a better spirit of cooperation among the entire personnel of the organization which is particularly desirable.

All outside structures, in general, should be painted alike but even this rule need not stand in the way of making some particular structure conform in appearance to its surroundings, if, for some reason this course seems desirable. Modern generating plants, substations and relative buildings, however, are as a rule fire resistive, but many other buildings are not. Therefore, the question of painting enters very little into the exterior appearance of modern structures.

The interiors, and this applies to structures and apparatus, should be kept well painted, and floors and walls should be looked after in this respect. The color

scheme should be agreeable, cheerful and well blended in order to contribute its share toward a proper frame of mind, and if such tint and consistency as will produce the largest quantity of reflected light possible from such surfaces. Inside structures and apparatus should be painted chiefly because of utilitarian reasons, but even these should be so colored that they will blend nicely with the building colors and not produce sharp contrasts.

The grounds surrounding the buildings, both operative and inoperative, should be kept clean and neat and, if possible, should be cultivated so as to present a pleasing aspect. Well-kept lawns, a generous supply of shrubs and, where practicable, a few trees, selected and placed with care, will add materially to the general appearance. Where personal supervision can be given by the operating force, flower beds with well-chosen combinations can well be made a part of the landscape gardening. The grounds of outdoor stations generally are covered with crushed rock and do not lend themselves to decorative effect, but even these structures can be so maintained as to blend well with the surroundings.

The careless and untidy storing of materials in storerooms and plants may occasion both fire and accident hazards. Often when a shipment of material arrives the cases are opened and allowed to remain unpacked for several days, and the excelsior, sawdust or paper packing constitutes a very serious fire hazard. Special care should be exercised that material piled near aisles and passageways is not likely to fall, or to be knocked over; the piles should not be too high; neither should parts extend into the passage or roadway where passing men or trucks may strike against them.

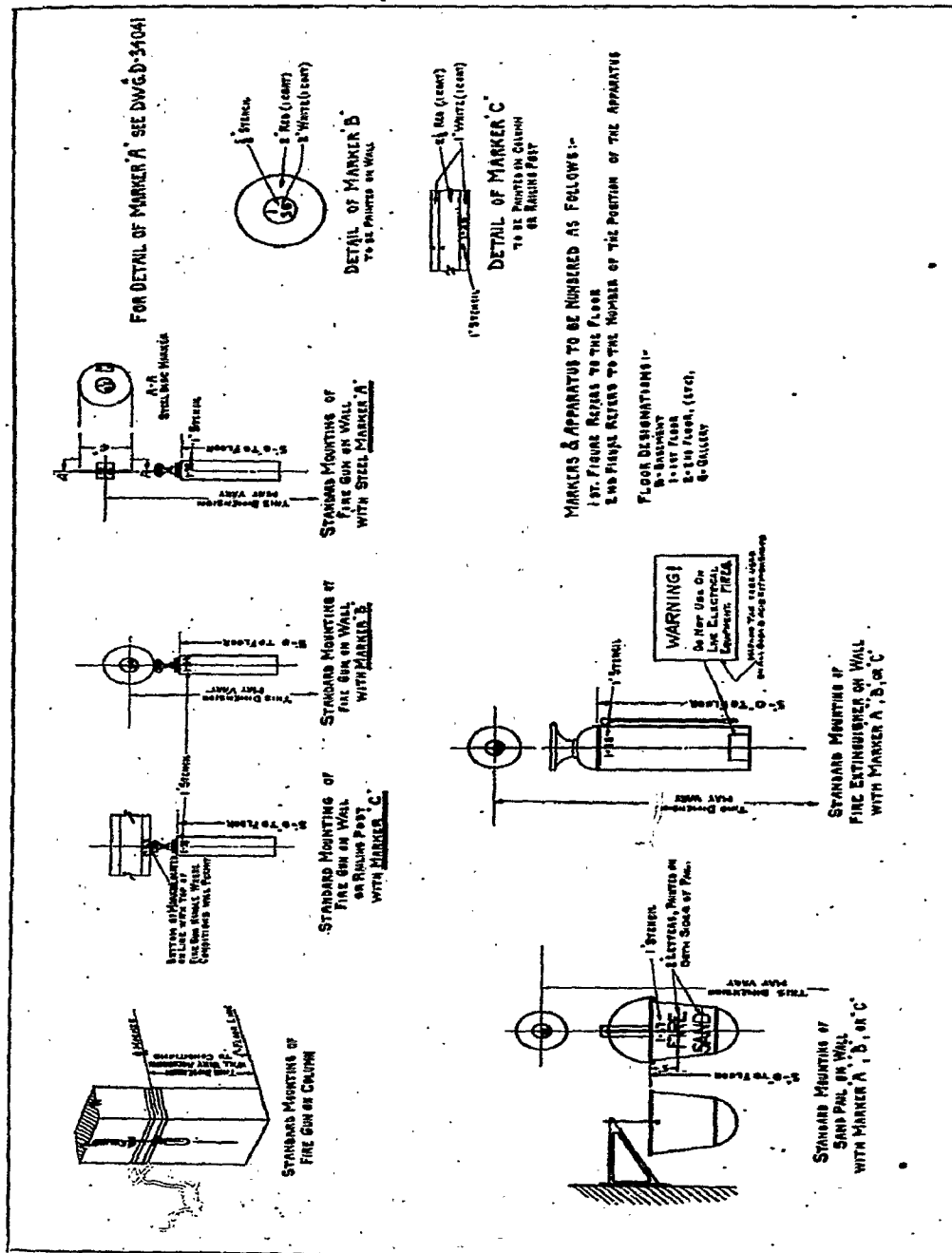
Proper provision should be made for the storing and handling of miscellaneous oils, paints, etc., and when small quantities are withdrawn for use, any portion left over from the day's supply should be returned to storage. The practice of storing materials in operating rooms of power houses, substations, etc., constitutes a serious fire hazard and should not be permitted.

The lighting and ventilation systems should be maintained in good operating condition. A well designed artificial lighting layout is an essential upon which too much stress cannot be laid and this applies equally as well to ventilating by natural or artificial means. Poor ventilation and bad lighting result in physical and mental reactions which are detrimental to service and cause diminution of alertness.

Although the modern building housing electrical apparatus and equipment is constructed in conformity with the best engineering standards for fire resistive qualities, nevertheless some electrical apparatus and equipment necessarily contain materials of a combustible nature. A fire hazard therefore exists but such fires are easily kept under control. In order to place the combating of such fires on an efficient basis, each building should be equipped with a full complement of fire extinguishing devices carefully selected for the building in question and located in conspicuous and accessible places. The proper selection of extinguishing devices for each particular building necessitates a thorough knowledge of each and all items in the building, electrical and otherwise, from the standpoint of possible fire hazard, and the selection should be made on the basis of efficiency of each extinguishing device in combating each class of fire.

Extinguishing devices have certain rather definite characteristics and applications. Because of such differences certain devices have come to be recognized as particularly adaptable for certain classes of fire and this tends to simplify the investigators' task in selecting the proper extinguishing equipment. It is advisable to submit proposed installations to a check by the engineers of the insurance rating bureaus. This will also facilitate securing proper credit in the insurance premium.

Closely associated with the fighting of fires is the danger from fumes of some extinguishing agents and from suffocation due to smoke. To protect the employees against these hazards, gas masks of an approved type should be supplied in confined areas where the ventilation is insufficient to remove the fumes or gas. These masks



Standard mountings of Fire Gun, Fire Extinguisher, Sand Pail and Markers.
(Station construction department, Vje Philadelphia Electric Co.)

should be conveniently located so as to be instantly available. Definite instructions and frequent practice in the use of these masks should be given to those concerned.

Great stress should be placed on the absolute necessity for frequent and periodic inspection, care and maintenance and instructions in use of all fire extinguishing apparatus and gas masks to insure 100 per cent utility. It is desirable to locate extinguishers on a specifically marked background. Through constant association employees become familiar with the different locations of fire fighting devices and it becomes second nature for them to make the proper selection.

The desirability of cleanliness in and about stations and buildings is so unquestionable that no particular argument need be advanced in support of it, but even so it frequently happens that too little attention is given to attain this end.

The necessary cleaning supplies such as tools, brooms, dust pans, mops, mop pails, sponges, etc., should be furnished unstintingly. In the larger stations it has become recognized as economy to install modern labor saving appliances for the use of the clean-up crew. Having provided the necessary equipment and clearly defined the standards of cleanliness in and about the buildings, steps should be taken to see that the established standards are maintained.

It is sometimes difficult to prevent accumulations of litter and dirt, particularly in basements, at the bottom of elevator shafts, under piles of materials and other out-of-the-way places. Such conditions, however, can be prevented if proper measures are taken. Extreme care should be given the storage of rubbish and useless material, and prompt removal from premises should be the rule. Wooden boxes should never be used for temporary disposition of these materials.

Greasy and oily waste is subject to spontaneous ignition and the greatest care should be taken in its disposition. Unless it is immediately burned after use, waste should be deposited in standard metal waste cans. The construction of the waste can is of vital importance, and non-standard cans are of but little value. The old-style wooden closets, lockers and enclosures are sometimes used as a catch-all for discarded and greasy garments all of which increases the fire hazard. Substantially constructed and properly ventilated metal lockers for employees' clothes should be installed.

Cleanliness of machines and other equipment, such as transformers and oil switches is another housekeeping requirement that is particularly important. Machines covered with grease and oil are dangerous for operators and repairmen to work around. Where oil and grease are allowed to collect on a machine, the floor usually becomes soaked, thus increasing both fire and accident hazards.

The education of the operating force along these lines and the gradual attainment of these standards is no light task and requires both energy and tact in no small degree, but once this mental attitude of good housekeeping is developed it is a comparatively simple matter to maintain it. Constant and rigid supervision, however, is necessary. One of the best means to accomplish this is to provide well defined and explicit inspection forms and an established practice of reporting and supervising.

The foregoing statements as to what should be done to maintain desirable housekeeping conditions very naturally gives rise to the question, how can all this be accomplished? There are many ways in which this can be done, but the best results may be obtained with the smallest expenditure of time by close cooperation between those charged with the supervision of such matters and the operating force.

Quite frequently meritorious reports are forgotten, due to the fact that specific attention is not called to them. Attention is directed to the splendid reports of the Accident Prevention Committee, N. E. L. A., particularly:

Detail Report No. 2—"Fire Prevention and Extinguishment." Presented Report G2-21, June 31, 1921.

Detail Report No. 4—"Organization of Employees for Fire Fighting and the

Public Utilities Section

571

55-10 1268 11 1267

Forward this report on the first day of
each month to

Report Received

MONTHLY FIRE INSPECTION REPORT

Official Name of Property.....

Date of Inspection.....

Location.....

CONDITION OF FIRE APPLIANCES

Hose.....

Hose outlets.....

Fire pumps.....

Chemical Engine.....

Chemical Extinguishers.....

Tetrachloride Extinguisher.....

Sand buckets.....

Water buckets.....

Alarm system.....

Emergency lights.....

Sprinkler system.....

APPLIANCES MISSING?.....

APPLIANCES DEFECTIVE?.....

ARE FIRE DOORS IN PROPER WORKING ORDER AND UNOBSTRUCTED?.....

ARE EXITS CLEAR?.....

ARE ALL LIGHTS AT EMERGENCY EXITS AND ON STAIRWAYS IN GOOD CONDITION?.....

FIRE ALARM IN GOOD ORDER?.....

IS WATCHMAN TOUR OF PREMISES SATISFACTORY?.....

REMARKS.....

For the greater safety of all employees, and the protection of Company's property, each extinguisher, fire bucket, hose, hose outlet, fire pump, chemical engine, must be examined individually and thoroughly. Only thru the co-operation of all can we expect the highest degree of protection from fire.

Fire hose and spanners must be kept in their proper place and ready for immediate use. Each hose connection inspected separately, each length of hose run off of the rack at least once every two months and tested with pressure at least every six months. All valves on fire line outlets kept in such a condition that they are easily opened. All hose thoroughly dried after water is run thru and carefully rehung or wound on the reels.

Chemical Extinguishers contain a solution of water, bicarbonate of soda and sulphuric acid. Foamite Extinguishers come under this same heading, and contain a solution of bicarbonate of soda and foam producing agents dissolved in water in the outer compartment and aluminum sulphate dissolved in water in the inner chamber. The hose nozzle must be kept clean and free of obstructions caused by seepage. The couplings and hose kept in perfect condition. A tag must be kept on these extinguishers showing the date that they were charged. They should be charged once every year, both the tank and the hose thoroughly cleaned and washed before recharging. To keep from freezing they should not be left in an exposed location or an unheated building.

Fire Doors—Must be arranged to close easily, kept clear of all obstruction, the fusible link examined and all hardware kept in good repair.

Fire Pails—If containing sand must be examined for any dirt, and kept filled with sand within two inches of the top of the pail; if containing water the water should be within two inches of the top of the pail and clear of all dirt.

Tetrachloride Extinguishers—Must be tested by turning the handle, seeing that the pump works freely and from time to time oiling the plunger to prevent sticking. Fire Guns, J. M. Fyr Fyter, Pyrene and all extinguishers containing a non-conducting fluid and for use where there is electrical current contain tetrachloride liquid. There must be kept on hand a sufficient amount of liquid to keep these extinguishers charged to their full capacity.

Inflammable Liquids—All inflammable liquids must be kept in special approved containers and at that point set aside for this purpose exclusively.

Oily waste, rags, etc., must be kept in approved containers with gravity closing lids.

SUGGESTIONS FOR REDUCING FIRE RISK AND INCREASING PROTECTION

Signed.....

Position.....

EVERY LINE MUST BE FILLED IN OR CHECKED.

Remember that these inspections are very important. The Safety of this property from fire is largely up to YOU.

Give attention to every question on this blank. If the question does not apply to this plant draw a line through the space left for the answer. In this way you can be sure that you have not overlooked anything.

Under the heading of (Condition of Fire Appliances) the word GOOD or BAD should be used. The balance of the questions answered YES or NO or more fully if necessary.

*Reverse side of "Monthly Fire Inspection Report"
shown on previous page.*

Inspection and Maintenance of Fire Fighting Equipment." Report G1-22, May 16, 1922.

Detail Report—"Fire Extinguishing Devices and Liquids." Report, Accident Prevention Committee, 1924-1925.

"Good Housekeeping" should be a slogan constantly in mind and rigid adherence to its basic principles will result in continuity of service.

ETHELBERT STEWART (Washington, D. C.): I am Commissioner of Labor Statistics and have been trying to get some line on the amount of loss from fire both of property and of life. I am told by the National Fire Protection Association and the other associations, that the only figures that are reported are where there is insurance. That means that nobody knows what proportion of the fires are reported or what proportion of accidents are reported. The day before I left Washington, in Forest Glen, a small town just out from Washington, a woman took her five-year-old and her seven-year-old child to the station to meet some one. She left two younger children in the house. When she came back only ashes remained of everything they had—children and all. The fire insurance had lapsed about five days before. Those things we don't get. Is there any way that this organization can give me assistance in getting the report of the actual number of fires and losses and injuries and deaths from fire? I am thoroughly convinced that I don't know what per cent of properties are outside of insurance. I am convinced it is a very large percentage and that our figures are rather deceptive.

CHAIRMAN RUTLAND: I am sorry I did not recognize you, Mr. Stewart. I don't know if there is a body that accumulates statistics on losses. The insurance companies do where they have risk covered and in cities where there are fire departments well established. Of course, the Fire Chief or someone delegated by him makes a proper report and they summarize it each year. Whether there is a national body that checks those statistics irrespective of whether or not insurance is carried, I don't know. I think it is a proper question. I think it is a problem for our benefit at least from a standpoint of gas and electric fires, and incidentally the gas and electric industry is charged with many fires due to defective wiring and gas leaks, and mostly where they should not be. Our committee might take that under advisement, consult with the National Fire Protection Association and see what can be worked out. I think you will be interested each year in knowing of this loss and injuries because of fires and particularly interested in those fires caused from electricity or alleged to have been caused from electricity or gas, so we thank you for the suggestion.

MR. STEWART: When you get fire insurance figures you have gotten, after all, the cream of the American people—I mean the 127,000,000 that comprise the population. The people who are not insured are in my judgment a vast majority. I am not going into the industrial side, but owing to the fact that they have no one at home to look after things, the percentage of loss of life in those fires would be greater in proportion to the dollars invested than in the other; I have been trying for a year to get some line on how to get at that figure. It does seem to me that if we put our shoulders to the wheel, all of us, we could get some line on the real fire loss and the real loss from fire.

CHAIRMAN RUTLAND: I promise you we will take this up with the National Council Headquarters' staff and see what they have in the line of suggestions and see what can be done; and I will suggest to Mr. Keller that whatever he finds out in the immediate future that he communicate with Mr. Stewart and advise him of what progress is being made.

H. B. HARMER (Safety Engineer, Philadelphia Electric Co., Philadelphia): There is wonderful ground being laid by public utilities in gathering that information. We expect to have, without any doubt whatever, every fire loss with resultant

loss of life together with causes that happened on utility property in the United States in full operation before the end of the next year.

MR. STEWART: Do you mean the fires in the homes?

MR. HARMER: I said "utility." Now take the next step. We, as members of the Fire Prevention Committee, expect to get in touch with the Chambers of Commerce or those organizations that primarily have fire prevention as part of their activity, and gather information together. I feel, as Mr. Stewart does, that it has been overlooked to a certain degree. Fire prevention has been given too much engineering thought and not enough human.

MR. STEWART: I am interested in the home that burns down as well.

H. L. MOTT (Bell Telephone Company, Chicago, Ill.): Generally speaking, insurance people pay no attention to fires except when insured. The majority of large cities have what is known in the Fire Department as a Bureau of Statistics which gives the approximate loss of fires in a record book whether insured or not, the number of people insured, loss of life, I think you can get that from the books of the Bureau of Statistics of the Fire Departments. Furthermore, I might say that when the Chief or Battalion Chief arrives at a fire his first guess may be it was crossed wires. His report covers whether it was lamp exposure, crossed wires or fireworks or whatever it might be.

ROBERT STEWART (Interstate Public Service, Indianapolis, Ind.): Some states have state fire houses and they are supposed to get a report of all fires in the state. Now, through them, Mr. Stewart might be able to get the information or some of the information he desires.

CHAIRMAN RUTLAND: Thank you.

I think nearly all of you attended the joint luncheon and witnessed the trophies given to the different gas and electric and combination gas and electric companies who won those trophies and are really appreciative of the accomplishment of those companies in accident prevention work. It is hoped that next year will witness a great number of contestants in this contest so that next year instead of having 115 we will have possibly 215. We did not call on Mr. Doeller, Chairman of the Contest Committee, yesterday to make his report for the specific reason that we wanted him to make it after the luncheon which was held yesterday so I will call on Mr. Doeller to make his report now.

Report of Statistics Committee

By G. A. DOELLER, Chairman

This report covers the two principal activities of the Committee. The first refers to the simplification of the Accident Report Form, together with a study of combining the report forms of the N. S. C.—A. G. A. and N. E. L. A.

The second part pertains to the Accident Prevention Contest, sponsored by the Public Utilities Section.

I.—Report Forms

At the St. Louis meeting of the Executive Committee of this Section on December 5, 1927, the subject of simplified and combined forms was discussed. Immediately following the Safety Congress in Chicago last September, a meeting was called by Mr. MacKinnon, then Chairman of the Accident Prevention Committee, N. E. L. A. This meeting was attended by many of the subchairmen of the geographic sections who were in Chicago at the time. The question of duplication of effort was discussed and Mr. MacKinnon sent a letter to Chairman C. J. Rutland of the Public Utilities Section, N. S. C., in which it was suggested that the collection of

statistics on accidents be made one of the functions of the National and of the Geographic Committees of N. E. L. A. Copy of the data thus collected would then be submitted to the N. S. C. for its further study.

The chairman of the Statistics Committee drew up a form which was a combination of the forms used by the N. E. L. A. and N. S. C. Copies of this were submitted to Mr. MacKinnon and Mr. Rutland.

Considerable correspondence was exchanged and finally at the time of the annual convention of N. E. L. A. at Atlantic City, Mr. Wm. Loyd called a meeting which was attended by Messrs. Van Brunt and W. Dean Keefer. This group discussed the matter of combination forms and seemed to be in agreement relative to the procedure of collecting the data, that is, by having the N. E. L. A. do the work as outlined in the previous paragraph. Official approval, however, has not yet been obtained and so the matter rests at this point.

The committee therefore recommends that the chairman of the Accident Prevention Committees of N. E. L. A. and A. G. A. take the necessary steps to procure the official approval of their respective organizations on the plan outlined at the Atlantic City Conference.

II.—Contest

By far the greater portion of the actual work of "Putting On" the contest was done by Mr. Burns and his assistants of the Headquarter's Staff. The idea of a contest such as this is not new. Other sections of the Council have been conducting similar contests for several years and the efforts required have been justified in every case. Our own contest was not started as early as we had hoped and for that reason only six months have been included in the first contest. A complete report covering the relative standing and the experience of the various companies, together with the announcement of the winners will be made at some other time during the present Congress.

The committee wishes to acknowledge its great obligation to Mr. Burns and his assistants in compiling the reports and computing the standing of the various companies.

The committee wishes to make the following suggestions for the guidance of the new committee which will serve the coming year:

A—Effort should be made to enroll a much larger number of companies in the next contest.

B—The monthly results as compiled by Headquarters should be made available as soon after the end of the month as possible. A special letter to the managers or safety directors of the companies in the contest would perhaps make this information available more readily.

C—In computing the relative standing of the companies, we believe that the severity factor should in some way be included in the computation. In our first contest the only factor used for rating was that of frequency. Some of the contestants have raised the question as to why it was necessary to report severity each month when this figure was not used for computation.

D—During the last few months of the contest it was noticeable that several contestants in each group failed to submit reports. The inference is that the record was perhaps so poor that the company was ashamed of the record and therefore would not submit it. Since the identity of the contestants is known only to a few people at Headquarters Staff, we see no reason why the contestants should not submit their experience each month, even though it is unfavorable.

In conclusion, the committee wishes to acknowledge with thanks the help received from Messrs. K. R. MacKinnon, George C. A. Opp, W. Dean Keefer, and G. E. Burns.

CHAIRMAN RUTLAND: Thank you, Mr. Doeller.

Ladies and Gentlemen: We have a real treat in store for us. Mr. R. O. Bentley, Superintendent, Public Service Electric Light and Gas Company, Newark, N. J., has consented to put on a playlet entitled "Cloud and Sunshine," which portrays to a very great extent, fundamental causes of some accidents. I know you will enjoy it.

"Cloud and Sunshine"

A Playlet

By R. O. BENTLEY

Superintendent, Public Service Electric Light & Gas Company
Newark, N. Y.

CAST OF CHARACTERS

SECRETARY
SUPERINTENDENT'S SON
SUPERINTENDENT
OFFICE BOY
LINEMAN
ASSISTANT SUPERINTENDENT
CABLE SPlicer
TRUCK DRIVER
LINE FOREMAN
LINEMAN
TRUCK DRIVER
WIDOW

(Telephone rings)

SECRETARY: Mr. Bentley's office. Yes, this is the superintendent's office. No, he is not in now. All right. Thank you.

(Telephone rings)

SECRETARY: Mr. Bentley's office. That is service order 10039 to set meter at No. 140 Broad Street, isn't it? Mr. Bentley told you this morning that meter would be set today, didn't he? Well, then it will be!

SECRETARY: *(Calls)* Mitchell 6070 please. Yes, that's right, 6070. Mr. Rosseland please. Is this Mr. Rosseland? This is Mr. Bentley's office, Public Service. Will it be convenient for Mr. Bentley to see you at your office tomorrow at two o'clock? Thank you, Mr. Rosseland. Good bye.

SECRETARY: *(Looks at calendar on Superintendent's desk, calls)* Market 126. I would like to speak with Mr. Snyder, please. Is this Commissioner Snyder? This is Mr. Bentley's office, Public Service. I called to tell you that Mr. Bentley can meet you tomorrow at eleven o'clock at the City Hall. Will that hour be convenient for you? Thank you, Mr. Snyder. Good bye.

(Enter Superintendent's Son)

SUPERINTENDENT'S SON: Hello, Dorothy! Where's the Governor?

SECRETARY: Hello, Bill! Out; I think he will be here in a few minutes.

SUPERINTENDENT'S SON: How long before you are going home?

SECRETARY: When your father gets here.

SUPERINTENDENT'S SON: I don't know about that. He usually gets busy when it's time to quit.

SECRETARY: That's better than not getting busy at all, isn't it?

SUPERINTENDENT'S SON: Yep, I've been busy all day. Where did you get the pretty flowers?

SECRETARY: Your father brought those in. You know he is very fond of flowers.

SUPERINTENDENT'S SON: Have you an engagement for tonight?

SECRETARY: I'm not sure, why?

SUPERINTENDENT'S SON: Want to go to the movies? There's a good show at the—

(Enter Superintendent)

SUPERINTENDENT: *(Takes off overcoat and hat)* My, it's a nice day. I hated to come in. The sunshine is beautiful. There's not a cloud in the sky. Wouldn't it be wonderful to have our lives like that, with never a cloud of sorrow or adversity. Then they would be filled with sunshine and happiness. Tears would be replaced with smiles and each day would bring new hopes, new joys, new ideals and new inspirations. Wouldn't that be wonderful?

SECRETARY: That would be heavenly.

SUPERINTENDENT: Yes, I guess it would. Well, now, after that burst of eloquence, I think we will come back to earth.

SECRETARY: Yeh, your necktie is untied.

SUPERINTENDENT: So it is; so it is.

SUPERINTENDENT: Any calls for me?

SECRETARY: A few, I took care of them. A cable splicer who said he used to work for you in Hackensack called.

SUPERINTENDENT: *(Busy at desk)* Yes, what did he want?

SECRETARY: A job.

SUPERINTENDENT: What did you say to him?

SECRETARY: I asked him if he was working in Hackensack.

SUPERINTENDENT: Yes, what did he say?

SECRETARY: He said "no." I asked him why not and he said he got in a jam with his foreman.

SUPERINTENDENT: Yes, what did you tell him?

SECRETARY: I told him if he would get a letter of recommendation from his superintendent, we might take him on.

SUPERINTENDENT: Yeh, what did he say?

SECRETARY: He said there was a fat chance for that.

SUPERINTENDENT: Yes, what did you say?

SECRETARY: I told him that without that letter, his chances of getting a job here were just about as fat.

SUPERINTENDENT: So that's what you told him, eh? Well, I guess that was all right. Anything else?

SECRETARY: That Mr. Fussy called to see you.

SUPERINTENDENT: He did, eh? Has he had a haircut since the last time he was here, or is it still growing over his coat collar?

SECRETARY: It's still growing over his collar.

SUPERINTENDENT: What did he want?

SECRETARY: He wanted to see if he could interest you in an electric egg beater he is working upon.

SUPERINTENDENT: An electric egg beater? Good Lord! I am glad I wasn't here. He would have been good for an hour at least. How he can talk and his false teeth don't fit. They are always clattering around in his mouth until I am fearful every moment he will spill them in his lap or mine.

SECRETARY: Well, you have some false teeth, haven't you?

SUPERINTENDENT: Yes, but mine fit.

SECRETARY: *(Types, then slams desk drawer)* Ouch, darn it, ouch!

SUPERINTENDENT: What's the matter now?

SECRETARY: I just broke my finger nail.

SUPERINTENDENT: Oh, my gracious, thought you'd broken your arm.
SECRETARY: *(Starts filing nail)* Do you file your nails, Mr. Bentley?
SUPERINTENDENT: No, I just cut them off and throw them away. Call Mr. Rosseland of the Newark Safety Council and ask him if it will be convenient for me to see him in his office tomorrow at two o'clock.
SECRETARY: I did and he said that it will be convenient.
SUPERINTENDENT: Oh, you did?
SUPERINTENDENT: *(Looking at calendar)* Call Commissioner Snyder and tell him I'll meet him tomorrow at 11:00 o'clock at the City Hall to go over that street lighting matter.
SECRETARY: I did and he said that would be satisfactory.
SUPERINTENDENT: These lighters are handy little things. I could not get along without this one. I think a lot of it.
SECRETARY: Was it a present?
SUPERINTENDENT: Yes, an agent for life savers gave it to me.
SECRETARY: It is handy, isn't it?
SUPERINTENDENT: Yes, very, just about as useful as the hole in the center of a life saver.
SECRETARY: *(Strikes match and lights cigarette for him which he has been trying to light with cigarette lighter.)*
(Enter Office Boy with card which he hands to Superintendent)
SUPERINTENDENT: Tell Montgomery to come in, Frank. I want to see him, too.
(Enter Lineman)
SUPERINTENDENT: Hello, Tom. How are you coming along? Sit down.
LINEMAN: I guess I'm coming along all right. I came down to get my pay and I thought I'd just stop in, say hello.
SUPERINTENDENT: Tom, I'm awfully sorry you were injured, and at the same time, I haven't much sympathy for you, either.
LINEMAN: You haven't? Gee, boss, my getting hurt was just hard luck.
SUPERINTENDENT: Maybe I did not get all the facts in the case. Tell us about it.
LINEMAN: Well, I came into the storeroom to get a reel of No. 4 wire and the storeroom man asked me to come up on the next floor and help him with it and when I was going up the stairs, I stubbed my toe and in trying to catch myself, I stuck my spur in there, clear to the bone. Oh boy, it is sore.
SUPERINTENDENT: So am I. You didn't have to put your spurs on to climb up the stairs, did you?
LINEMAN: No sir, but I didn't stop to take them off when I came in from the job. I wish I had now. There wasn't any sense in keeping them on and after I did hurt myself, I didn't do anything about it until two days later.
SUPERINTENDENT: That was bad. It only takes about a half minute to put a pair of spurs on or take them off, and when it is not necessary to wear them, a man should take them off, then he will not injure himself or anyone else. You should have had that wound treated at once. There is a medicine kit right in the storeroom.
LINEMAN: Yes, I guess that's right.
SUPERINTENDENT: When does the doctor think you'll be able to get back on the job?
LINEMAN: In about ten days. I would have been back before, but the wound became infected and my leg swelled up like a balloon. It's coming along all right now, though.
SUPERINTENDENT: Well, I hope so. How is your wife and the children?
LINEMAN: They are all right, but my wife was sure worried about that leg. Well, I guess I'll be going now so as to get a bus home ahead of the crowd.
SUPERINTENDENT: All right, Tom. I am glad you came in. Is there anything we can do for you?

LINEMAN: No, thank you. Good bye. Did you ever walk on crutches?

SUPERINTENDENT: Not yet.

LINEMAN: Well, don't try it. They sure are hell on your arm pits if you ain't used to them.

SUPERINTENDENT: Now can you beat that? There is a man who actually fell down and stepped on himself. I'll bet we won't have to tell him to take his spurs off when there is no climbing to be done.
(Airplane heard—Secretary goes to window)

SECRETARY: (Returning to desk) My, he was up high, wasn't he? I wouldn't want to be away up there with that little thing.

SUPERINTENDENT: You wouldn't, eh? Well, I wouldn't want to be way up there without it.

SECRETARY: What made that airplane snap and bang like that every once in a while? I never heard one do that before.

SUPERINTENDENT: Why, the engine was missing.

SECRETARY: The engine was missing! What did all the roaring and made all the noise if the engine was missing?

SUPERINTENDENT: Why the engine, of course.

SECRETARY: Yes, but you said it was missing.

SUPERINTENDENT: I didn't say there was no engine. There was an engine but it was missing.

SECRETARY: How could there be an engine if it was missing?

SUPERINTENDENT: The engine was there, but it was not functioning properly.

SECRETARY: Oh well, why didn't you say so.
(Enter Assistant Superintendent)

SUPERINTENDENT: Hello, Bernie, how is everything?

ASSISTANT SUPERINTENDENT: Everything is fine now.

SUPERINTENDENT: Where did you find the fault on that Montclair cable?

ASSISTANT SUPERINTENDENT: Up on Bloomfield Avenue at Lake Street.

SUPERINTENDENT: Did you have to pull in a new section?

ASSISTANT SUPERINTENDENT: No, trouble was in a manhole in a joint. We made up a new joint and turned it back at 2:30.

SUPERINTENDENT: Did you stop in the hospital to see how Smith is getting along?

ASSISTANT SUPERINTENDENT: Yes, he is doing very well, expects to go home Saturday.

SUPERINTENDENT: I'm glad to hear that. Let me see, he is the last man we have in the hospital, isn't he?

ASSISTANT SUPERINTENDENT: Yes, he's the last one.

SUPERINTENDENT: (Picks up accident report) Miss Burkner, see if Splicer Flynn is in. I want to see him. (To Assistant Superintendent) Bernie, here is a report of an accident that occurred yesterday. I want to read it to you.

ACCIDENT REPORT

While lowering a pot of hot solder into the manhole, Splicer Joseph Flynn bumped the pot against the side of the manhole and spilled hot solder down the back of Carl Pierson's neck. Pierson was treated from the emergency kit and taken to the company doctor. A woman who was passing just as Pierson came out of the manhole said she was going to report him for using improper language. His language under the circumstances sounded proper to me. I didn't see anything wrong with it. It seemed just right for the occasion. He didn't leave anything out.

(Signed) EDWARD STALEY,
Foreman.

(When Superintendent finishes reading report, Secretary returns with Splicer Flynn)

SUPERINTENDENT: Hello, Flynn. Sit down. Flynn, how did you come to spill hot solder on Carl Pierson yesterday?

CABLE SPLICER: I don't know. Everything went wrong yesterday.

SUPERINTENDENT: How is that?

CABLE SPLICER: Oh, I got off to a bad start in the morning.

SUPERINTENDENT: What happened?

CABLE SPLICER: Well to start with, I was out late the night before and overslept in the morning. Then, the kids left a ball bat on the top step of the front porch and I stepped on it and fell down the stairs and near busted myself open.

SUPERINTENDENT: That was bad. What else happened?

CABLE SPLICER: Then the foreman bawled me out for not getting to work on time.

SUPERINTENDENT: Well, you don't blame the foreman for that, do you?

CABLE SPLICER: No, I suppose not, but I ain't late often; there wasn't no use of him being so damned nasty about it.

SUPERINTENDENT: What else happened?

CABLE SPLICER: Then I burnt my hand when I lit the gasoline furnace and that was hurtin' all day.

SUPERINTENDENT: *(Gets up to get a drink of water)* My gracious, you were out of luck, weren't you?

CABLE SPLICER: I sure was.

SUPERINTENDENT: Have a drink, Flynn?

CABLE SPLICER: I don't mind, what you got?

SUPERINTENDENT: Water.

CABLE SPLICER: Naw, I don't want water.

SUPERINTENDENT: Why not, water never hurt anyone.

CABLE SPLICER: Don't you believe it. I once heard of a guy who died with water on the brain.

SUPERINTENDENT: Poor man, I'll bet he wasn't a cable splicer.

CABLE SPLICER: Naw, he was a superintendent.

SUPERINTENDENT: Now, if you had said he died from nervous prostration, I would not be surprised, but water on the brain, that's terrible. Well, Flynn, you must buck up, get here on time in the morning and replace that grouch with a smile. Pierson's getting hurt was due to your carelessness and I am sorry for him.

CABLE SPLICER: So am I and I am going to turn over a new leaf, Mr. Bentley. I won't cause any more trouble from now on; believe me. I am going to be careful. I've learned my lesson and I ain't a damned bit proud of myself.

SUPERINTENDENT: That's the way to talk, Flynn. Now I believe you have come to your senses. I think that's all, thank you for coming in. Now do be careful. So long.

SUPERINTENDENT: Bernie, I want to read some accident reports to you. Miss Barker got them out for me this morning. I think you will agree with me that they were all due to carelessness and thoughtlessness.

ACCIDENT REPORT

While driving Dodge car, Company number E-74 south on Walnut St., Newark, I was run into by taxicab number 0973-T. E-74 had the running board smashed, front wheel broken and mudguard badly bent. The headlights on the taxi were broken. I was driving at about four miles per hour. There were no personal injuries.

(Signed) WALTER MEYERS.

ASSISTANT SUPERINTENDENT: What did you do with him?

SUPERINTENDENT: I discharged him for two reasons. In the first place I think he

was untruthful when he said he was only going four miles an hour. Why that is about as fast as a live person walks and we do not want anybody in our employ who does not tell the truth. In the second place, if he *was* going but 4 miles an hour, we don't want him around here either. He would be too damned slow to keep up with the rest of the outfit.

SUPERINTENDENT: Here is one by Isaac M. Wiser, the Troubleman.

ACCIDENT REPORT

I went to No. 295 Fifth Avenue on a trouble call. I went down in the basement. The Janitor was taking hot ashes out of the furnace and throwing them on the floor. The main switch and fuses were near the furnace. Everything looked all right so I put my fingers across the main switch to feel for current. I landed on the pile of ashes. I got right up again. I was burned where I touched the switch and I was burned where I sat on the ashes. I decided not to test for current with my fingers no more.

(Signed) I. M. WISER.

ASSISTANT SUPERINTENDENT: He should be.

SUPERINTENDENT: Some people would think that is funny. It isn't. That man might have been seriously injured.

ACCIDENT REPORT

While driving down Mt. Pleasant Avenue at 4:30 in the afternoon with truck E-89, I run over a brindle bull dog near Clark Street. It was the dog's own fault. If he had been up on the sidewalk and not in the street, he wouldn't have been runned over.

(Signed) MICHAEL BRENNAN.

ASSISTANT SUPERINTENDENT: Even dogs become careless.

SUPERINTENDENT: Yes, they have a bad example set for them by their owners.

SUPERINTENDENT: Bernie, do you know we are having a regular epidemic of accidents again? When I think of the large number of accidents we have had during the last six months and of the very serious one that cost Parker his life, well, to say the least, I am worried all the time. I sit up nights to devise ways and means to prevent accidents, and when I go to sleep I dream of "Safety" lectures, artificial respiration, prone pressure and everything imaginable about accidents and their prevention. I'll swear it's getting on my nerves.

ASSISTANT SUPERINTENDENT: Yes, I worry about them, too. I do not believe men as a whole are as careful as they used to be.

SUPERINTENDENT: Well, perhaps they are not. If they are not, it is up to us to be more vigilant. We have got to get it into the heads of the foremen that they must watch their men more carefully to see that they do not make foolish moves. Now, take that case of Parker's. If he had covered up the exposed parts around him while he was making that connection, he would be here today. He knew what to do. He covered up some of them and left others exposed. He took an unnecessary chance and that does not pay. He was a good man and a good workman and he left a nice wife and little boy. It's going to be hard for them. It is true they have a little money that they saved and they also have his insurance, but that will not last forever. It sure is hell when you think of it, and damn it, there is no excuse for it.

ASSISTANT SUPERINTENDENT: None whatever.

SECRETARY: (Takes report from typewriter which she has just written) Here is a report of one that occurred this morning.

SUPERINTENDENT: WHAT! (*Secretary hands him report which he reads*)

SUPERINTENDENT: I would like to know more about this. Bernie, step out in the linemen's room and see if any of the men that were in that gang are in.

(*Assistant Superintendent returns with Mickey, the Truck Driver*)

SUPERINTENDENT: Hello, Mickey. How are you today? Sit down.

TRUCK DRIVER: Fine, sure I'm feelin' fine.

SUPERINTENDENT: How is Mrs. Mickey and all the little Mickies?

TRUCK DRIVER: Sure they are fine.

SUPERINTENDENT: You have five children, haven't you, Mickey?

TRUCK DRIVER: No, I have six.

SUPERINTENDENT: Is that so, I thought you had five.

TRUCK DRIVER: No, there's six o' them.

SUPERINTENDENT: Michael is the older, isn't he?

TRUCK DRIVER: No, Patrick is the oldest. Now here's the way they are. Patrick is one, Michael is two, the twins is three, Mamie is four and the baby is five.

SUPERINTENDENT: I thought you had but five.

TRUCK DRIVER: No, wait a minute, wait a minute, what the hell is wrong here? (*Counting on fingers*) Patrick is one, Michael is two, the twins is three, Mamie is four and the baby is five.

SUPERINTENDENT: All right Mickey, I was sure there were five.

TRUCK DRIVER: There's six o' them, I'm tellin' ye, don't you suppose I know how many kids I've got?

SUPERINTENDENT: Well, you should know.

TRUCK DRIVER: Yes and I do know, too. Now here's the way they are. Patrick is one,—

SUPERINTENDENT: Never mind, never mind, I won't quarrel with you about a child or two more or less. You were driving for Cobb's gang this morning when an accident occurred, were you not?

TRUCK DRIVER: Sure, I was there.

SUPERINTENDENT: Then you know about the accident?

TRUCK DRIVER: Sure, I know all about it.

SUPERINTENDENT: That's fine. Now, Mickey, tell me in your own way all about it and just what you saw and did.

TRUCK DRIVER: Well, I had just gone over to me truck with a hand full of old tie wires to throw them in when I heard a lineman yellin' to beat hell. I looked up where Sweeney was working and saw him drop over like and hang there in his belt. I started to run over there and when I got about half way there, I thought, when they get him down they will want to take him away in a hurry, so I runs back to the truck, turns the switch, gives her a crank and she just gives a little sputter and stops. Then I gives her another crank, but she don't start. Then I runs back to make sure I had turned the switch, then I runs around front again and gives her a good crank. Nothing doing. Then I lifts up the engine hood and tickles the carburetor.

SUPERINTENDENT: You did what?

TRUCK DRIVER: I lifts up the engine hood and tickles the carburetor, then I cranks her again but she don't start.

SUPERINTENDENT: Then what did you do?

TRUCK DRIVER: Then I started to cuss. First I used the kind that we are all used to using. Then I cranked her again and she wouldn't start. Then I used some that you don't hear every day. Then I tried her again, then I invented some. I've done some cussin' in my day but I never did any that I was as proud of after, as the cussin' I done this morning.

SUPERINTENDENT: That's fine Mickey, I always knew you were capable. Then what did you do?

TRUCK DRIVER: Then I went over to see how Sweeney was gettin' along, but by that time they'd taken him off in the ambulance.

SUPERINTENDENT: Oh, I see. Well, what was wrong with the truck Mickey?

TRUCK DRIVER: There was a little leak in my gas pipe and when I stopped there in the morning, I turned the gas off at the valve so it wouldn't be leakin' all the time and in the excitement, I forgot all about the damned thing.

SUPERINTENDENT: All right Mickey, thank you, that's a great help. I'm glad you came in. *(As Mickey starts out, counting on fingers)* Say Mickey, after this, be careful how you run around with your gas pipe out of order.

TRUCK DRIVER: Yes sir, thank you, the same to you sir.

SUPERINTENDENT: That's a big help. We know a lot about that accident now. See if the foreman is in, will you Bernie?

(Assistant Superintendent goes out, returns with Foreman Cobb)

SUPERINTENDENT: Hello Cobb, how are you? Sit down.

FOREMAN: Not so good.

SUPERINTENDENT: Cobb, I have read the report upon the accident of Lineman Sweeney and I do not understand how he got crossed up. You say he was wearing his gloves at the time. How did he get it?

FOREMAN: Well he had changed the crossarm on the pole and was just tying the three phase primary. He had three of the wires tied in and he was reaching out to toe the wire on the end pin. He had his safety around the pole and as he could not reach the wire very well in the position in which he was standing, he kicked one spur loose and let his leg hang down and that's when he got it for his leg went right into the telegraph wires below.

SUPERINTENDENT: But I don't understand yet how he got it if he had his gloves on.

FOREMAN: Why he was lying right across the opposite phase wire and the juice went through the insulation and his shirt. That's how he got it.

SUPERINTENDENT: Oh, I see. Didn't he have any of those wires around him covered with blankets or hose?

FOREMAN: No sir.

SUPERINTENDENT: Well, don't you think it would have been much safer if they were covered?

FOREMAN: Yes, I suppose so, but that was an easy job. He had no business getting crossed up.

SUPERINTENDENT: Yes, but he got crossed up just the same, didn't he? I do not understand why you did not have him throw a blanket over those telegraph wires or put a hose on that phase wire that he had to reach over. You had plenty of them on the truck, didn't you?

FOREMAN: Not today.

SUPERINTENDENT: How did that happen?

FOREMAN: Well, we cleaned the truck out this morning and we took all that stuff off with the rest of the junk.

SUPERINTENDENT: You don't call these protective devices that we furnish to keep you fellows from getting hurt, junk, do you?

FOREMAN: No, not any more. Believe me Mr. Bentley, I learned my lesson this morning. I never had such a scare in my life. That man being hurt was just damned foolishness and from now on there will be no more chances taken by the men in my gang. I hope Sweeney will come through all right for he is a fine chap and a good lineman. We all think a lot of him.

SUPERINTENDENT: All right Cobb, do your best, don't get careless, and help me to run this job in a safe way. We must do everything possible to avoid accidents and to prevent carelessness. Thank you for coming in.

SUPERINTENDENT: I thought after Parker was killed by not using the protective devices, the men would be more careful and not take chances, but it seems I was mistaken.

(Enter Office Boy with card which he hands to Superintendent)

SUPERINTENDENT: All right, tell them to come in Frank.

(Enter Lineman and Truck Driver)

SUPERINTENDENT: Well for the love of Mike, now they are coming in pairs. Hello fellows, you are looking fine. How are you feeling? Sit down.

LINEMAN: We came down to get our pay and we thought we'd drop in for a minute.

SUPERINTENDENT: Well, that was nice of you. Haven't tried to knock any more street cars off the track lately, have you?

LINEMAN: Not lately.

SUPERINTENDENT: When I first heard about your accident, I was that mad that I could have beaten up both of you. My first inclination was to fire you and I am not sure that I have changed my mind. Have you fellows got a book of rules?

LINEMAN: Yes sir.

SUPERINTENDENT: Did you ever read it?

LINEMAN: Yes sir.

SUPERINTENDENT: Did you ever read the rule that says when trailing another vehicle you shall stay at least 20 feet back of it?

LINEMAN: Yes sir.

SUPERINTENDENT: By the looks of you two men and the front end of your truck you didn't stay 20 feet behind the street car, did you?

LINEMAN: I'll say we didn't, but boss, you should have seen the way that street car stopped. It was rolling right along about 18 miles per hour and next thing we knew, bang, she had stopped.

SUPERINTENDENT: Yes and the next thing you knew, bang, your head was through the windshield and bang, Bill's arm was broken where it jammed in the steering wheel. You were driving on the track, I suppose.

LINEMAN: Yes sir.

SUPERINTENDENT: And it had just started to rain.

LINEMAN: Yes sir.

SUPERINTENDENT: And you were trailing the car pretty closely and chinning, I suppose.

LINEMAN: Yes sir.

SUPERINTENDENT: Never thinking of an accident.

LINEMAN: No sir.

SUPERINTENDENT: And you had one.

LINEMAN: We sure did.

SUPERINTENDENT: Well; I am glad it was not more serious. It is bad enough as it is. Two good men and a truck "busted" up simply because you were careless. It was carelessness, wasn't it? Come now, be honest.

LINEMAN: Yes, I guess it was and Mr. Bentley, you don't know how sorry I feel for poor Bill with his broken arm and then he says his wife keeps giving him hell all the time and says she'll bet he was looking at some little chicken and not paying attention to his business.

SUPERINTENDENT: Some of them are good to look at, aren't they Bill? But see here, when you get over your injuries and come back to work, do be careful. Don't have accidents and help me to guard against them. I am doing everything I can to handle this job in the safest possible manner, but I cannot do

it alone and you and every other employee must help and then accidents will be avoided.

LINEMAN: All right, Mr. Bentley, we'll help. We are very sorry this happened and I guess it was all our own fault. Bill was too close to the car in front and I didn't have sense enough to tell him to stay back. Well, I guess we'll be going. Good bye.

SUPERINTENDENT: Good bye, remember your good resolutions, take care of yourselves and get back on the job as soon as possible for we miss you.

Bernie, they are two nice boys, It's a pity they had that foolish accident. They have been here a long time and have a good record.

ASSISTANT SUPERINTENDENT: Yes, they are nice boys.

SUPERINTENDENT: Now, something is going to be done. Miss Burkner, the first thing tomorrow morning, I want you to notify those in charge of accident prevention that there will be a meeting in this office at 4 o'clock Thursday afternoon, and do not confine your notices to our own department. Get men from other departments and companies. Call the Safety Director and he will give you their names and Bernie, you select some of our foremen and have them here and we will see if we cannot do something that will arouse interest and enthusiasm in the work of accident prevention. We must do more than we are doing. Now, as there are no more cripples coming in, I think we will call it a day.

(Enter Office Boy with card which he hands to Superintendent)

SUPERINTENDENT: All right Frank, tell Mrs. Parker to come in.

ASSISTANT SUPERINTENDENT: How do you do Mrs. Parker.

SUPERINTENDENT: How do you do Mrs. Parker. I am glad to see you. How are you getting along?

WIDOW: Quite well, thank you.

SUPERINTENDENT: Have you moved yet Mrs. Parker?

WIDOW: Yes, we are living with my sister now and it is very pleasant, but it is not like our own little home.

SUPERINTENDENT: No, I suppose not. How is the little boy?

WIDOW: He is well, but he misses his father very much.

SUPERINTENDENT: Yes, I suppose so, I am very sorry for you both. What are your plans, Mrs. Parker?

WIDOW: Well, I will have to find employment. That is what I came to talk to you about. The money that I have will not last long if there is none coming in.

SUPERINTENDENT: That is so. Have you any idea what kind of employment you would like to have?

WIDOW: I would like a position in an office.

SUPERINTENDENT: Have you had experience in office work?

WIDOW: Oh yes, before we were married, I held the position of secretary to the manager of the electric light company in Pennsylvania where Mr. Parker was employed. That is where I met him. I would like to get a position of that kind if I can.

SUPERINTENDENT: Are you a stenographer?

WIDOW: Yes sir.

SUPERINTENDENT: Well you came to just the right place. There will be a vacancy here the first of the week. One of our young ladies is leaving. She is to be married.

WIDOW: Do you mean that I will be employed here?

SUPERINTENDENT: Right here.

WIDOW: In this building? Right here with all of these nice Public Service people who have been so kind to me?

SUPERINTENDENT: Yes, right in the next office.

WIDOW: Oh, Mr. Bentley, thank you, that's wonderful. When shall I come?

SUPERINTENDENT: Tomorrow morning if you want to. I would like you to be here for a few days before the other lady leaves.

WIDOW: Oh, thank you, so much. Oh, Mr. Bentley, I don't know what to say. You have no idea how I was worried. It just seemed that the sun would never shine again and now it is shining.

SUPERINTENDENT: Now never mind, never mind, of course it is shining. You are going to get along fine here and we are all going to do everything possible to make you happy.

WIDOW: Thank you. I will go now.

SUPERINTENDENT: Wait a minute, Mr. Reilly is going your way and he will take you home. Here, take this to your little boy and give him my love. *(Takes apple from desk drawer and gives it to Mrs. Parker)* Keep your eye on the road Bernie. Good night.

Mrs. Parker seems like a very nice lady.

SECRETARY: Yes, she is exceptionally nice.

SUPERINTENDENT: She is pretty too. It must be nice to be young and good looking.

SECRETARY: It is.

SUPERINTENDENT: Yeh, it must be. *(Takes mirror out and looks in it)* My, I am getting old and gray and homely.

SECRETARY: No, you're not. If you would dress up and take care of yourself as you used to a couple of years ago you would not look a day over 40.

SUPERINTENDENT: You don't say so. Let me see, Miss Barker, What are your wages now?

SECRETARY: Thirty-five dollars a week.

SUPERINTENDENT: I thought so, you know I've been thinking for quite some time you were underpaid. Beginning the first of the week your wages will be forty dollars.

SECRETARY: Thank you.

SUPERINTENDENT: Do you know Mrs. Parker's new address?

SECRETARY: Yes sir.

SUPERINTENDENT: Just make a memorandum of it for me. I may want to use it some time. You might forget it.

SECRETARY: No, I won't.

SUPERINTENDENT: Well, you might.

(Secretary makes note of address and hands it to Superintendent)

You may as well run along now Miss Barker, there is nothing more today. I'm tired and I guess you are. Miss Barker, on your way out, stop in the Street Lamp Dept. and tell the Foreman the lamp right in front of my house was out at half past one last night when I came in. No, don't say that. Say it was not burning at half past one.

SECRETARY: *(Aside)* That's bad. *(To Superintendent)* You didn't have any trouble finding the house did you?

SUPERINTENDENT: No, I made it the first time.

Sorry I kept you so late. It's getting dark too. I should have told Bill to take you home. Good night, Miss Barker, be careful, don't get hurt.

CHAIRMAN RUTLAND: Gentlemen, I am sure you enjoyed this part of the program.

Next I have the honor of presenting Mr. W. H. Olschewsky, Jr., Supervisor, Western Union Telegraph Company, New York City, who will address you on typical pole accidents.

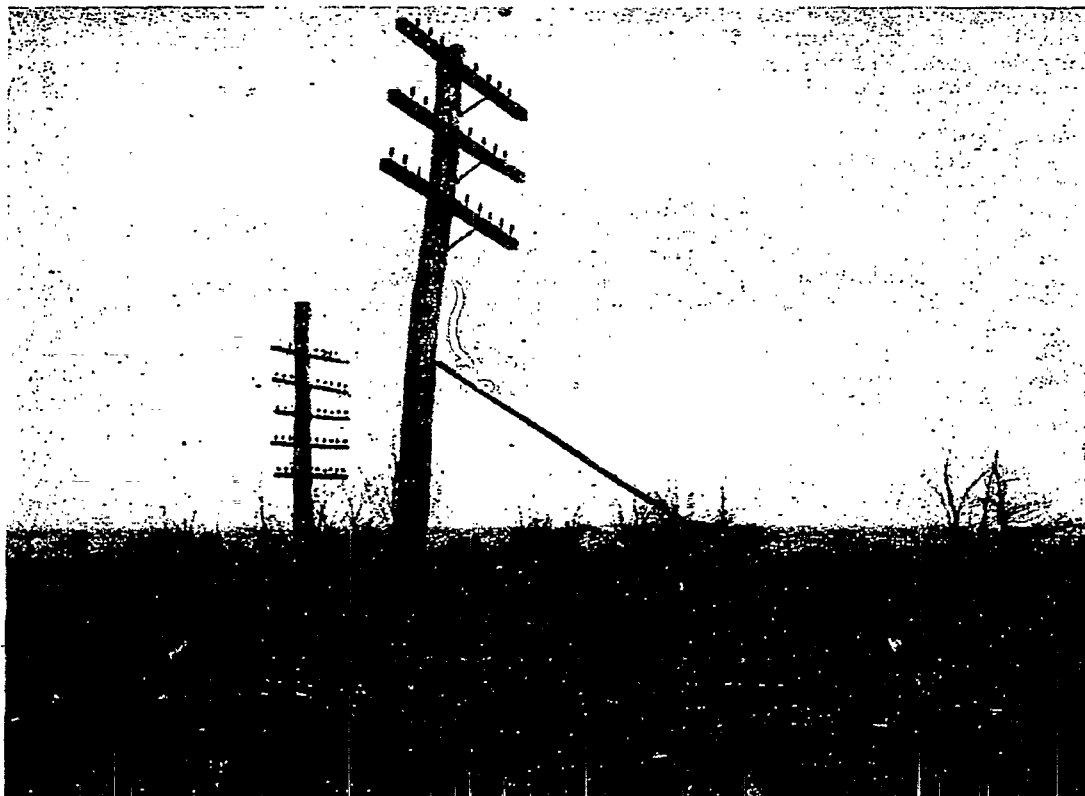
Pole Accidents

By W. H. OLSCHESKY, JR.

Supervisor Western Union Telegraph Company, New York City

Under the classification of pole accidents we find many different classes of accidents, among the more serious class being those resulting from poles falling, and it is the prevention of this class of accident which we will give consideration at this time.

While the number of accidents from poles falling according to the Western Union Telegraph Company's experience is relatively small, it is generally the case



Slide No. 1. Pike pole method of testing the pole.

that such accidents result in serious personal injury, involving considerable suffering and long periods of disability.

Our studies of accidents from poles falling develop that they most always occur from poles falling while linemen are on them engaged in removing wires or crossarms. The serious aspect of such accidents has long been recognized and the Telegraph Company has for many years issued specific instructions to each

employee on the importance of determining whether or not poles are in a reasonably safe condition before undertaking to climb them.

While it is true that the taking down of poles whether defective or otherwise, is an operation more or less hazardous, local conditions vary so greatly that the method to be followed must generally be left to the foreman in charge of the work. We attempt to meet this situation by having only experienced men in charge of such operations.

It might be expected that experienced linemen would use due caution while engaged in the operation of removing wires or crossarms from poles known to be more or less defective. As a rule poles removed have served a purpose and are not fit to properly carry the load which may be placed on them, but as a matter of fact, we have found that many of our men must be continually warned against following unsafe practices while engaged in dismantling wires or crossarms and we considered it necessary to issue special instructions covering this particular phase of pole work. The slides which will be shown have been taken from our handbook which is placed in the hands of all employees and was issued for the purpose of suggesting safe methods and impressing our linemen with the importance of the general subject.

While the methods followed by the Telegraph Company may not always be applicable to power lines or other classes of pole lines, the general policy of proper inspection of the structures to be climbed; providing the necessary reinforcement when such structures may be found to have insufficient strength; and employees following methods while engaged in work on these structures, which will minimize the liability of personal injury in case of structural failure, we think may be advantageously applied to any type of pole line or aerial wire structure.

There has been an encouraging reduction in the number of accidents from falling poles during the last few years and there has also been a reduction in the seriousness of the accidents which have occurred. We believe the reduction in the number of accidents has been principally due to steps taken to prevent the structure from falling and the seriousness of accidents from educating our men to exercise greater care while engaged in the work of dismantling poles to be removed. We have impressed upon them the importance of giving careful attention to:

1. Properly inspect and test all questionable poles before climbing them.
2. Avoid unnecessary risks of strapping themselves to poles or crossarms with safety straps.

Slide No. 1.—There are two methods of inspecting poles to determine whether they are safe for climbing, one by applying stress against the structure with a pike pole generally known as the pike pole test and the other by examination of the wood with suitable tools.

The picture before you illustrates the application of the pike pole method of testing. This method may be used in testing poles that have no wires on them, and for testing poles that carry wires but are not guyed or braced. (This test is made by pushing the pole across the line and is not dependable if the stress is applied in line with the wires even if they are untied.)

Slide No. 2.—Here we see a dangerous method to follow in removing crossarms from a defective pole. The pole has been tested, found weak and the pikes have been used to strengthen it. The pike poles make the pole reasonably safe for climbing, provided care is used. The use of the safety strap is unnecessary and adds greatly to the danger.

Slide No. 3.—This correct method is comparatively safe and it is not difficult. It should be followed when necessary to remove the bottom crossarms first.

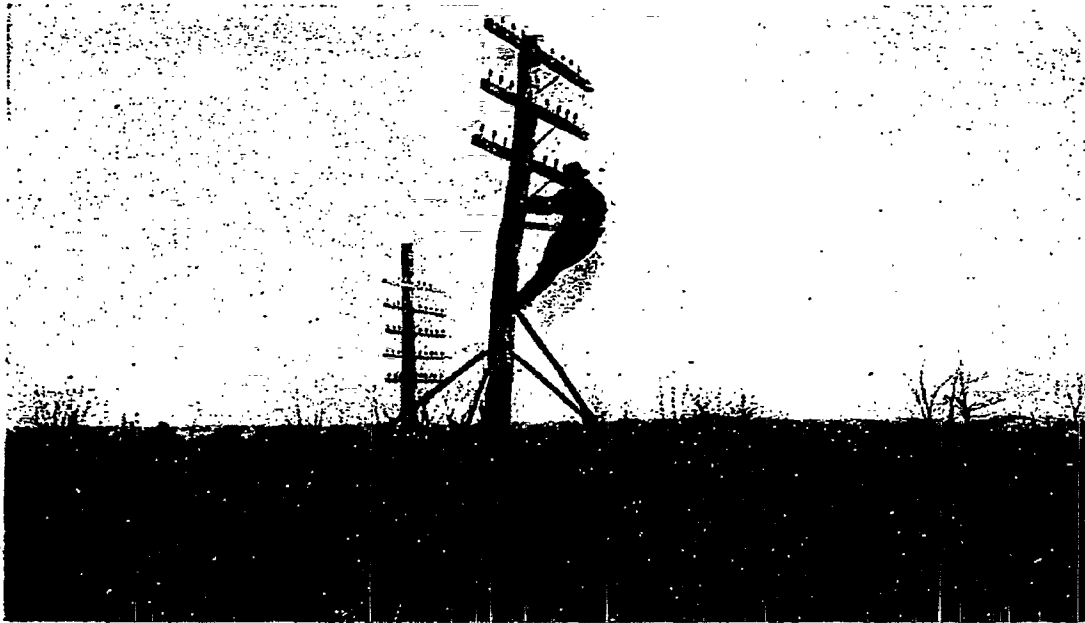
In the next three slides we show correct methods of removing crossarms from a defective pole which has been strengthened starting with the top arm. The

use of rope in lowering arms avoids the danger of the arms falling against one of the pike poles and dislodging it. The work can be performed without undue exertion.

When working on a standing pole without a safety strap a lineman generally works on the "upper side" if the pole leans. If the pole does fall it will generally fall "away" from the lineman and he has a fair chance of escaping serious injury.

Here we see the method in which the lineman shown in the previous picture may follow to protect himself if the pole should fall, being in position to jump just before the pole strikes the ground and probably escape serious injury.

When necessary to remove crossarms from a standing pole the safest and easiest method is to always begin with the top arm if practicable. It may be necessary,



Slide No. 2. A dangerous way to remove cross-arms.

however, because of the position of the wires, etc., to sometimes remove the bottom arm first.

Should the pole break while the lineman is working on it he has a good chance to ride down with the pole and jump before it strikes the ground and probably escape serious injury.

A test inspection does not always disclose a weak condition. Thus we consider it a dangerous method to remove crossarms while strapped to the pole with a safety strap. The use of a strap under such conditions is not only unnecessary but is dangerous, because if the pole should fall the man has little chance of escaping without serious injury.

Slide No. 15.—Here we see a condition which is liable to occur and illustrates the position of a man when a pole to which he is strapped begins to fall "toward" him. When the pole falls "away from" a man strapped to it his position is not

so hazardous as when it falls "toward" him, but his chances of escaping serious injury are very small.

When a pole falls with a lineman strapped to it he has no chance of getting away from it. When a lineman uses a safety strap he generally works on the "under side" if the pole leans. If the pole is defective the lineman's weight may break it when he leans back in his safety belt and thus cause it to fall on him.

CHAIRMAN RUTLAND: Now, gentlemen, I wonder if we might take about ten minutes for any discussion or question you might like to ask or discuss at this time. If you want to anticipate, when you rise please give your name.

H. B. HARMER (Safety Engineer, Philadelphia Electric Company, Philadelphia,



Slide No. 3. Correct method of removing cross-arms from defective pole.

Pa.): I would like to know why it is necessary for poles to fall? Why are there no picks or guards or something of that kind? I would like to know the general practice as a question. It seems to me unnecessary nowadays as to why we should have accidents of poles breaking off.

PHILIP SHATBOLT (Counties Gas and Electric Company, Norristown, Pa.): I want to ask a question along these lines. Is it considered all right by member companies to work on a pole while using a safety? The companies with which I have been associated have spoken strongly against it. We have never had a pole fall. By using the picks we hold it enough so a man can get his guy line fast. After the line is fast it can't come down until loosened and then he can lower the pole in any direction by the use of those lines. I want to ask if member companies as a rule figure it a good practice to work a man without a safety pole?

MR. HARMER: I say it is bad practice. What do you have the safety for? That is why safety is provided to the men and why we ask them to use them.

W. F. NORRIS (American Telephone and Telegraph Company): It is our practice to use the safety strap. We further make a practice after we have secured our pole with picks to guy it with ropes, the idea being that when you take off a cross arm as in the illustration, you are liable to twist your pole and your picks will cut out and we find it very necessary to use the ropes.

MR. MOTT: Mr. Chairman, while the pictures illustrate just what they try to put over, you must be governed by conditions. Take the pole in a field. We assume the wires have all been removed. Why send a man up at all if the pole



Slide No. 15. In this position a man has little chance.

is deteriorated? It is only junk. This idea of testing with a pick pole is an illusion, in my judgment.

Proficient climbers climb a pole where fibres are pretty well down but after they have rattled it and shaken it with a pick pole and climbed half way up it clicks. It might have stood before but it will not stand after. That picture if on the street somewhere, we could understand why you had to dismantle the cross arms but out in the field it is not necessary at all. The rope is the only way to really secure a pole you have to take down. The gentlemen mentioned about the lowering of the pole. A number of years ago we took a line of poles which went over the top of the elevated stations. We removed the cross arms and in those days we had accidents to line men. We don't have the same type today. We dropped the poles right there on Third Avenue between the curb and the elevated railroad. Cut them right down. No picks, no nothing. We blocked off the street while they were dropped. You cannot cover every condition in pictures. The story must go with it more or less.

J. BATES (Pacific Gas and Electric Company, California): Our practice is 18 inches below the ground line and test with the swinging bar. The pole is then picked until such time as they can guy it with ropes. As far as working without a safety belt, that is the only rule which we have which carries a specific discipline. A man who works in an elevated position in the company without the use of a safety belt is immediately discharged and the dropping of poles is a very bad practice.

S. M. HOUTER (National Electric Power Company, Asbury Park, N. J.): It is customary when we set poles to concrete the pole. We leave no space for a man to test the pole. I would like to know if you know of any filler we could put in between the sidewalks and the pole, a distance of, say, four inches that could be taken out or the kind of material you could put a bar through to test the pole. Could you tell me how to handle this situation?

MR. WARE (Public Service Electric Light and Gas Company, Newark, N. J.): We have practically the same problem and we are now endeavoring to develop a creosote wooden block shaped so they will keep it in position and a man can remove wood blocks with a bar with a lock on it. We are trying to develop it with a key so that an authorized person only can get at it. We expect to get something on that in the next few months.

I would like to say in regard to pole accidents, one of the most important parts is to maintain the pole in safe condition. That calls for a system of inspection of poles which we have been carrying out for the past ten years. We don't have such conditions arise as illustrated by the pictures. Where poles and cross arms are removed, where we find a pole defective, we never send a man up on the pole. It must be replaced. Of course, when the new pole is erected, the first thing that is done is to see that the old pole is lashed to it at the top. That is the first step and after that it is safe for a man to climb it and work on it. To our mind that is one of the most important questions facing the utility company.

I would like to put another question regarding men getting electric shock while working on poles. We have been using a standard 14 inch rubber glove and still have accidents. The men received shock because of the gauntlet. We are endeavoring to get a longer rubber glove or a short sleeve that will overlap the gauntlet and extend to a point just above the elbow. We have succeeded in getting such a sleeve and are using it. A manufacturing concern is furnishing us with a small supply of 19 inch rubber gloves. I wonder whether other companies are finding a need for rubber gloves?

E. S. HOFFMAN (Jersey Power Company): We have found out that the longer cuff is uncomfortable. We do have a rubber sleeve that fits over the glove up to the shoulder and where it is necessary to use a rubber protection we find the men are more apt to use these.

CHAIRMAN RUTLAND: I don't think we will have much time left to continue the discussion of this particular subject. There may be some other subjects. I think they have covered the pole situation pretty well and I think the gentleman who asked the question in regard to the gloves has received his answers.

MR. HOFFMAN: Sometimes we have several jobs where it is necessary to install boxes of sand. Sometimes we go around and find tools, waste and materials in the sand. Sometimes the sand becomes moist. I have heard that some people put a piece of paper in the sand bucket and the sand is kept dry and if anybody places anything in the bucket the paper is broken.

CHAIRMAN RUTLAND: Can anyone answer that question specifically? I mean without much discussion? I suggest that you write the Council and let them look it up for you.

E. J. KREH (Duquesne Light Company, Pittsburgh, Pa.): I find there are a

great number of companies whose men contract poison ivy. They find they can prevent poisoning by ivy if the men cover their hands, but after the blisters have been raised they want to know how to reduce and cut out the painful itching and other irritations. Is there anything that can be used.

DR. WIENER (Eastern New York Power Company): We are not troubled in this country so much as in the tropics. They have found a remedy, powdered quinine. The quinine tablet contains two or three grains of quinine and the rest is saccharine, but the powdered quinine is rubbed right over.

CHAIRMAN RUTLAND: I am sure he has the authority to give the correct answer.

MR. HARMER: Another remedy is that available to all of us. We recognize poison ivy. We know it. As soon as you see that you have it, wash your hands in the commonest kind of soap you can get and you will not get poison ivy. If you clean your hands you don't have any poison ivy. Common ordinary soap is sufficient to kill all of that oil that comes off the poison leaf.

MR. OLSCHESKY, JR.: We have recommended a common, ordinary laundry soap. Work up in the hands a good lather. Five or six times this should be done. If it is not gone then, the doctor is the next best fellow.

DR. WIENER (Eastern New York Power Company): If a man has exposed himself to poisonous plants, if he feels it and there is not already the stage of itching and inflammation because of the blister, it is all right to wash your hands in tough soap, the tougher the better; but the question is, suppose the man is already poisoned? As a preventative, the idea of using a tough soap is excellent but after it is there, that is different.

H. F. WEBB (General Safety Division, West Penn Power Company, Pittsburgh, Pa.): I have three questions. Probably the members might be interested. Number one: What protection do you give your men handling creosoted poles, and when they become poisoned what do you use at that time? Number two: What protection do you put around the steel legs of your towers, preventing children from climbing and at the same time facilitate or allow your workmen to climb when necessary to do some work on them? Number three: What hand protection do you give your workmen when they are called to clean highway lighting globes to prevent severe lacerations, knowing that leather gloves get wet or slimy, or canvas gloves too bulky? If you use a thin rubber glove the glass will cut through. If you use a canvas glove the glass will cut through.

L. E. DICKINSON (Pacific Gas Company, California): One ounce of epsom salt and one pint of water, to treat creosote poisoning, applied externally, of course.

DR. WIENER (Eastern New York Power Company): We have had in the last few weeks a number of creosote burns. They are quite a problem. So much so that we have written to the American Medical Association asking their opinion; and the reply was received that the best preventative is to cover the exposed parts with an anti-fibrous grease. We have now in the market an excellent ointment. I am not advertising this at all. It is a remarkable thing. As soon as you apply it, it seems to have an anesthetic property and a definite pain is quickly relieved and it is healing. It is merely an application of this once or twice a day.

MR. KREH: About two years ago a row of linemen were all burnt with creosote. The foreman used Unguentine and had good results and we are using it and we have not had a creosote burn for two or three years.

MR. WEBB: I learned only yesterday that one of the exhibitors is preparing something. I think it was called Iscopilen made by the U. S. Alcohol Company. I am sorry I have not got the name straight. It was claimed to be a positive cure.

CHAIRMAN RUTLAND: That covers the question of creosote. The other question was a means of preventing children from climbing steel tower structures. Who will answer that?

PHILIP SHATBOLT (Counties Gas and Electric Company, Norristown, Pa.): We are using an angle arm and extending it three feet beyond the tower legs. That is covered with a wire netting and strips of barbed wire and at the leg there is a trap door cut in to hold it and hold the leg so when the man has occasion to go away he can lock it and the trap door will fall down through the side and after they are through it can be closed and locked. We had very little trouble.

MR. HARMER: Is that a general practice or an isolated one?

MR. SHATBOLT: We are using that on all the towers on which we are fitting guards.

CHAIRMAN RUTLAND: The next question was the manner of handling street lighting globes. What method of protection to the hands?

MR. KREH: We insist that all of our employees, when descending a pole, must have rubber and leather gloves on. That includes our trimmers and cleaners in street lighting work. For some time they objected and thought it could not be done. For the past three years all our trimmers and cleaners have been using both leather and rubber gloves in their daily work.

L. E. DICKINSON (Pacific Gas Company, California): I would like to see statistics published in such a fashion that various utilities can compare them by department, not by company or not after a fashion as printed last year.

CHAIRMAN RUTLAND: Is your particular company keeping statistics by department?

MR. DICKINSON: Yes.

CHAIRMAN RUTLAND: Well, if they are all doing it, it will be all right, but if not, it will be a double job. There are not a great many companies who keep them by departments. I know that Mr. Burns had that question before.

MR. DICKINSON: It seems to me they could differentiate between the electric department, gas, office, construction, and water department, instead of publishing it as statistics for the whole company.

MR. HARMER: It would be a good idea to have the records that way. Generally, statistics have never been compiled that way but I think as a departmental activity, the comparison of records between departments have a great deal to do in helping your problem.

CHAIRMAN RUTLAND: Let me suggest that those companies who are not keeping their records by department, give this question some thought. It might be very helpful and it might be an additional step in securing statistics from companies by department for the general committees. You will find that helpful.

CHAIRMAN RUTLAND: As your retiring chairman I have appreciated very deeply the responsibility resting on myself in the preparation of the programs, in the correspondence and publications of *News Letters*, posters, amusements and various other work. I appreciate it more because I realize that you gentlemen come here for something to eat, for material to take home to work with, looking for new tools. It has been our intense effort to get the best we could for you. I hope you enjoyed the session, the discussions we had, the talks made. As I have served this year as your chairman and coming in contact with the Executive Committee as I have, it has given me a little broader outlook on life and it makes me love these men more who have worked with us and who have had experience in accident prevention work. I hope I won't now lose the contact I have had in the last four or five years. I have enjoyed it. It made our safety department for the company I represent. It will yours. I am very happy to have served as your chairman.

I am glad we have a man coming in who is fully capable and who will take

the reins and carry them still further and expand the activities of this Section even beyond a dream that might have been made several years ago. Now I want to take this time to have a word or two from the incoming chairman.

H. F. Webb (General Safety Division, West Penn Power Company, Pittsburgh, Pa.): Last year during my attendance at the Congress I heard the story of a town in Texas which was going through a young riot and in order to get assistance to squash the riot, they called upon the Texas rangers, and a body of men went to the train to meet this troop of rangers. When the train pulled in one man stepped off and the town spokesman said, "Where is the rest of your gang?" and the ranger looked at the body of men and said, "Is there more than one riot?"

It is clear in my opinion that all Texans are born leaders and judging from the past leadership of Carl Rutland, we know we have had a successful year in



so far as public utilities is concerned. Carl is a leader and he can get more work out of a body of men with less effort than any man I know. In addition to that, because he comes from Texas, Carl is a square shooter. He is an enthusiast, particularly a safety enthusiast and worker, and in addition to that Carl Rutland is my friend. I think we ought to all stand and offer a vote of thanks for the past.

Now for the untiring work that Carl Rutland has given during the past year.

I have also heard it said that the way to make a speech is to stand up, talk up and shut up. That is my motto. Nevertheless I want to tell you a story that Charlie Schwab told about a New York girl that he brought to his mansion in Pennsylvania to act as a personal maid to Mrs. Schwab. She was beautiful and one of the farmer boys who worked about his estate became very much in love and they decided to get married. They talked it over with the Schwabs and they decided to hold a real wedding in the mansion and give them a real start. Of course prior to the wedding they were prompted and told just what to do and how to behave and the wedding took place and a great many notables were

there. Everything went smooth and fine. Later all the male guests gathered around the beautiful bride to kiss her. Mr. Schwab noticed that the new groom was ill at ease. He was putting his hands in his pockets and standing around and Schwab walked up and said, "John, everyone has greeted the bride but you. What is the trouble?" He immediately saw his mistake and rushed up to the bride and shook hands with her and said, "I'm pleased to meet you."

Gentlemen, that is the way I feel. Many of you know me and I am glad to say I know you. I hope we will have a successful year. This is a great year for politics. I was reading *Safety Engineering* the other day. It said: "Some of us may be Republican and some of us may be Democratic and we may argue about the different points of the different parties, but where it pertains to accident prevention, there can be no argument." So I am mighty glad I have been elected to this great national party "Safety" and I assure you I will do everything I can to promote the activities of this wonderful section. It is amazing the way the Public Utilities Section has grown in the past years and I realize the responsibility thrust upon me.

I don't think I could hardly get away with it if it were not for this wonderful group of accident prevention specialists who are going to support and back me through this entire year.

It is always customary for the incoming chairman to ask for cooperation. I am not going to ask for it that way. I will say that actions speak louder than words. I am reminded by the poster that if we put our shoulders to the wheel, we will all be assured another successful year in fighting public utilities interests.

CHAIRMAN RUTLAND: There will be a general round table discussion at two o'clock this afternoon in this room. Fortunately the chairman of that Section is our own good George Opp, who achieved high fame last night when you heard his name read as Vice-Chairman in charge of Local Councils. He is a night and day man. George last year was chairman of our Section and has been a member of the Executive Committee now for three years. As I said, last night he was elected Vice-Chairman in charge of Local Council because they need such a leader as George is, and now next year there will be a marked increase in their activity.

Our meeting is just about to close and we are reaching a climax but we are going to be sent away with a good message. George Opp will speak. I take great pleasure in introducing Mr. Opp.

And Now What Are We Going to Do About It?

By GEORGE OPP

Safety Engineer, The Detroit Edison Company, Detroit, Mich.

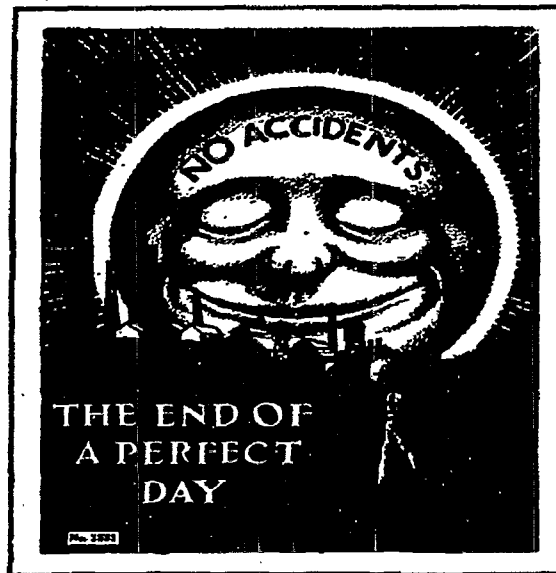
A Congress of this kind is generally words, words, words. We hear what has been done. We hear of plans that are being made. We start home feeling inspired for at least a short time but getting home we are tired and the spell of inspiration dies down and sometimes nothing results.

Today is a day of questions. Questions on every hand, whether social, political or otherwise. Time was a few years ago when everything was an exclamation—Oh! How wonderful! Well! But today it is a question. What is it? How does it work? Why? Who? What? The question today is a matter of our own personal interest in taking back from this Congress some of the good derived from the splendid program set up for our benefit. I want to commend those responsible for the Section's fine program they set up, beginning with "First Principles" presented in that wonderful talk by Dr. Grafflin, getting back to the fundamentals of

all things, safety included, then carrying on with definite and concrete illustrations of various aspects of splendid safety work and winding up this morning with an opportunity to take the burden off your own chest by asking what you might do about some of your problems. Questions! Questions of all kinds!

What Are We Going to Do?

Now for the answer to what are we going to do about it all? We feel we have accomplished something and have just pride in feeling so. The presentation of trophies at yesterday's luncheon is illustrative of the work that can be done by real, intensive, safety effort. Two of the three prizes awarded went to companies belonging to an organization that has been real intensive in safety work and in that respect the wards indicate what can be done by making our efforts all the



more intensive for the future. But let us not stop there. Let us not merely set up records of our own. Let us not be selfish and keep our safety efforts within the walls of our own plants or restricted to work along our own lines. Spread it out to include the community, to include the State and national organizations wherever we may come in contact with them in order to make our own Public Utilities Section more effective.

How can the Public Utilities Section do a bigger, broader job in organized safety? Can we not stimulate an interest in safety among the companies we serve, the many small plants where organized accident prevention has a big field for improving our national accident record—not too good by and large the country over. Can we not stimulate interest in public safety in the schools and on the part of public officials in the communities we serve. No danger of a power probe into that activity either.

I would ask you to give serious thought to the question of having a full time consultant attached to the Public Utilities Section. One who can visit all of us

occasionally, help us in our problems; give concrete, expert advice when needed for intensifying systematic safety service.

Then take the matter of getting the contact with your own local community councils. Show them that you can stimulate their interest, that you will back them. Tie in with them, because they can help you.

It is all of these things that are needed to hang up an even better record than in the past. Let's not forget there are even better marks to shoot at. We must realize that we have a whole lot more to do than what has already been done.

Two railroads of this nation (two leading railroads) by reason of the interest stimulated by the National Safety Council contest, stand to save no less than one hundred ten lives of employees alone on the basis of the records they have set up to the first of October of this year. The Cement Association has member plants who have achieved marvelous results. Think of it! One of their plants, employing over a thousand men, went one year without a lost time accident. Then, not satisfied with that record, they came back a second and a third year with clean records. That's a real record! There are any number of records we might refer to. All ought to stimulate and urge us to renewed effort. Let us not feel content. As Kettering of the General Motors says: "When you are satisfied with yourself, the concrete in your brain has set."

The job of safety is not done—will NEVER be done. It is deserving and clamorous of our best efforts to keep going and even when the Angel Gabriel sounds his trumpet on Judgment Day we will have to rush up and yell: "Hey, Gabe, our safety work is not yet done."

How are we going to tackle it best and hardest? That is for *each* of us to solve.

As the sun came up this morning, I saw the various architectural beauties in New York City's landscape. Some wonderful, some big and massive; others, sharp spires, piercing the blue atmosphere of the sky. Each of them built according to the design of their own builder. That is the way Safety needs to be done. Build on your own plans, wherever you are, down to your own local conditions, but upward all of the time.

Now it is a fact that the viewpoint of safety workers has had to be changed. We did not have as wide a vision ten or fifteen years ago. That vision has gradually broadened and then suddenly opened to a wonderful vista of possibilities undreamed of in the earlier days. At that early time it was considered merely as a garden plot and practicing Safety in those days meant going out and plucking a weed of indifference or a sprout of carelessness out of the garden, so as to permit the full fruition of the garden. Since then this plot, due to the wonderful metropolitan development attendant upon industrial progress, has become the center of a great big city. It becomes a building site. And its full utilization is now required. We set steam shovels digging deep, deep; taking out the muck of carelessness and quicksand of indifference. We put down our caissons to the solid bedrock of common sense and build upon it the foundations to support a big building. Along comes the steel industry and supplies the frame-work of the superstructure with their wonderful accident record; the cement industry furnishes more "building material" in the substance of the splendid record set up in that industry. Many industries are contributing to building "Safety" but there is still much to be done before that structure of ideals is completed. We, the Utilities, are asked to take our part in the final building. What are *we* going to do about it? This building of our conception of Safety shows progress commensurate with our application of hard and persistent work. We go forward—we cannot stop or step back.

This has been a wonderful Congress; a marvel of inspiration, sincere attention on the part of the audience and conscientious effort on the part of the speakers. It stands as a peer of accomplishment and without a peer in the history of the

National Safety Council. It is outstanding as the greatest "gathering of the clan" of safety the world has ever witnessed—and comes as the finale of a year of the most dynamic effort in behalf of a full and complete program of accident prevention everywhere—in the shops of industries, on the lines of railroads and utilities, in the schools, on the streets and highways and developing at last in the homes, quite generally. Let us go back seriously to our jobs, feeling the inspiration of the "spark" that comes from this yearly contact and be ready to do our share. Let ours be a more systematic safety job. Intensify effort and magnify responsibility. When local and regional Congresses are called, let us put our shoulders to the wheel and see that they are made successful. Participate in all forward-marching activities of our section, help to generate that invincible interest in our work to tide us over until we get together again next year, each of us bringing, I trust, a record of even better accomplishments than we were able to tell, some with justifiable pride, this year.

Now, what are *we* going to do about it? That depends on your answer to the corollary question: What are *You* going to do about it? You answer, each of you, for yourselves.

ADJOURNMENT

Joint Luncheon Public Utilities and Electric Railway Sections

October 3, 1928

T. G. BRABSTON, Chairman
Superintendent of Transportation, Birmingham Electric Company
Birmingham, Ala.

The joint luncheon session of the Public Utilities and Electric Railway Sections at the Seventeenth Annual Safety Congress, was called to order at one-thirty o'clock by the chairman, T. G. Brabston, Superintendent of Transportation, Birmingham Electric Company, Birmingham, Alabama.

CHAIRMAN BRABSTON: Gentlemen, we are going to be very happy at this time. We are going to be entertained by some gentlemen representing the world's greatest railroad.

(A quartet representing the Pennsylvania Railroad rendered four compositions.)

CHAIRMAN BRABSTON: I am sure we all realize now after hearing these songs, why the Pennsylvania Railroad is so distinguished for its courteous and efficient service, and I am sure I reflect your sentiment when I say to this quartet that we are greatly appreciative for their contribution.

We have at this time a rather interesting event on the program. There is constantly a rivalry between departments and companies in establishing successful records. And that reminds me of the man that came up to my town from somewhere, and said to the waiter who was a darky, "If you will wait on us now satisfactorily I will reward you with the proper sort of tip. By the way, I have never been down here before, what is the average tip?" "Well, boss, ah'll tell yo', the average tip hits a dollar." "That is perfectly all right. You wait on us properly and I will give you an average tip." When he got through, the darky asked if the service was all right and the man said "Yes," and handed him a dollar. The darky said "I thank you. I have been working here close on to three yeahs and you am the first man what come up to the average."

We have 23 companies here who have a distinction that have certainly come up to the average. There are three trophies which are to be awarded to those companies who have established themselves in having records worthy of recognition and outstanding in the industry, and the first of these is presented by Mr. Floyd W. Parsons, Editorial Director, Gas-Age Record, New York City. I think it is a wonderful incentive and spirit that has prompted the offer of this trophy. At this time it is my pleasure to present Mr. Parsons who will make this presentation on behalf of that publication.

Presentation of Trophy

By FLOYD W. PARSONS
Editorial Director, "Gas-Age Record," New York City

In the words of the horsethief who was about to be hung and asked to speak on that occasion, I am the one most interested in this part of the performance and the least enthusiastic about it. If any of you play golf and play a blind hole and the caddy says, "It is just over the hill," and you shoot over and you find the ball is way off—that is just about the position that I am in today. First I did not believe

I could use my vocal chords. We editors dictate from seven to ten hours a day. We really work, and so I only expected to say a word.

I understand it is intended that I speak for just a few moments and then present this trophy. I visited a throat man this morning, so after leaving the throat man I went down to see my dentist and he put something in my mouth. He said, "What can you do for fifteen minutes?" I said, "If you will give me that package I will write a speech that I am going to make in about thirty minutes." So I did that. I have never been to one of your meetings. I have written stories and syndicated them and put some in the Saturday Evening Post and helped the movement along as best I could.

My experience with accidents started when I was six. They were building a new jail in our town. They left one of the cells outside. I was the prisoner. I had to escape. I fell off and cut my head and still have the scar. Later I jumped on a freight train and was thrown between the platforms of two cars; and the wheels went around and knocked me around until twenty cars had passed. I was still alive. That gave me a positive indication that there must be a good God that saves us. Later, I was a mining engineer and I went in with twenty-seven men to try to rescue a lot of men caught in the drainage. We organized our party and three came out. The other twenty-four came out some days later pretty stiff and dead—so that I have some acquaintance with what accident prevention means. When I first went into the mines in 1902 we shoved off and lit gas feeders and then took our coats and beat them out. That was when we talked about safety lamps, so that I have seen the development of industry, of accident prevention, for twenty-five years or more and have carried my little part in this movement in an editorial way in the big magazines.

There was a timid old lady who went to cross a ferry, and after starting she became a bit nervous and said to the darky boatman, "Has anybody ever been lost in crossing here?" The darky replied, "No ma'am, no ma'am; my brother was drowned last week but we found him the next day." So it is almost entirely a question of the point of view.

Today we are bothered with a lot of bunk and half truths. "Did you know that Harry made \$5,000 a week," said Abe to Solomon. "I don't believe it" said Solomon. Abe said "I will prove it. Did not Harry make \$5,000 in Washington?" "Yes, that is right" said Solomon "but wrong in four places. First, it was not Washington, it was Cincinnati. Second, he did not make it in a week but in a year. Third, it was not \$5,000 it was \$500; and fourth, he did not win it, he lost it."

Today we are perjuring in industry and life generally and we get a number of falsities. We believe guinea-pigs come from Guinea; lead pencils have lead in them; the staff of life is bread, the worst thing that nine out of ten can get; and that fish is brain food, but it is nothing of the kind. That the ocean is flat—nothing of the sort; it is a gently sloping hill. We take histories and fill them with exaggerated tales about the early hero. If you will examine our forefathers and what they did you will find they were a pretty tough bunch. Tremendous changes come along and cause great hazards to arise. We are always fooling with things we know little about. Radium has killed a lot of people. Radium, which you read about, is doing a lot of damage. The aeroplane—all these and other new things—are taking toll in life, but that is the only way we can improve life and relieve the over-carrying of the burdens that we shouldered under the old methods. The automobile is a great thing but the carbon monoxide from them as they roll along the streets goes into the lower parts of buildings, up the stairs and in the remote office and helps to give us a new problem in polluted atmosphere. Accidents,—the kind of taxi drivers we have—and that reminds me of a story.

A lady got into a taxi and told the man where she wanted to go. The taxi started off with a terrible jerk and the driver dodged everything on the road. When she arrived at her destination and wanted to get out she said, "This is the first time I ever rode in a taxicab and it is terrible." "That's nothing" said the driver; "this is the first time I ever drove one."

People who invest their monies in companies do not see the reports of minor accidents that cause delay and loss of time and reduction in production. The general plan we have in facing life is filled with so many inconsistencies. We go to an extreme in saving along one line and wasting along the other. That reminds me of the ducky who was going fishing, and he met an older boy along the road and he said, "What's the matter with your cheek, it's all swelled up? What have you got in your mouth?" "Well," replied the little ducky, "I'm going fishing." "Well, what have you got in your mouth?" "Worms!" The old boy said "Worms? Why don't you put them in your pocket?" "Put them in my pocket? Do you think I'm going to put them in my pocket with my lunch?"

Gases have quite a black eye. In fact the gas industry which has just awakened is about to play a dirty trick upon a lot of people who want an easy way to get out of the world. We are well along in our research to make it impossible to commit suicide with gas in comfort. The research men tell us they are well on with the experiment and when you try to take a little gas to end it all you get so damn sick before you die that your purpose is entirely defeated. Also we find that our ordinary radium gas fire is the nearest thing to sunlight. There is quite a craze around about ultra violet light. If you don't get it you can't absorb phosphorus in your system. We also have discovered that in our ordinary radium fire we have ultra violet rays. The use of gas will become more prevalent because fellows will strip off nowadays and the rest of the family get the ultra violet ray for nothing. It shows how things are changing nowadays but there are new days coming on.

The utilities, I will say, have gone a long way. One hundred thirteen units were in the contest just held this year and these employed 72,000 men. Out of the 113, 93 made complete returns. Fourteen of these units came through this contest without a single lost time accident, and when you consider that the accidents in the gas industry extend from traffic conditions to fitting and on through all of the other operations of building, chemical departments and all, that is really quite some record. In this contest the unit of the Southwestern Gas and Electric Company, the unit situated in Dallas, Texas, has won first honors. They employ 105 men and they worked 181,710 man-hours, and I want to present this cup to Mr. J. Allen Read, Safety Director of this particular company. Is Mr. Read here?

Accepting First Honors

J. ALLEN READ (Safety Director, Southwestern Gas and Electric Company, Dallas, Texas): The Chairman tells me to make my remarks snappy so I am going to. This is, indeed, a surprise to me. I have not even seen our last month's report. I thought it was hopeless. I felt that the small gas portion of our company had no chance at all. I want to thank the *Gas-Age Record* for this cup and thank the section; and I am sure we will duplicate this record not only when we have a contest but also when we have not.

I want to pay a little tribute to the company that won this cup. This was not won by any individual. It was won by every employee of the Southwestern Gas and Electric Company. They operate in some 80 or 90 towns from Mississippi to Arkansas and from Mississippi to Texas. Three hundred fifty to 400 employees have just completed a year with but one lost time accident, and that happened when a negro boy threw a stone in one of the fellow's eyes. This is only the gas section but all our sections are endeavoring to prevent accidents. I thank all of you. I am just so surprised and thrilled that I can't say anything.

CHAIRMAN BRABSTON: That is fine. At this time we are going to have the presentation to this other group who have so singularly distinguished themselves. Mr. Ernest W. Beck, Vice-President of the National Safety Council, will now make his presentation.

Presentation of Trophies

By ERNEST W. BECK

Vice-President, National Safety Council; U. S. Rubber Company,
New York City

Mr. Chairman, I feel very much out of place here, not being affiliated with a public utility. I am pleased however to come here and encourage the proposition of a no-accident contest. The previous speaker who presented the trophy spoke of the number of contestants. I noticed one or two gentlemen making a few notes regarding the number of units without a lost time accident. I want you to know that improvement as a result of this no-accident contest is equal to 280 per cent. In other words, the persons employed to no lost time accidents were 37 to 1, compared with the record of two years ago of 12 to 1. That is wonderful.

I have been quite tied up with these contests because I am convinced that this element has accomplished a great deal. I say that from experience. My company has shown an improvement each year for the last five years over the average of the last three years. These things don't just happen. The gentleman when he accepted that trophy gave credit to where it belonged—each and every one of the organization. He knows and I know that there must be somebody at the top who is giving the contest his approval, who is approving the expense account, making out the budget, believing it is good from a financial point of view and an humanitarian point of view. The expense is infinitesimal with the enormous savings it represents.

Your contest was started in March 1928 and was operated six months and showed the good results. You have six groups, gas, electricity, combination of gas and electricity, telephone, telegraph and water. I am surprised you did not get enough in your water group to contest for a cup, especially under the Eighteenth Amendment. You, have, however, been successful in getting 113. I believe you can get more and in another year the National Safety Council will be able to report many more in the contest, and the reason is because of the success this contest has had.

Any man who turns down a sound no-accident proposition I cannot understand. He cannot be sold on safety. It is a very, very essential part of a properly organized safety program. I have been asked to present this trophy to the group known as the electric group. In this group there were seven companies who operated without lost time accidents. Competition must have been very keen. That is a wonderful record. Is Mr. Watts in the room? Mr. Watts, in behalf of the National Safety Council, it gives me great pleasure to present this trophy and I hope you and your organization will be successful in winning another next year.

Acceptance by the Electric Group

MR. WATTS (Southern, O. Pub. Service Co., Zanesville, Ohio): When an occasion like this arises, a fellow is more or less swept off his feet. We did not, until a few minutes ago, know we won it. I suppose you men want to know where Zanesville, Ohio, is located. It is midway between Columbus and Wheeling, West Virginia. Our company employs something like 135 employees actually engaged in the manufacture and distribution of electric energy. We have found by experience that the safety director cannot sit behind his desk and preach safety. He must

get out on the firing line. As late as last Saturday we had occasion to put in a two and three quarter mile emergency line and had to employ something like 35 men. I took it upon myself to go with them to see that they got by with it. I want to take this occasion on behalf of my company and myself to thank the National Safety Council for this trophy.

MR. BECK: The losers win. I know of no factory, even if they showed red figures but what have felt that they really were better off than if they had not joined so I am going to mention as honorable the others who have operated without lost time accidents: San Antonio Public Service Company, Citizens Gas and Electric Company, Wisconsin Electric Company, Superior Water Works, and Wisconsin Power Company.

Our next group is combination gas and electric. It is a large group and the plant winning a prize is a plant working a large number of man-hours. The winner of the combination gas and electric group is the Lake Superior District Power Company, at Ashland, Wisconsin. They serve 36 companies in Michigan and Wisconsin, having a total population of 65,000 members. All companies are rendering electric service and one town served with gas and one town operates street railways. We are extremely fortunate today in having the vice-president and general manager of that organization with us. I have checked up on him and I have a wonderful record of the work he has been doing for safety. I know he must have it. You must meet the man and talk with him and you will know that he is a safety enthusiast. He is here today and it is a pleasure to have him with us. I will now present the trophy to Mr. G. W. Hodgkins.

Speaking for the Gas and Electric Group

G. W. HODGKINS (Vice-President and General Manager, Lake Superior District Power Company, Ashland, Wisconsin): Mr. Chairman, gentlemen: I am a long way from home and I want to tell you where I come from so you will live with me for a few moments in my home.

A year ago I was at a meeting and the gentleman that introduced me said that we build only nine hole golf courses in our section of the country because the summers are so short we cannot get all the way round the course. We live on Lake Superior at the western end. I have heard your safety directors talk. I have heard the men most interested expound their different ideas on safety practice but I am convinced of one thing and that is that first there must be some background to tie to. I know it is easy to issue bulletins for boards and put up your safety signs on your boards around your plants but I also know this: You men all know Abe Lincoln. You probably have all heard the story of the time Staunton wanted to do something and Lincoln said not to do it and the men went back to Lincoln and reported Staunton as having said "Lincoln's a damn fool" and Lincoln said "Staunton's usually right." You understand that Lincoln was President of the United States. A man whose every wish, every order, could have been fulfilled. Yet, he said, "Staunton is usually right."

From that attitude of mind, Lincoln developed a personal following from his bitterest enemies until today he comes to us through history almost a Christ.

In any industry you have got to develop the thing that Lincoln developed to achieve the highest degree of work, whether it be safety work or some other kind of work in your organization and when I say that, I don't mean loyalty to me—I mean loyalty to every man who has men responsible to him and men that look to him for their welfare.

If I were to wish for success, the greatest success that could come to me, it would be to have the feeling that the men who work under me believe in me and I want the men who are responsible to me to have the whole work under them of

the men responsible to them believe in them because nothing in the world runs as counterfeit as insincerity.

You can follow out a set of rules and orders because they are given you. The men that work for you know as well as you when the men to whom you are responsible are insincere. Men get wrought up and some one will criticise some man in his organization, but this is also true. You can criticise the men in your own organization but when it comes from somebody outside or somebody above in your organization you know that you will fight for every man in it who is depending on you for his welfare.

I spoke of Lincoln. It was my good fortune to be in Washington when Colonel Lindbergh came home, and I would not have missed that trip. I would not have missed seeing the things I did see for anything. I sometimes wish that some of the people back home who are sending some of the representatives down to Washington could go down and see some of the things that I saw.

You know that this country was not built in a minute or a day. It meant the sacrifice of years and sacrifice on the part of the greatest men of the nation, and that is what we mean when we talk about patriotism. You can't expect a man to come to this country off a boat and understand all the pictures that have gone before, pictures that our native born American can absorb. Yes, I went down to see the Statue of Liberty. It stands, a metal piece, and perhaps to some people it means just that. To me it meant more than that. It meant that the time of discord with France was over and we have an anchor out in the harbor, a present made to us by France; and those of us here and those of us there know what the Statue of Liberty stands for.

Gentlemen, I only cite these historical things to have you believe that the thing which will make industry prosper, which will make safety work more effective, is the loyalty which is born of association, respect and regard for the men you work for and with, and success can only come in that way.

I don't take any personal credit for this wonderful trophy I am taking home with me, and a few moments ago as they were singing their song, I wished it were possible for those back home, all of them who are associated with me, to be here today to get some of the inspiration that I will fail to take back.

You know the public utilities today are occupying so much of newspaper space. I wonder sometimes if the men who are writing these articles know men in utility business. Sometimes I doubt that they do because as I go around the country and look into the faces of such as are gathered here today, I don't believe it is possible for us to be such a damnable lot as some of the newspapers represent us to be. We all have to work. I don't believe any other industry furnishes men who are more sincerely and conscientiously trying to do the thing they should do, more than the men in the utility industry.

I want to add this, Gentlemen: I believe it was just our good fortune to have first prize. I don't believe we did any more than other organizations represented here today. We have all sincerely tried to do our best. Next year it will be some other company and I will be just as glad for you as I am for our own company.

As I go about the country I have pride in knowing the men engaged in the industry. I think this is true: generally speaking, we go back to the question of loyalty and I think the companies that have the least turnover have the greatest loyalty, and the companies that have the greatest loyalty have the fewest accidents; and I believe, the companies that have the fewest accidents have the best records in earnings.

Our Safety Director, Mr. Jule, gave me some records of accidents but I won't take up your time with those.

We should develop a sense of responsibility and gather about us younger men. It has been my good fortune to be associated with a company small enough so that I know the men.

Many of the boys are sons of fathers who are either on pension or are getting old. If there is any one accomplishment that I feel more proud of than any other, it is the fact that I have been able to gather about me young men whom I have known all my life and who have known me all their lives. We work together and it is just as easy to get into my office as it is to get into any other office on my property.

I am going home to my property with a thrill that comes to an organization in a thing of this kind. I want Mr. Jule to stand on his feet to show you the man on the property. He has not taken the prize himself but has been with the men throughout the territory. Mr. Jule!

(Mr. Jule stood up for a second.)

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Quarry Section

New Section Officers

General Chairman—R. E. COLVILLE, United States Gypsum Company, Chicago, Ill.
Vice-Chairman and Chairman Engineering Committee—F. F. McLAUGHLIN, Rock Cut Stone Company, Syracuse, N. Y.
Secretary and News Letter Editor—J. R. BOYD, National Crushed Stone Association, Washington, D. C.
Poster Committee Chairman—H. F. YOTTER, The General Crushed Stone Company, Easton, Pa.
Membership Committee Chairman—D. C. SOUDER, The France Stone Company, Toledo, Ohio.
Statistics Committee Chairman—W. W. ADAMS, United States Bureau of Mines, Washington, D. C.
Executive Committee: THE OFFICERS AND
A. J. R. CURTIS, Portland Cement Association, Chicago, Ill.
N. S. GREENSFELDER, Hercules Powder Company, Wilmington, Del.
OTHO M. GRAVES, The General Crushed Stone Company, Easton, Pa.
WARREN HAYES, National Slate Association, Philadelphia, Pa.
V. P. AHEARN, National Sand and Gravel Association, Washington, D. C.

Retiring Officers

Chairman, D. C. SOUDER, The France Stone Company, Toledo, Ohio; *Vice-Chairman*, R. E. COLVILLE, United States Gypsum Company, Chicago, Ill.; *Secretary*, J. R. BOYD, National Crushed Stone Association, Washington, D. C.; *Poster and Slide Committee Chairman*, FRED E. HATFIELD, Indiana Limestone Company, Bedford, Ind.; *Membership Committee Chairman*, C. ZIOLKOWSKI, United States Gypsum Company, Chicago, Ill.; *Publicity Committee Chairman*, NATHAN C. ROCKWOOD, Rock Products, Chicago, Ill.; *Engineering Committee Chairman*, R. E. COLVILLE, United States Gypsum Company, Chicago, Ill.; *Statistics Committee Chairman*, W. W. ADAMS, United States Bureau of Mines, Washington, D. C.; *News Letter Editor*, D. B. BUETTNER, JR., The France Stone Company, Toledo, Ohio. *Executive Committee: THE OFFICERS AND* A. J. R. CURTIS, Portland Cement Association, Chicago, Ill.; N. S. GREENSFELDER, Hercules Powder Company, Wilmington, Del.; H. F. YOTTER, The General Crushed Stone Company, Easton, Pa.; E. D. SHERIDAN, Chico Stone Products Company, Dallas, Texas.

October 2, 1928

D. C. SOUDER, Chairman

Director, Insurance and Safety, France Stone Co., Toledo, O.

The first session of the Quarry Section at the Seventeenth Annual Safety Congress was called to order at ten o'clock by the chairman, D. C. Souder, France Stone Company, Toledo, Ohio.

CHAIRMAN SOUDER: As Chairman of the Quarry Section, I am reporting on the activities of the past year.

One of the important moves that have been made is the completion of a Safe Practice Pamphlet for the quarry industry. That pamphlet has been put up in pretty fair shape by our vice-chairman, Mr. Colville, and we anticipate completion by the first of the year. He has to secure some more information from some of these quarries of the General Crushed Stone Company which have gone for 18 months without an accident. He has been getting most of his dope from the quarries that have had too many accidents.

As for the activities of the Quarry Section, that is about the extent of our year's work.

I am now asked to present to the members Mr. John Rice, president of the General Crushed Stone Company, who has devoted the better part of his life to the crushed stone industry; and previous to that time was affiliated with the stone industry. It was one of Mr. Rice's plants that secured the trophy presented by the National Crushed Stone Association for the best record during the year 1927. This plant, I am told, has an average employment of about 75, and is a producer of crushed stone products. In addition to proceeding for 12 months they, I understand, had a straight run of 18 months, approximately, without a lost time accident, then had one lost time accident, and have now gone about 6 months without a lost time accident.

I take great pleasure in introducing Mr. Rice.

What Safety Means to a Quarry Executive

By JOHN RICE

President, General Crushed Stone Company, Easton, Pa.

I am going to talk to you very informally without burdening you with a lot of statistics, first because they are uninteresting, and second because the General Crushed Stone Company with which I am connected has not been practicing scientific safety methods long enough to make comparison with past performance illuminating.

Perhaps my personal experience outlining the gradual evolution of thought about safety is quite typical of the growth of the movement among executives and students of human engineering generally, and this is my excuse for using it as the basis of this address.

There was a marked contrast in the relationship of the employer and employee during the past (let us say) seventy years with the antecedent time. In the early days before the time of large corporations employers were individuals or partners directing a comparatively few men. Prior to the Civil War much of the work was done by slaves and bond servants. The more intimate contacts and simpler character of the service performed together with the fewer number of individuals involved in the first instance and the self-interest inherent in slaves and bond servants in the second instance did result in some personal interest in the welfare of labor.

However, with the growth of corporations, with no personal contacts between executives and large aggregations of labor, with the introduction of machinery, with the opportunity to replace the waste due to accidents, sickness and death from emigration and from a prolific native stock, with the fierce struggle of pioneering business enterprises for financial success regardless of ways and means, little heed was given to the welfare of employees from a humanitarian standpoint and no conception of the waste from an economic one.

My personal executive experience covers a period somewhat over forty years.

The first ten years was for the most part devoted to general contracting and I was in quite close contact with my men. I was not by nature very hard hearted and had an emotional sensitiveness to human suffering, but I can not recall that I had any great concern about my men's welfare or safety and certainly no well defined policy or principle concerning it. Employers liability insurance covered the risk and that was all there was to it.

During this period, however, I became aware of the instinctive willingness of men to risk life and limb, when by reason of some accident or other untoward circumstances, structures, machinery or property of any kind were in jeopardy, by rushing to its rescue regardless of the danger. It was also quite obvious that men often took unnecessary, perhaps reckless risks, in the regular course of their work to expedite its accomplishment which otherwise would frequently have added to the cost of same. What I am emphasizing here is not my approval or admiration of such conduct but the evidence of men's willing cooperation notwithstanding the danger and resulting physical penalties.

Under the then existing law, drawn largely in the interest of the employer, the defense of contributory negligence and the act of a fellow workman were usually adequate to deprive a workman of any redress for accidents sustained by him.

In view of my observations just presented this seemed a rank injustice and led me and my associates to abandon the carrying of liability insurance when in connection with a contract for ballasting the Lehigh Valley Railroad, we entered into the crushed stone business about thirty years ago. We set up a reserve approximately equal to the insurance premiums and paid the men from this reserve for their expenses and lost time resulting from accidents on the theory that a business ought to be charged with this expense and not the men themselves. Parenthetically, this was of course the grounds for the passage of the later Workmen's Compensation Acts.

Whether as the result of this policy of intended justice and fairness or not, it is interesting to note that we have never had but one lawsuit with any of our employees as the result of an accident and that one we won.

As a further evidence of added and growing interest in our men some ten years ago, we inaugurated a profit sharing system through which our men ratably benefit in our success.

Moved by a continued regard for the well being of our men, a few years ago we effected a plan of group insurance carrying from \$500 to \$1500 per capita according to a wage classification and paid for by the Company, further increased by a plan which is partly paid for by the men themselves. This group insurance now amounts to nearly \$1,000,000.

The purpose of reciting these acts of modest generosity or enlightened selfishness as they may appear is not to exploit our virtues but to point out that notwithstanding a fairly well advanced theory of the relationship of employer to employee during all these thirty years, not until within the last three or four, did we even give any study or analysis to a definite policy of systematic safety from a humane or economic standpoint. We really gave little thought as to how and why accidents might and should be avoided. It was to the persistent efforts of those interested in the National Safety Council which awakened our vision to the fact that we were overlooking a matter of great importance which was doubtless quickened by our recent adoption of the plan of self-insurance instead of through the various insurance companies otherwise required by law.

We began a thorough study and research in this movement with the result that we formed a definite organization charged with the responsibility of carrying these theories into practice.

This plan consists of a general committee made up of the executives and assistants in the main office together with a new officer entitled Supervisor of Insurance and Safety. At each plant is established a committee with the superin-

tendent as chairman. These plant committees meet frequently to confer with the main office committee and also locally to discuss practices and plans. At some plants they meet in the evening to avoid distraction by their current duties, being allowed their regular hourly rate of pay as though at their regular jobs. This has the effect of making the men take the purpose more seriously and thoughtfully.

Of course, one of the greatest difficulties is impressing the men with the seriousness and importance of the work. Their first reaction is that they can take care of themselves and resent the suggestion of a nurse's solicitude for their welfare. Upstanding two-fisted men like to take a chance, they like the dramatic, the sensational and as I have already observed there is an instinctive impulse to do the helpful thing regardless of danger to themselves.

However, the appeal to them that the idea is not born of a maudlin sentimentalism, but on the one hand to avoid suffering and loss to them and their families and on the other hand the loss to the company through the displacement of a skilled or trained employee, the direct expense of the accident through compensation and the indirect loss due to stoppage of work and demoralization of other employees.

One method of arousing and holding the interest of the men is posting on a conspicuous bulletin board the striking posters of the National Safety Council. In order to further attract the men to these posters we have subscribed to a news service which gives the latest information as to events most likely to interest men of our class, similarly posted on the bulletin board. By their inspection of the lessons borne home to them by these posters, they are influenced by the injunction of the Pennsylvania Supreme Court to "Stop-Look-Listen."

It is but a step to further impress upon the employees the necessity and desirability of prevention of accidents to machinery and property as well as to the life and limb.

The constant dwelling by the committees on all phases of these questions develops in them secondary ideas such as neatness, order and forethought. It results in a place for every thing and every thing in its place. As leaders learn, others follow. The best way to learn is to teach.

Neatness reduces fire hazards by the practice of gathering up inflammable material and having a safe place to dispose of it. Cleanliness of machinery often discloses latent weaknesses which otherwise is only ascertained by a breakdown.

A questionnaire to our superintendents as to the effect of the movement, discloses in their judgment a distinct improvement in the morale of their men, a greater interest in their work and many resulting economies.

As one of them expressed it, they have all come to realize that a trained man on the pay roll was a lot more valuable than on a compensation list.

There is a growing and increasing belief by the men that the company is really interested in their welfare, not sentimentally or piously but sensibly and wisely.

It is interesting to note that in the Safety competition inaugurated by *The Explosives Engineer* under the auspices of the United States Bureau of Mines for such quarries in the membership of the National Crushed Stone Association as entered the contest, our White Haven plant won that trophy for 1927, not having had a lost time accident for eighteen months. Our Winchester plant during July had only forty-five minutes lost time as the result of accidents of any nature whatever, men or machinery which is an admirable record in our experience.

I can not reduce to dollars the resultant benefits of this intensive safety movement on our part but I believe it is no exaggeration to say it has effected a saving of ten per cent in our operating expenses and thirty per cent in our accident expense.

The movement is humane, economical and profoundly wise from any point of view and speaks well for the vision, labor and persistence of those pioneers of the National Safety Council in so earnestly keeping at it until it has become impressed upon most executives as a necessity to industrial progress.

fact, I don't know of any case where it has been done that way. I don't think that that is always the way to approach safety in any aspect, whether it be goggles or any other line of work.

The work which I have done on the Technical Committee of the Bureau of Standards in Washington has put me in contact with many different types of goggles. And about the first thing I would say is—fit the man with goggles. It is very important that the goggles be comfortable; and that comfort may be influenced by the length of his eyelashes, the width of his temples, the distance between his ears and eyes, if he uses the temple type, or simply the fact that you have given him goggles with the head band tightened up. The goggles should be fitted to the man. If you use the eye cup type of goggle, which I believe is the type best fitted to quarry conditions, give it to the man with the head band relaxed, and he will tighten it himself to the right tension so that it will not hurt him; and the result is that it is comfortable.

A great deal of trouble is experienced with men who think they can't see through goggles, that they must be able to see through the side of their screen in some way. Those of us who wear glasses know that if you want to see something you turn your head and look at it. And after a man has worn goggles for a period of, say, a week, he becomes used to them and will forget about those side screens.

And another thing which I am glad to have a chance to present to you is that you men in a leadership capacity should wear goggles when you go on the job in places where you expect your men to wear goggles. Your eyes are just as valuable to your company. Therefore, as protection to your eyes you should wear goggles; and also as an example to your men you should wear goggles; as a representative of your company's policy, you should wear goggles.

Now if you are going to go out and wear goggles you want to put on those goggles a preparation which is variously known as "Anti-Sweat Pencil," "No-Mist," or "No-Sweat"; it is all the same, a glycerine soap. Rub it on the goggles, on the inside and on the outside. Rub it off dry with a clean rag and the goggles will not mist up for a period of four to five hours under ordinary circumstances. If you are a man who perspires very freely, you may need a sweatband to keep the perspiration from running down inside the goggles. But that is the exception and can be determined by examination of the men.

Another important thing is to see how good your men's eyesight is. Men have accidents due to defects in vision, which they do not suspect. In my own case I qualified as a sharpshooter and thought I could see pretty well; I took the examination as locomotive fireman and the examiner told me that I would have to have glasses. And the same way with some of your men, perhaps they need glasses and don't know it. If they do, they should have prescription goggles. That may sound like a lot of expense. I don't say that all of your men need prescription goggles. The definite work they do will determine whether it is logical for them to have prescription goggles or not. I have a pair which I have used for years, and they have saved my eyes.

The chairman spoke of a pair of goggles being brought in with just so much left of them. If that goggle was broken in the prevention of an accident, certainly you can afford to buy that man another pair of goggles. It has probably paid for all the goggles you have in your plant; and I know of many cases where that has happened.

I had a personal experience, occurring in my railroad connection, where I went into a shop and found a man working under a car with his goggles over his forehead; they were not protecting his eyes, and I told the foreman I thought he ought to have them on. The foreman told him to put them on and he did so. As a result of that visit he was wearing them two weeks later when his goggles were struck by a flying rivet and the lens broken. And I got a very nice letter

telling me that while my name didn't appear in the report which was the basis of a safety bulletin throughout the shops and later throughout the entire Pennsylvania System, that I had saved that man's eye. That satisfaction will never be taken away from me, and I am going to tell everybody I know about it, because if you ever have the same experience, it will pay you in things you can't measure in dollars and cents.

J. R. DAVIS (U. S. Gypsum Co., Chicago, Ill.): I want to say that I agree with everything Mr. Chapin has said, but I also agree with what Mr. Souder has said. I have fitted men with prescription goggles and I have worn goggles out about the plant as an example, and I find that sort of work and that sort of approach to the problem will probably touch 90 per cent of your men. But the other ten per cent are not touched that way, and it takes a little of the old strong arm discipline, the method Mr. Souder mentioned, to make those fellows understand that they must wear goggles.

R. P. BLAKE (Independence Bureau, Philadelphia, Pa.): I view accident prevention work as you would view any major activity in your business. Now the plant executive, giving any orders to any of his men, covering any of their ordinary work, if he found any man persistently refused to obey those orders he wouldn't think of anything but firing him. You can persuade 90 or 95 per cent of your men to obey reasonable safety requirements, but the other five per cent require strong arm methods. I think many people fail in thinking that they should never use discipline in safety.

R. E. COLVILLE (U. S. Gypsum Company, Chicago, Ill.): There is only one point that I want to add to this, and that is about that brought out by Mr. Blake. He mentions any reasonable suggestion or requirement, and that is very important. We have had men come into our plants, so-called safety engineers, who want every man in the quarry to wear goggles, and that may not sound extreme, but in some cases it is. So don't ask a man to do something that is unreasonable and not necessary. We want to prevent every accident which we can conceive of, but we don't want to waste their time or ruin our chances of their cooperation. So be reasonable. Tell them only what they need to do, and then force it through with a little strong arm stuff, if it is necessary.

Safety Success Comes from Organized Effort

N. S. GREENSFELDER (Hercules Powder Co., Wilmington, Delaware): One thing that has impressed me in my observations, particularly in connection with the national safety competition which started about four or five years ago and is conducted now by the U. S. Bureau of Mines, is that success in safety is largely the result of organized effort. Mr. Rice said that the organized effort in his company is something of comparatively recent date, and I think in the crushed stone industry in general the organized effort is a number of years behind that in other industries. But if you will examine the records in the Bureau of Mines, reports on the national safety competition, you will see that without exception the companies that are making the best records are those who have been well organized on safety for a number of years, and in practically all industries these belong to industries with associations that have been thoroughly organized on safety.

Take the Portland Cement Association, which perhaps comes nearest to this industry in the type of its operations. I think you are all familiar with what they have done in their organization. It seems to me that the safety work is the thing they devote most of their attention to. It is the thing that the man on the outside hears most about. During this last year they have been holding safety meetings in all parts of the country where there are cement quarries, and I have attended some of them. I am sure they are productive of a lot of good. That is one evidence of what they are doing in an organized way.

Recently I received a letter from your chairman, stating his opinion that the crushed stone industry should have some one who was devoting at least a part of his time to safety matters, and to my mind that would be one way of increasing the results that have already been started. Because it takes some one to direct the organized effort in the crushed stone industry. We have a few companies that are outstanding examples of it—Mr. Rice's company and Mr. Souder's company, and some others, that are really well organized. But I think the majority of the quarries need a little string and stimulation, somebody telling them and showing them how to do these things to get results throughout the entire industry. I believe such a step would be well worth while.

MR. COLVILLE: Just in that connection, Mr. Greenfielder, it is planned next year that the Quarry Section will have a very close tie-up with these various associations, the State Association, the Tile Association, the Sand and Gravel and Crushed Stone. Mr. Boyd is secretary of the Quarry Section and secretary of the National Crushed Stone Association, and that is a mighty fine thought. I think that in the past the Quarry Section has not given individual attention to the divisions of the quarry industry, and that is one thing we want to try and work out.

CHAIRMAN SOUDER: What is the John T. Dyer Quarry Co. doing in this accident prevention?

Reducing the Total of Lost Time

H. H. ESCHELMAN (John T. Dyer Quarry Co., Norristown, Pa.): I believe we have reduced our accidents somewhat in the past two years. In 1927 we had 41 accidents and two compensation cases—that is, those were lost time accidents. In 1928 so far we have had 22 accidents, and two lost time accidents; out of that, 22 were minor accidents, eye cases. But since we started goggles, in 1927 we had 142 minor eye cases and in 1928, we had 22; we lay that to goggles. Other than that I think our safety organization is getting along well there and doing good work.

CHAIRMAN SOUDER: How do you do it?

MR. ESCHELMAN: We give each and every man a pair of glasses or goggles whether he wants them or not. When he is hired he gets a pair of goggles. Some of them carry them in their pockets, some of them wear them, but they carry them at all times. If they are moving around from place to place, on windy days—that is our worst condition, blowing dust and chips and so forth—they wear the goggles. Other days it isn't necessary to wear them. We don't have to force them when they need to wear them; they seem to take right to it.

DR. E. M. PARLETT (Pittsburgh Limestone Co., Newcastle, Pa.): One manner of educating the men to wear goggles is to make up a photographic bulletin of every pair of goggles that has been fractured on the job. We do that, and at the end of the year we make a composite photograph of all those men, giving their names and the plant in which they work. This, of course, is posted on the bulletin boards around the respective plants. Now, for instance, last year there were 26 eyes saved, and here are the names. These bulletins stay up for a period of three weeks, and then are put up again at the expiration of three months. I don't think anything in the world has such a personal appeal as a bulletin of photographs of that sort. Everybody at the plant knows this particular man, and they talk it over with him, and I think it makes a wonderful exhibit. We don't have the slightest trouble in getting our men to wear goggles.

QUESTION: Do you do that only as regards eye accidents?

DR. PARLETT: No, we show the right and the wrong way as regards other accidents, as well, but the eye problem is handled in this manner. All of our men wear goggles around their necks all the time.

W. C. BRYANT (Hartford Accident & Indemnity Company, Hartford, Conn.): It might be interesting to know that I had a test made of goggles in three quarries, covered by our company, just recently, and in two of the quarries they selected a cup type of goggle, and in the third quarry, where they employ about 75 men in the quarry alone, they tested it out with five or six men, and the test is now going on, and those five or six men selected a sandre goggle. Now in the other two quarries they have selected the cup goggle, and they have been ordered, and in one of these quarries they are asking for the goggles, wanting to know when they are going to get them.

The Group Accident and Sickness Plan

MR. COLVILLE: Did you fellows ever see the operation of a group of accident and sickness insurance plan? The way it works out is something like this—when you try to show the advantages to your men there are always a lot who don't believe in insurance; their fathers never had any so they don't want it. But you get a lot of them to enter into it and there are a few left. If you wait a month or so until the cold weather sets in and a few fellows get colds or appendicitis, or are off from work, where there is a group accident or sickness plan in force, then you ought to see the fellows climb on the band wagon. When they see the benefits of the plan they want to be in on it.

Now the same thing is true with Dr. Parlett's thought on goggles, I think. A lot of this is in selling your stuff. You are talking to a bunch of men who have to be sold on this idea. You may sell them in various ways, through appealing to their emotions or possibly through fear of discharge, but anyhow you have got a message and a sale to make.

Now the easiest way that we get our thoughts is through our eyes. I don't know the percentage, but a large percentage of what we learn is through our eyes; a small percentage is through our ears and the rest through other senses. So I think this is a splendid thought you have got there, Doctor, and why not give it a little publicity? I think Dr. Parlett's idea can well be adopted by all of us. It is not expensive to do that; you can do it by drawings or get a snapshot of the man and place it on your bulletin board; but make use of it. There is no use of having accident statistics unless you use them, and I commend that to every man here.

Absence of Goggles Cost an Accident

C. L. HAAS (Coplay Cement Co., Coplay, Pa.): I have been safety manager of our plant for the past two years. Last year we had a little argument on glasses. It was on a riveting job. The rivet heater thought he would do a favor for the bucker-up and try to see if this rivet was up. He looked up and received a scale in his eye, coming from the rivet. And as a result we had quite an argument over the men in the air not wearing goggles. I would like to know if any member here can give me some information about that, when the men are working in the air and are rather nervous about wearing goggles.

CHAIRMAN SOUDER: On the answer to that question, we will give you boys a chance to think it over, and will go on to the next speaker. Now our next speaker has been very faithful to the Quarry Section. He at one time was working in the largest lime plant in the world, at Genoa, Ohio. He took an active part in the welfare of his men and was picked at that plant to lead the men in safety. From that step, he is now Assistant to the Vice President, in Charge of Operations, of the U. S. Gypsum Company. I now take pleasure in introducing Mr. J. R. Davis, of the U. S. Gypsum Company.

Practical Accident Prevention

By J. R. DAVIS

Assistant to Vice President in Charge of Operations,
United States Gypsum Company, Chicago

Last year at the A. B. C. session of the National Safety Congress, which many of you doubtless attended, Mr. Colville, manager of the insurance department of our company, read a letter written by Mr. Knode, our vice-president, announcing a new plan of accident prevention. The plan was, in substance, that the United States Gypsum Company would cut the red tape of accident prevention; that we would stop *asking* our men to work safely, and *demand* that they work safely; or in other words, that we would become "hard boiled" in the matter of safety.

The reaction to this letter, by those attending the A. B. C. session, was varied. One or two of those present reacted favorably, but the majority felt that the plan was too drastic to achieve the results desired. The plan, however, was put into effect; and today I want to discuss the reasoning that led to its adoption, in the hope that our experience may be of benefit to others who find themselves in a similar situation.

A year and a half ago the United States Gypsum Company was practicing all the conventional ideas of accident prevention. We had safety-committees, gave safety prizes, gave safety dinners, conducted no-accident campaigns, held safety rallies, etc. Despite these efforts we were confronted with steadily mounting accident costs, and an alarming list of fatalities. Mr. Knode, our vice-president, was the only one among us who saw clearly the cause and the remedy, and it was his clarity of vision that developed the plan announced at the A. B. C. meeting last Autumn.

This plan has produced results; and I expect as I have said, to show you that sound reasoning led to its adoption, and that, in our case at least, the decision to adopt it was the right one.

Accident Prevention Like Life

Accident prevention, looked at in one way, is like life. Some succeed in life; others do not. Some succeed in preventing accidents; others do not. The sound preparation for success in life is education, acquired either in institutions of higher learning or in the school of experience. Education by itself does not bring success. But education, plus application, plus the desire for success, inevitably brings success. The same chain, education, effort and desire, prevents accidents. In other words, education as to the causes of accidents and the manner in which accidents can be avoided, plus the application of that education, plus the desire to avoid accidents, brings success in accident prevention.

It appears to us of the United States Gypsum Company that the greater part of the safety work we have done in the past has been educational. Now we are applying the education. And we make the utilization of the education compulsory. No longer do we tell employees that they *should* wear goggles, or that they *should* shut down machinery that is to be oiled, because education and experience have taught them that these things *should* be done. We tell employees that they *must* wear goggles, and that they *must* shut down machinery that is to be oiled; that if they fail to do these things their jobs will be in jeopardy.

And to some of you here today that attitude may seem an about-face from me, for a year ago I told you that safety primarily is a sales problem, that the idea of safety must be *sold* to employees. I still believe that the idea of

safety must be sold or, in other words, I believe that employees must be educated to the importance of safety. Our experience, however, indicated that education reached 90 to 95 per cent of the men and was voluntarily accepted by them, but it was the other 5 or 10 per cent who simply would not accept it that was ruining our accident record and raising our costs. For this reason we changed our policy to one of compulsion and demand that they apply their knowledge of safety or suffer the consequences.

Application of a Common Principle

The statements I have made may sound radical. Actually they are not. All of you gentlemen apply the principle described in your everyday affairs. Experience has taught you, for example, that a crusher must be started before rock is fed into it. Suppose one of your workmen dumped rock into a crusher and then tried to start it. The result would be one or two hours of operating time lost, due to the necessity of cleaning out the plug-up. What would you do to such a man? You would reprimand him or fire him on the spot.

Suppose again that you had planned a shot in your quarry, and had left instructions as to how the shot should be loaded. Suppose the shot to be a failure that delayed operations and piled up expense. In investigating the cause of the poor shot you find that it had been loaded contrary to your instructions, because some person thought it didn't make much difference how the charge was placed. What would happen to that person? He'd be severely reprimanded or fired; and neither reprimand or discharge would strike you as particularly radical.

But if some workman violates a safety rule, and is laid off, or fired, in consequence, the action is considered radical, or "hard boiled." Why should it be? It is no more than the application of the same discipline to the matter of safety as is applied to costs, quality and numbers of other things connected with manufacturing. You discharge a workman who wastes your money or time. Certainly a careless workman wastes both. And certainly a workman discharged for violating a safety rule is an example to other workmen.

Now let's see if comparable discipline is applied in your own home—and applied to a problem of domestic safety. The example I am to cite will not be within the personal experience of all of you gentlemen, but it will be near enough to personal experience to bring home my point.

Let's say each of you lives near a river; and let's say that each of you has a small son. The river you regard as dangerous. The son you regard as precious. On a certain night the young man comes home with wet hair. You ask him how he got his hair wet. He tries to evade a direct answer, but you finally drag out of him the confession that he has been swimming in the river. Immediately you are alarmed for his safety. By reason and persuasion you attempt to convince him that the river is dangerous, and that he should not go swimming in it again. A week passes, and again you discover your son with wet hair, and again he confesses, reluctantly, that he has been swimming in the river. You repeat your arguments; he promises to respect your wishes. Another week passes, and once more you find the boy with wet hair, and once more you extract the confession that he has been swimming in the river. What do you do? Do you again reason with the boy. Hardly. Convinced that reason and persuasion are of no service, you take the boy to the wood shed; and there you discipline him—with a strap.

Are you acting differently then, than we act when we discharge a man who violates a rule of safety? Are you dispensing a different brand of justice?

After all, accident prevention simply is good business, as discipline is good business. And the plant wherein discipline is maintained not only will be a safe plant, so far as accidents are concerned, but in virtually every instance will be a plant

wherein manufacturing costs are low, quality is high, and "housekeeping" is efficient.

What Are Accident Costs?

Webster defines mining as "the art of extracting ore from the ground at a profit." Quarrying is open pit mining. If we are good miners, market conditions being favorable, we make a profit, largely by keeping our costs down. Accidents are an item of cost; and if we attempt to operate without an accurate knowledge of cost of accidents, we fail, in part, at our jobs.

But what are accident costs? Are they solely the money paid in premiums for compensation insurance? We don't think so. In our case we compute costs of accidents, not only by the premiums we pay, but by money spent on hospital bills, doctor bills and compensation actually paid to the injured man or his family. These figures we compare with our past costs in the same manner that we compare operating expenses and profits with the past. And it was this comparison of accident costs, on the basis just described, that led us to abandon the more sentimental policy of accident prevention by wheedling and persuasion, and to substitute for it the clean-cut policy of individual responsibility of each workman to observe the safety rules that we make.

And I might point out, that if you find compensation rates high, the best way to force them lower is to reduce the number of accidents in your plants.

Results of the New Plan

As I have already said, the plan of making the individual workman responsible for his own safety has been in operation for approximately a year. You want to know the results, of course. Before I give them to you, however, I am going to read to you a letter, written by one of our works managers who was quick to grasp the significance of the plan. This man has had much experience in mill operation and his point of view is more practical than literary. So disregard an occasional violation of the rules of syntax and grammar; and heed the meat of his remarks. Here is what he said:

"I have your letter setting forth our safety record for the year to date. This report is disheartening, and after all you have done to promote safety, the facts must be a keen disappointment to you....

"I have read the letter many times, and in the following letter I have tried to analyze it from two view points. Though I may not have succeeded in my analysis, I have, at least, set forth my true thoughts, and expressed my attitude.

"Under the present plan we try to promote safety by appealing to our workmen, the strongest note in this appeal being that we are seeking safety for them. We invite them to serve on our safety committees, ask their advice as to how we can better conditions, try by means of bulletins, movies, literature, and 'silver-tongued' orators to show them the errors of their ways, and the heart breaks, wants, and suffering that is caused by accidents.

"We make personal appeals to our workmen, begging them for the sake of their loved ones to work carefully and not get hurt, and as a net result of the time and money spent we have a mounting accident cost, and workmen whom we have not only failed to convince that safety paid dividends, but that we were even sincere in our purpose.

"Now, it is very evident that we have failed. Why? I can only give my opinion, and that is, that there has been too much division of authority, or rather, no authority, and too many uninterested men on our safety committees.

"The plant managers put safety work up to safety supervisors, who pass it on to the different committees and foremen. The safety supervisors have their routine inspections and meetings, and consider the work done when they have

turned in the regular number of suggestions concerning guards and defective equipment, should they be able to know what defective equipment was.

"These reports are all nicely typewritten, and presented to the works managers. And as there are a lot of them, and as he has a number of trusted employees on the committees, he assumes that his plant is as safe as a nursery, and that all his employees are true disciples of safety. Then there is an accident, but no one is to blame. The required number of men have been on the committees. The inspections have all been made on the day and date set. Meetings have all been called to order at the specified time. The minutes and records are all complete. The safety supervisors have done their duty in a routine manner, and have complied with all rules as set forth in the safety bulletin governing the plant safety organization. This done, why should they be to blame for an accident. They all are sorry of course, and express their sympathy in different ways. By sending flowers, or, if necessary, by taking up a collection. This done, their interest, which was first aroused at the time of the accident, stops, and the accident is something that just happened, and happened because we had a safety man in the office reading up on improved safety methods written by a man also sitting in an office; because we had a committee of foremen who served on the committee only because they had to and whose minds were more concerned regarding the quality of a certain product, or the production of a certain machine than they were concerning the inspection they were making, and whose idea of safety was to run in as many suggestions as possible regardless of their value; because we had a committee of workmen, who, believing that we were not sincere in our efforts, were not sincere themselves, but as they had to do something, turned in a lot of recommendations, the chief value of which was to take up the stenographer's time in writing them. This being the cause, the remedy would be:

Character of the Safety Supervisor

"First, a safety supervisor who knew what he was required to do, and had the authority to do it. In a small plant this would be the superintendent, and in a large plant the assistant works manager, for it is just as essential to have someone with authority in charge of safety as it is to have someone with authority in charge of quality or production. In fact the three are so closely related that they should come under one head.

"This supervisor, whoever he would be, would have as his only assistant a man who would keep records necessary to carry on the work. These records should be a true statement of conditions, and not records that lead to the belief that we were making progress when we were not; and should include records of the men, who as far as the workmen are concerned, are the company: the department heads, foremen and the key men on whom the success of the safety movement depends. These men were chosen as foremen, etc., because they were above the average and able to lead, and do lead in everything but safety. In safety, however, we have a division of authority, and, as stated before, a safety supervisor with ideals that do not fit conditions, a foremen's committee, which knowing that they are not held responsible, have no interest other than to get their inspections done and to get back to the job for which they are held responsible, and a workmen's committee, the main function of which is to clutter up the joint meeting with numerous and worthless suggestions, but which must be taken up and disposed of in a manner will not offend them. It is true that it is a part of this committee's duties to interest their fellow workmen in the safety-first idea, and to caution them whenever they resort to unsafe or unsanitary practices. But it is not done. And as I see it, it can not be done. When men are not sincere they can not be convincing.

"Second, as they have no authority they can only suggest.

"Third, as the workman lifting on one end of a board considers himself just as good as the man on the other end, and will resent anything he may say regarding his habits or practices, many workmen resent safety warnings.

"Fourth, the average workman, whether he be a high priced mechanic or a common laborer, has no use for tale bearers, and though he may know of unsafe practices will not report them. The only way such practices can be found out is through the foreman, and as he would be responsible for the safe operation of his department, he would have authority to see that unsafe practices or habits be stopped, or he could dismiss the workmen, and when he did, it would be his duty to talk to the man and impress on him that he was being dismissed because he had persisted in doing what the company considered as detrimental to its interests.

"I would, in this way, show our workmen that safety paid, not only by eliminating pain, want, and suffering caused by accidents, but also pain, want, and suffering caused by the careless workmen having no place in industry.

"Safety is an ideal worthy of our best efforts, and it would be sublime if it could be obtained by ideal methods. But if this is not possible, let us strip it of its glamour and make it just what it should be, a cold business proposition, in which all sentiment is left out.

"This will require work by plant managers, work by the department heads and foremen. And the measure of success obtained will be in proportion to their efforts. To me this does not appear as added work, but an opportunity to show you that we can and will, if it is within our power to do it, attain your safety ideal."

(Signed) F. O. GOTCH, Works Manager.

This was the response of a practical operator to Mr. Knode's plan. And the results of his attitude immediately were apparent in his plant. Others, however, did not grasp the vitality of the plan as quickly as he did; and were slow to put it into operation. But August, 1928, the busiest month we have ever had, and one in which we employed many new men, was one of the best months, from the view point of safety, that the United States Gypsum Company has had. And with your permission, I will read details of our August safety record.

YEAR TO DATE

	AUGUST, 1928	1928	1927
Fatal	None	5	6
Permanent total	None	1	2
Disability one or more days.....	16	111	127
Total reportable	65	420	473

In order to better apply the principle of individual responsibility for accidents, we now analyze all accidents by causes, dividing them into personal and impersonal classifications. We further break them down so that the real cause of each accident may be known, and the proper remedies to prevent repetition may be applied. I have a few copies of our method of analysis if anyone wishes one.

In addition to this we require our foremen to send in a complete report of each accident. This report sets forth the circumstances under which the accident occurred, leads up to a conclusion as to the real cause of the accident, and requires a statement as to what action is being taken to prevent a repetition of the accident. The application of our method of analysis to our August accidents gives us the following classifications of causes.

Personal

1. Supervisor	1
Incomplete Instructions	
2. Worker	
A—Mental Deficiency—	
Ignorance	1
Poor Judgment	6
B—Mental Laxity—	
Inattention	40
Non-cooperation—(disobedience of rules)	2
B—Physical Defect—	
Weakness	1
D—Unsafe Practice—	
Clothing (gloves)	1
Haste	2
Short Cuts	3

The point most to be observed in the analysis just presented is that 40 out of 57 accidents were due to inattention or carelessness. Accidents resulting from these causes are the ones we are constantly striving to overcome, for it is these types of accidents that are most frequent and least necessary. It may occur to you that our August record does not show, in preventing these types of accidents success comparable to the enthusiasm with which I have presented our new plan of accident prevention to you. In our plants, however, the percentage of accidents resulting from inattention and carelessness is declining sufficiently to convince us that we are on the right track; to convince us that so soon as all factors concerned in the operation of the plan are thoroughly understood the results will far outstrip anything that we have accomplished in accident prevention in the past.

ACCIDENTS**PERSONAL**

1. Supervisor (Foreman)
 - A. Faulty Instruction
 1. None
 2. Incomplete
 3. Erroneous
 - B. Operations—Improper
 1. Layout of Machinery
 2. Layout of Operations
 3. Layout of Processes
 - C. Poor Discipline
 1. Rules Not Enforced
 2. Horseplay
2. Workman
 - A. Mental Deficiency
 1. Ignorance
 2. Inexperience
 3. Poor Judgment
 - B. Mental Laxities
 1. Excitability
 2. Violent Temper

IMPERSONAL

1. Building Conditions Unsafe
 - A. Fire Protection
 - B. Exits & Openings
 - C. Floors
 - D. Miscellaneous
2. Working Conditions—Improper
 - A. Light
 - B. Sanitation
 - C. Ventilation (Dust)
3. Housekeeping—Poor
 - A. Improper Piling & Storage
 - B. Insufficient Room
4. Equipment—Defective
 - A. Machines
 - B. Tools
 - C. Miscellaneous
5. Hazards—Mechanical, Electrical, Chemical and Steam
 - A. Unguarded
 - B. Ineffectively guarded

- 3. Sluggishness or Fatigue
- 4. Inattention
- 5. Non-Cooperation (disobedience of rules)
- 6. Worry
- C. Physical Deficiency
 - 1. Defects
 - 2. Weakness
 - 3. Fatigue
- D. Unsafe Practice
 - 1. Clothing—Improper, loose, long sleeves, ties, high heels
 - 2. Protection—Improper, no goggles, gloves, masks, shoes, hats, etc.
 - 3. Short Cuts
 - 4. Haste

CHAIRMAN SOUDER: Now, gentlemen, Mr. Davis is willing to give you what information he can on this subject. It is your turn now; he has had his.

R. P. BLAKE (Independence Bureau, Philadelphia, Pa.): Mr. Davis' report is the most encouraging thing I have heard at any meeting, for this reason: As I have already said, I think if you study the record of the work done by any organization that has achieved an excellent accident prevention record, they have done so by making it a major activity. They use the same fundamental methods of plant operation and of organization to achieve that end, as to achieve any other. And from the realization of Mr. Davis' company that that is the way to do it, and the fact that he is getting that way, even though the progress is slow—because you can't change the viewpoint of an organization in a day or a year, particularly a big organization—I think it is most encouraging. It is the most encouraging fact I have heard on the way to get and maintain a high degree of safe operation in a plant.

E. S. CHAPIN (Independence Bureau, Philadelphia, Pa.): The paper described one thing which I also met in my railroad experience, and that was the authority granted to the safety man. I was with a railroad company, and the top, Class One railroad in accident prevention—that is, those reportable to the I. C. C.—was the Union Pacific. We were not the top; and the Union Pacific proceeded to tell us how they got there. They gave more authority to their safety superintendent, whereas we had the title only of supervisor, which means a great deal of difference in the railroad. And he was authorized to stop a man whom he saw doing something which was contrary to the safety rules. He was a man who knew the operating rules intensively; he had come up from the caboose, and he knew the men on the road and he didn't try any frills with them. He knew just exactly what they should do, and he stopped them if he saw them doing the wrong thing. That, perhaps, is a pretty large bundle of authority to give any one man in an organization, but it worked with them.

They had their safety work divided by geographical divisions, and shops. Mr. Carl Gray, their vice-president, noticed that one of the shops was slipping. Whereas the other divisions were lowering their accident rates, this particular shop was rising. Under this organization method he called in the master mechanic and said to him, "Now we have an accident record since the first of January going up in your shop; if that doesn't come down between now and the first of December, I will put a man in there who will bring it down." Well, when the master mechanic got back to the shop he called his foremen together and said, "Now here is what Gray said to me. Now when December comes I am not going to be on the outside looking in; any fellow in this shop who doesn't do the same thing in his department to bring down the accidents is going out first." And they came down in that shop.

Now that is the attitude from the top down to the bottom. It may represent discipline; it may represent influence; it may represent education—all of them in their proper proportions, but it made every important man in that job get his toes in the ground to make his department safer, and the aggregate result was natural.

From some of my earlier remarks you might think that I wouldn't countenance discipline in the case of an infraction of safety rules. I was thinking of what I was planning to say with respect to making goggle wearing easy or attractive for the men, rather than the requirement that they shall wear them or get off the job. There are some men that you cannot deal with in any other way. Fortunately they are in the very great minority.

I know of an organization producing a commodity which is very dusty, just as dusty as any of your crusher plants, and there is a man with a broom sweeping it up all the time. It happens that that dust is poisonous in some respects. It isn't all poisonous, but he keeps the poisonous places clean and the rest at the same time. The superintendent of this plant had occasion to tell his men that he wanted this work of erecting a new shop done without accident, and that they were to be particularly careful not to drop any loads. And two carpenters (I think it was), hoisting a load, did not have it properly secured and it was established that one had made the hoist and the other had given the signal to raise it, knowing the condition of the load. It was dropped, knocked the scaffold from under two steel workers, and only by their agility in clinging to the girders, did they escape a fall of 30 feet onto the debris below. The carpenters were fired.

Now that plant was not over supplied with labor and they were in the midst of a busy construction program. The carpenters were old employees, but they were fired, and it has had the most wonderful effect upon the workers in that plant. The superintendent did not fire them without, you might say, a court, which was participated in by the heads of departments. All of the sides of the case were thoroughly considered and it was no hasty action. The men in the plant knew just why those men were fired.

MR. DAVIS: I would like to add one thing to what I said. If any of you are new in the safety business, haven't tried safety work before, and are just branching out into it, I would advise you, although we have discontinued committees, I would advise the use of committees up to a certain point. All of those things are very, very valuable from an educational standpoint, but their value exists only for a certain length of time. I would hate to have any of you carry away the impression that you can go right back to your plant and start in, without any education, on a hard-boiled program. The education side is absolutely necessary and by means of committees and rallies and safety talks you can build up that education to the point where, when your men have the knowledge of that which they should do, you can demand that they do it.

G. S. GELSTON (Travelers Insurance Co., New York City): In investigating an accident, do you include the question—What, in your opinion, could be done to prevent a recurrence of this accident?

MR. COLVILLE: We ask for the circumstances attending the accident, the way the accident happened, about the injury itself, and then at the bottom there is a place which is supposed to be an analysis. It shows what is the actual cause of the accident. We give as the cause of the accident—a man may have been asleep, or tired, or he didn't think, careless—what we call the actual cause of the accident. And the foreman must add that to his report. Then right below that is a space for the remedy or corrective measure which was taken, and that must be filled in. The bulletin which was sent out to announce this plan, also announced that no reports would be accepted incomplete; if they are incomplete we send them back to the plant. In other words, it forces the foreman to investigate the cause and think out what should have been done. Of course there are

some cases where it is hard to apply a remedy, where a man has had limited experience.

WALTER J. WOOD (U. S. Gypsum Co., Chicago, Ill.): I don't know whether Mr. Colville or Mr. Davis ever had a chance to analyze our August report of discipline that we sent in from the New Brighton plant, but I would like to say to you gentlemen that we had a two per cent turnover during the month of August, due to discipline, a very appalling figure. Out of a force of possibly 500 men we were forced to discipline 12 men in the month of August.

MR. COLVILLE: That may have been a lay-off for two or three days, although some are discharges. Our thought is this, that a man should first be told what is the right thing, and then he should have some further explanation. Maybe the foreman sets the example and gives him more details, but if those measures fail, then some discipline should be applied. It may be, in the first case, only a warning, where the man is insufficiently informed or where he has just not thought.

JOHN W. DORSEY (Solvay Process Co., Syracuse, N. Y.): Under this new system of accident prevention what are the provisions for educating the new men?

MR. DAVIS: We follow education chiefly by means of bulletins and instruction. The means of education vary in different plants. Some plants have a card with various safety rules which a man is required to learn and return to his foreman, or to inform his foreman that he is familiar with all of those provisions. Also, by means of personal instruction by the foreman, by bulletins and by lists of safety rules.

DR. PARLETT: I think a good plan in these cases of accident, and which would include men who are disciplined, would be to have them appear before the next safety committee meeting and explain the case. We do that and find that it has had a very successful outcome. Naturally, the men don't like to be there, but it makes quite an impression on the safety committee and the general rank and file.

MR. CHAPIN: Along the same line, I know of a division on the railroad with which I was connected which did that same thing. They had the man there, if possible, who was hurt. But they had his foreman there too, and the safety committee asked the foreman questions. One of the foremen told me that he would a good deal rather go on the carpet in the superintendent's office than before the safety committee, because, as he expressed it, "Those fellows can certainly ask you questions that are embarrassing if you don't know how and why that accident happened." Certainly that is a feature of safety work which can be used to advantage, and I think we are here today to get all the features we can.

MR. COLVILLE: Another word of explanation may be in order, regarding our discipline. We don't wait until a man gets his arm cut off and then fire him; that isn't our thought. The idea is to prevent the accident. Mr. Davis read of one case where the responsibility lay on the foreman, insufficient instruction, I believe, was the way it was given to you. Well, a man wouldn't be disciplined for that.

The thought is that there are three places where discipline can be given. One, is improper working conditions, or something wrong with your building construction for which a man cannot be held responsible. That means a remedy in the condition in whatever way you can do it. That is the management's discipline, you might say. The second point is the supervisor or the foreman—that means insufficient instruction. He may have given incomplete instructions. Maybe he doesn't enforce rules. Now the enforcement of rules is just as much a part of the foreman's job as it is getting quality or getting good costs. So I wanted to make that clear, because you may think that the Gypsum Company waits until a

man gets killed and then fires him. The thought is that we are trying to put it where it will do the most good.

CHAIRMAN SOUDER: Our next subject that we take up here is the election of officers. The nominating committee has a slate for your approval or disapproval. Mr. Boyd will take care of that.

Report of Nominating Committee

SECRETARY BOYD: Gentlemen: Mr. Evans and Mr. Cartwright, the two members of the Nominating Committee, were both unable to be present at this meeting, and consequently I will have to read their choice for the officers for the coming year:

CHAIRMAN—R. E. Colville, Manager of the Insurance Department of the United States Gypsum Company, Chicago, Illinois.

Vice-Chairman, and Chairman of the Engineering Committee—F. F. McLaughlin, Rock-Cut Stone Company, Syracuse, New York.

Secretary and News Letter Editor—J. R. Boyd, Secretary, National Crushed Stone Association, Washington, D. C.

Chairman of the Poster and Slide Committee—H. F. Yotter, Supervisor of Insurance and Safety, The General Crushed Stone Company, Easton, Pa.

Chairman of the Membership Committee—D. C. Souder, Director Insurance and Safety, The France Stone Co., Toledo, Ohio.

Chairman of the Statistics Committee—W. W. Adams, Supervising Statistician, Bureau of Mines, Washington, D. C.

Now in addition to the officers just read, the Executive Committee will be composed of those officers and the following: N. S. Greensfelder, Editor, "Explosives Engineer," Hercules Powder Company, Wilmington, Delaware; A. J. R. Curtis, Secretary, Portland Cement Association, Chicago, Ill.; Otho M. Graves, President, National Crushed Stone Association, Vice-President and General Manager of General Crushed Stone Co., Easton, Pa.; Warren Hayes, Secretary, National Slate Association, Washington, D. C.; and V. P. Ahearn, Secretary, National Sand and Gravel Association, Washington, D. C.

CHAIRMAN SOUDER: You have heard the report of the Nominating Committee. Are there any objections before we proceed? All in favor of the report of the Nominating Committee, as read, please raise your right hands.

(The slate was unanimously adopted.)

CHAIRMAN SOUDER: We now have a disappointment for you. Our dear friend, F. F. McLaughlin, is not with us, and as I have had occasion to work with Mac for a number of years, I wanted him to be here, because you can say a lot of things to him and he likes it. But he was good enough to telegraph his speech and Mr. Boyd will read that. He could have come down here from Syracuse cheaper than sending that, I believe.

(Secretary Boyd read the following telegram from F. F. McLaughlin, Syracuse, New York, on the subject, "Getting Tonnage With Safety," as follows:)

Telegram from F. F. McLaughlin

Best and envious regards to those in Quarry Section meeting. Unavoidably detained from attendance. Here is my paper on "Tonnage with Safety."

Success in human enterprise depends on intelligent human leadership. I believe in the necessary mechanics of safety work such as plans, committees, safeguards,

first aid, and all the various ways and means that are guides of action to produce accident prevention.

But quarry safety rules and machine guards are effective only when it is the spirit of our men to observe their use. Safety rules will not enforce themselves nor a removed machine guard replace itself. The spirit of observance can be had from most of our men by driving or by the better way of leading. Only he is fit to lead who has fitted himself for following.

Accident prevention is humanitarian progress and requires applied dynamic sincerity in its leadership. Observation of a number of safety efforts has convinced me that the most perfectly laid plan for safety is but as a house on shifting sands until laid on the foundation of a sincere man's leadership. When the choice lies with themselves our employees will follow a man who is sincere enough to practice what he teaches.

I well remember when we listened to J. R. Davis tell of plans he used to create extremely satisfactory safety records in a quarry in Ohio, of which he was the superintendent. His talk was full of the details of his plans, but the main thing I saw was the manner in which the man himself was absorbed in his effort on behalf of his men. In itself this sincerity invited the hearty cooperation of his men, no matter if the details of his plans were sane or otherwise.

Men put their faith and following in a man, not in a plan.

We all join in congratulations to the men of the White Haven plant of the General Crushed Stone Company upon their attainment of first place for the 1927 "Explosives Engineer" award for safety. Mr. John Rice, the president of this company, who is in this meeting with you, will probably testify that positive active sincerity was the foundation under the effort that secured this fine result.

Do you men honestly want safety with your tonnage? Are you willing to pay the personal price to get it? Then think straight, like your men; be the kind of a man you want your men to be. Be a leader for your men fit to be followed, and it will follow slowly but surely that most of your men will willingly engage with you in the attempt to attain the highest standard you can set for safety or tonnage or both.

ROCK CUT STONE CO.,

F. F. McLAUGHLIN, General Superintendent.

CHAIRMAN SOUDER: Now, gentlemen, we are still ready for some discussion. I will say for Mac that he had a very good record, when he was with our company, in the handling and use of explosives. He never had an accident over a period of 11 years, 1916 to 1927. We feel that that is a remarkable record. He is not with us now and our company hopes that he continues his good record with his new connection.

MR. CHAPIN: I was on my feet before in connection with Mr. Davis' paper, but remarks made after I spoke made me think of another case.

In Pennsylvania one of the steel companies makes investigations of near accidents and they impose discipline for near accidents where they might not impose discipline for an actual accident, because they feel, in an actual accident, that the man who may be at fault has been injured and to that extent has been disciplined. But in the near accident, which might just as well have caused the same kind of an injury, the blame can be more equitably placed, and it may prevent a real accident later on. It is just going one step beyond the recurrence of this accident. It is getting the recurrence before the accident happens, and in that way it is good accident prevention.

The question of diagramming or picturing accidents that have happened has been touched upon, the goggle illustrations were shown, and there again there is room for making the men think—did I ever do that thing myself? Have I ever taken that same chance? And that brings it home to them. I think this Section is to

be congratulated on the papers presented this morning. I know. I have enjoyed them and I certainly wish to all of you, success in your efforts.

CHAIRMAN SOUDER: Mr. Graves, can't you say a word at this time to the Quarry Section of the National Safety Council?

O. M. GRAVES (General Crushed Stone Co., Easton, Pa.): I was extremely interested in what Mr. Davis had to say. To my mind, the letter from that works manager was the most severe arraignment of our present procedure that I can conceive of, and I was in sympathy with it. But it is a most scathing condemnation of much we are doing; and the only consolation I think that many of us can draw out of it is the rather softening addition that you made to it in saying that much of the work that many of us are doing now is simply a necessary preliminary.

It is perfectly useless, I think, and certainly psychologically unwise, to order a man to do anything, to follow the consistent attitude of issuing orders which are not understood, and the reason for which is not understood. Man is certainly a reasoning animal, and the type of man we like to have working with us and for us is that type which sympathetically understands what you tell him to do. The ideal state is that where orders are never given, but we can't arrive at that within our generation; but we should strive for it.

Being more or less a new member in the General Crushed Stone Company, I have the unusual opportunity of observing the attitude of mind of the employees of that company; and as I view it now in perspective, without in the least connecting myself with it, it seems to me that the thing I admire most there is that the men do the things they ought to do because they want to do them. They want to do them primarily because they like the head of the company; they want to do what Mr. Rice wants to be done. That pervades the entire organization.

Also I think they try to do the things they ought to do, not only because of their affection for the company, but because the things they are asked to do are reasonable things. They recognize the propriety of the system under which they are working. And that being so, certainly we have felt, in our safety efforts, which are relatively new, that if we could make the men understand that we were in earnest and sincere, they would cooperate to the fullest. I am proud of that fact, that the men understood that we were sincere and wanted to do it for their benefit as well as our own. No mutual interests are really existent unless both sides are happy. There is nothing to be ashamed of as to the material benefit of the company to reduce accidents. It ought to be and certainly is; we don't try to conceal that from our men or take it away from them. That is one of the arguments we present, because with their attitude it makes them all the more anxious to do it.

Also, we are equally sincere in saying that we don't want this and that man—most of whom we know by their first names—hurt. And we would rather work along that line of thought. We make them understand that there are safe and unsafe ways of doing things, and that we are vitally interested in their methods of working safe, but also interested in trying to so arrange the plant and its equipment that it will be a safe place in which to work and live, and to a reasonable extent they have met us along that line.

CHAIRMAN SOUDER: I would like to hear from Mr. Colville on some problems that he has got up his sleeve, at this time.

E. R. COLVILLE (U. S. Gypsum Co., Chicago, Ill.): Mr. Chairman and Gentlemen: I didn't intend to give a speech; I wasn't on the program and am not going to do it, but I am going to exercise the prerogative of the newly-elected chairman and very briefly touch on one or two points which I believe are worthy of attention.

One thing, as regards the duties of the various officers of the Section. We have tried to outline to each man what is expected of him, in the thought that if a man knows what he is doing and where he is going he can get there quicker than if he has to grope blindly.

The work of the chairman of the Poster Committee will consist primarily in first reviewing the posters which have been made and distributed. Second, he will review the accident statistics. Rather, he won't review the statistics but will take the meat out of them, what they show as needing extension, and apply that in posters.

I am telling you men this because I feel that each one of you has something to give, not to me, but to the quarry industry, the Quarry Section, and each one of you has a peculiar condition which I may not have or the next fellow may not have. So that is the work of the Poster Committee, and we will see that the posters are put up. There have been criticisms or suggestions that there have been too few quarry posters in the past, and we are going to try to overcome that this year.

The Statistics Committee chairman is going to try to divide quarry accident statistics into the natural divisions of crushed stone, sand and gravel, slate, lime, gypsum, and those individual classifications, so that you will be able to tell how you stack up. We may not get this in one year, but we hope to do it. Mr. Adams is the supervising statistician of the Bureau of Mines, and he gets all the reports in and can handle that work very well. In that connection I must appeal to you to send in your statistics. He will ask you for them and you should send them to him.

As to the Membership Committee, my conception of this committee may be a little different than is generally held. I don't believe its prime mission is to sell memberships in the National Safety Council. I say that for this reason—there are too many quarry men. We have a membership of 68, I believe, in the Quarry Section, and how many are there here? I don't believe there are that many different organizations represented, and we want to strengthen ourselves internally before we begin expanding. Does that sound reasonable? Now I am giving out these ideas. They are the children of the brains of the Executive Committee, but we have only one line of procedure. We can outline the plan and present it to you. If anybody has any suggestions or changes to give us, we are very happy to receive them. We don't want to make it a one-man outfit at all. So I am telling you this and if it doesn't line up right, let's hear it.

Now the vice-chairman will be in charge of the Committee on Engineering Standards. Last year the Engineering Standards Committee was able to start a Safe Practices Pamphlet for quarries, dealing with these various divisions of quarry operation, and we hope to complete that shortly and present it to you men.

I have left the secretary's duties to the last, because his job will be to first get out a *News Letter*—not simply a routine *News Letter*, but he will try to coordinate the information which we get from the various chairmen, and send it to you. He will ask you for posters and he will ask you for ideas. So let's view the thing a little seriously and see if we can't help the secretary in his work in that connection.

There is one more thought that I want to commend to your consideration. We talk about safety. I believe the word carries with it some ideas which are not exactly what we mean. I have no criticism of the work, but we do feel—the Executive Committee of the Quarry Section—that we are trying to say accident prevention and compensation. Now that may be a little aside from the point, but that is the thought we are going to carry in our Quarry Section with you men in the *News Letter* this year, the thought we are trying to prevent accidents first. After that, we are trying to handle the material of compensation for injuries.

That concludes what I have to say. I would like to hear from the men present if they have any suggestions, or, for that matter you don't need to do it now, you can write. Now we are looking for help from you members. We will try to lead the work but you have got to follow and push us.

O. M. GRAVES (The General Crushed Stone Co., Easton, Pa.): Mr. Chairman, as I recall it, and if I may interrupt the train of thought that you suggest, when

the report of the Nominating Committee was made we rather apathetically raised our right hands in signifying our approval of the officers which the committee had nominated; and that was about all there was to it. The work devolving upon the chairman of this Section is very arduous, and on him largely depends whether or not it is successfully and earnestly conducted. Many of us know that Mr. Colville has entered on his new duties with the realization of the work involved; we also know that the tasks reposing upon the shoulders of the secretary are numerous, and again it largely depends on the character of that man as to whether this work is adequately or carefully done. We who happen to be members of the National Crushed Stone Association realize that the Quarry Section, in having Mr. Boyd as its secretary, is mighty fortunate. I think we are also appreciative of the fact that we have had an excellent chairman through the past year, and I am taking the responsibility, as one of the members of this Section, to ask for some real applause, in thanking Mr. Souder and wishing God-speed to the new officers.

(The members arose and applauded.)

CHAIRMAN SOUDER: I thank you. Now, gentlemen, there is nothing more to do from a program standpoint. In our lineup for the coming year, Mr. Colville, with your able assistance, will put this thing in a better shape than it has been in the last twelve months. Mr. Colville is located in Chicago; he is in close touch with the National Safety Council. Mr. Boyd is in Washington, in close touch with the Bureau of Mines. We have got a good set-up. We are lined up just right to do something with our own membership, of 68 I think, and if we can get 68 members to keep in the harness and help along here and give some valuable information to either Mr. Boyd or Mr. Colville, I am sure that you will find results.

Practically everyone in this room today is vitally interested in safety, and there is no reason why, in a year from now, each one of you men should not bring with you another member of your industry. Why don't you bring along a plant superintendent, or you may call him a foreman, so that he can find out what it is all about and get this inspiration?

I ask that you please give Mr. Colville your support in the coming year. Also, as to our secretary, write him a letter once in a while. Any of you men, regardless of whether he is a plant superintendent or safety man or who it may be, write a letter to Mr. Boyd along the lines of some of the safety problems you have, some of the good features you have put across so that Boyd can broadcast that to the members of the Quarry Section and to the members in the quarry industry. I don't believe that we have to stop with only the members of the Quarry Section of the National Safety Council. After the other fellows find out what we are doing they will all want to be in here. This same battle has been fought in all other organizations that have started. They have had a hard fight and after they get under way everybody wants to join. As the years go on all industries are coming to the point where they must realize that something will have to be done to prevent accidents.

I would like to have at this time a word from Mr. Boyd, on anything he wishes to say regarding the program for the coming year.

SECRETARY BOYD: Mr. Chairman and Gentlemen: I can assure you that Mr. Boyd, the newly-elected secretary, will do much more for the Quarry Section than Mr. Boyd, the retiring secretary. There is a lot of room for improvement which I well appreciate.

For the benefit of those of you who do not know me at all, personally, I would like to say that of the two classes of mail which might come to my office, that is, mail that would be perhaps flattering and that which would be criticising, I really much prefer to have the letters come in that are criticising. I am not sensitive about having anybody tell me that the job is going rotten. Really, that is the way we can improve the Quarry Section and the program.

Shortly after this meeting, and as soon as possible, I would like to send to everybody present a brief letter which you can consider a kick letter. We all think we had a good session, and probably there isn't one of us who thinks it could have been a great deal better, but let us hear from you. We want you to send in that dope. When I write to you and ask you to send back information regarding what you want on the program next year—which I propose to do—send that information in so that we can build a program for this Section that will attract people. We can't expect to have them come here and sit through a morning with us unless we are going to give them something.

MR. CHAPIN: Some of the remarks of the retiring chairman stuck in my mind. When you go back to your companies you probably will make some report of what you have heard and what the program is for the coming year. I think that about that time is the one to propose that you send your representatives, as the retiring Chairman suggested, next year. If you wait until next year, before the Congress, it will be too much of a shock to the management to realize that they must send these men. So take it up with them immediately and get their approval. I might say that the National Carbon Company has 71 men at this convention here at New York, taken from all over the United States. That is a large wad from one company alone. I know that the Union Pacific is sending 14 men, all of them from West of Omaha, and in a proportionate scale to your industry, I think you will benefit by having the men who, we will say, have made good safety records, given that trip as a reward for their effort. Hold it forth, if you wish, for those who are competing for your prizes, who are working in your plant for safety, that the men with the best records are going to come to the next Safety Council. You will get back all the money you pay for their expenses.

CHAIRMAN SOUDER: Mr. Colville would like to say a word at this time.

MR. COLVILLE: There is one thing that I think can well be put before you men. The Quarry Section is represented by men who do work in lime, in sand and gravel, slate, crushed stone, in gypsum. Now the National Crushed Stone Association has been quite a help to us. They are a red hot organization and each year they have a convention which deals with their own Association, yes, but it deals primarily with quarry operation. Last year they had one at West Baden, and as I understand it, it was quite a session. Now this year, January 21 to 24, at Cleveland, will be their next annual meeting. I don't know just where it will be—that will be announced later—but this is the appeal I want to make. Each one of you men here represents some organization which does quarry work. Now we are asking them for help. We are going to ask every association for help, the sand and gravel, the slate, the crushed stone, and so forth. Now they devote one afternoon of their meeting to quarry safety. It doesn't consist of quarry only, but crushing and transportation and all the operations contingent to that process. Now give that a little consideration and thought. We would like to have a group out there. There was a splendid group there last year but there was not the group we would like to have, that is, outside of the National Crushed Stone Association. There are no restrictions on this at all. They extend a very hearty welcome to everyone and you are cordially invited to attend. We will have good talkers, men who know their stuff, and we expect to waste no time.

CHAIRMAN SOUDER: I want at this time to thank Mr. Rice and Mr. Davis for their wonderful papers that they have delivered and the inspiration that they have given us. I appreciate that their time is valuable and that it has been an effort to make this appointment. We are sorry that McLaughlin is not with us. And I want to thank all of you men for being present and only hope that you continue on with the good work.

ADJOURNMENT

**SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL**



Quarry and Cement Sections Joint Sessions

October 2, 1928

D. C. SOUDER, Chairman

**Director, Insurance and Safety, France Stone Company
Toledo, O.**

F. E. TOWN, Chairman

**Superintendent, Manitowoc Portland Cement Company
Manitowoc, Wis.**

The luncheon session was called to order at one forty-five o'clock by the chairman, F. E. Town.

CHAIRMAN TOWN: We have been having a great time over at this table. It has been a question of whether Mr. Souder was going to preside or I myself. However, Mr. Souder has persuaded me to take charge, and as our time is very limited, I will not take time with preliminaries.

I take great pleasure in introducing Mr. R. P. Blake, Sales Engineer, Independence Bureau, Philadelphia. He is here to tell you something new, if there is anything new under the sun, at any rate to inject a little enthusiasm into us concerning safety.

Address

By R. P. BLAKE

Sales Engineer, Independence Bureau, Philadelphia, Pa.

It is a shame to drill down the Chairman but I am going to start in by asserting that I am not going to say a thing that is new to anybody here. My view of how I can be of best service to this group is not to attempt to say anything new but to emphasize:

It seems to me that the present staff of the Safety Movement needs a little more attention drawn to them. A man who was talking with me yesterday injected that idea into the conversation, and it seemed so important to me that I changed my talk clear around to fit it.

He said the thing that is most wrong with the organized safety movement today is that in spite of all the splendid work that has been done, enough American industries haven't seen the light. President Niesz brought that out when he pointed out that about 25,000 deaths occurred in industry in America last year. Had the rate which had been preserved in those plants which are a part of the

National Safety Council been applied to the entire industry, approximately one-third, or 8,000, could have been saved.

Carrying that a bit farther, had all of the American industries done as good work as the leading members of the National Safety Council, such as Union Carbide & Carbon, Inc., and others too numerous to mention, but all doing absolutely first-class work, instead of saving 33½ per cent of the deaths, we would have saved about 95 to 98 per cent of the deaths, and presumably the lost-time accidents in similar proportion.

In trying to get the view of the thing, I attempted to sort of withdraw a bit from close contact with the Safety Movement and tried to get an outline of it as one would get an outline of a big building.

It seems to me that three things stand out as absolutely fundamental. First, enough organizations in every branch of industry in every part of the country, big and small organizations of every type have done excellent work, have achieved excellent accident safety records to prove that anybody can do it. In other words, they have proved that, practically speaking, freedom from lost time through accidents can be achieved as part of ordinary successful operation of any industrial organization or any industrial business.

The next thing is that it pays. It does justify your trying to prevent accidents. In many cases it means from one million to four million man hours of consecutive operation and in small plants without a single lost-time accident. There isn't a single executive who doesn't say that in dollars and cents (keeping off of the humanitarian note) accident prevention work of that kind has paid dividends in returns on the money invested.

You all know, of course, of the very excellent surveys made of accidents, both direct and indirect, by the insurance companies. I take real issue with them in their statement that the indirect cost was a matter of five to one against the direct cost. I believe it is ten to one or more. I am going to attempt to show that here from a brief outline.

First of all I am going to state what I think is the best definition of an accident. An accident is anything that interferes with the ordinary procedure of the work. Only a portion of such accidents cause injury to human beings, but they all cause injury to the operating cost of the plants.

Now those organizations, without exception as far as my knowledge extends, who have done the best work, whether they realize it or not, have attacked their accident prevention work by eliminating unexpected happenings in the operation. It is obvious if we can plan our work accurately and carry it out as we plan it, we are not only going to prevent all accidents from happening, but we are going to attain the lowest possible cost of operation.

The next big cost—and instead of calling it cost I like to call it an indirect saving! Whenever you analyze any operation in any plant, you try to the best of your ability to develop the routine that makes it possible to carry it on practically free from interruption. You have studied your work so that you have not only been able to effect large economies but large opportunities for improvement; and right in there is probably the biggest possibility of saving through accident prevention work. You might call it indirect cost, indirect dividend on safety organization work.

Finally, whenever you organize a plant to an extent where the men work together so well, the entire organization works together so well that you can, practically speaking, eliminate the accidents, you have thereby forged a tool of organization, a tool of personnel, that is going to be extremely effective in carrying out any measure that the management finds practical and profitable. You have formed an organization that is going to carry that particular plant and that particular organization a long way along any path it finds it well to go.

Now, I have mentioned that accidents can be prevented. I have attempted to establish that it pays. I want to draw on the point that anyone can do it. I say this in spite of the fact that only a small proportion of the American industrial organization have up to the present time gone very far in accident prevention work. If they had, what Mr. Niesz said would not apply.

I don't know just how it is best to explain what I mean when I say anyone can do it, except to again recite the fact that in all branches of industry, in all sizes of plants, in plants with all sorts of leadership—by all sorts of leadership I mean leadership with all kinds of industrial theories but reasonably successful—there appear instances where they have succeeded in practically preventing accidents. This leads me to believe that any organization whatsoever that has sufficient capacity, sufficient direction to enable it to continue to exist and make profits under the competitive conditions of industry today, can, if it chooses, prevent accidents almost wholly.

Why don't they do it? I think the first reason is that they don't see the facts. They don't have the figures. They don't get the viewpoint somehow or other, in spite of the excellent work that the National Safety Council has done. In spite of the fact that all over the country are earnest men seeking to reduce accidents, men in every district, in every place in the country, there are a large number of organizations, of moderate size and small, who still don't see the point, who are still running along having unnecessary injury to men and failing to realize the profits that they might have and should have if they are going to deserve the term of reasonably progressive and able people. I think the first reason why more don't is because they don't see it.

Second, there seems to be a widespread idea among the executives of small organizations that because they are small they cannot do it as well as if they were big. I really think that the shoe is on the other foot, because of the fact that the executive of a small plant, with from 25 to 50, maybe 200 employees, has by virtue of his very nearness to those men, the opportunity to inject his own personality, his own energies, his own mental capacity and ability to each individual employee to a much greater extent than the executive of a big plant can, operating as he needs must through his department heads, foremen, straw bosses, and so on.

There are other things that come into the picture; but I have in mind the plant of the American Tar Products Co., with some 18 or 19 men who have operated now something over four and one-half years without a single lost-time accident. There are plenty of other instances but that happened to come to my mind, and the management of that plant, as I size it up, has just the ordinary ability that you would expect to find in any small plant. It probably needs to be less able than would be the case if that plant were an independent organization, because the head of such a plant, one of a chain, doesn't have the financial and other problems that the executive in charge of an independent organization would have. So probably the actual executive ability of the small, independent plant is greater than the plant of similar size that is one of a large corporation, a large string of plants. They just don't see it.

If we should study large numbers of accidents covering all industries, it would be found that as a rule that the special hazard that many plants make so much of is one of the less important hazards, measured in number of accidents, total lost time or any such gauge you care to use. For instance, in the quarry industry, if I recollect correctly, the figures given by the Bureau of Standards, showed tripping and falling as head of the list, and the special quarry hazards such as dynamite were down in fifth or sixth place in the list; and if all of those had been saved the accident record would still have been bad where it was bad in the first place. So that the myth of special hazards as particularly significant

when measured against the total of accidents, is nothing but a myth. If we prevented all the accidents, all the deaths, all the lost time from the special hazards existing in any and every industry, we would still have prevented but a small fraction of the total.

Another point is the human element. It is human nature for us to neglect relatively mild hazards. If in the center of this room were a pair of wide open gears screaming away at us, even though they screamed only for a little while and then became noiseless and we were told that they were still there and still dangerous, we would avoid that spot very carefully, and probably, being creatures of habit, we would continue walking around that spot for a long time after those gears had been removed.

But suppose there were a small depression in the floor, and I called your attention to it and you actually looked at it. In walking around this room later the chances are not one but several that you would stumble and ~~some might get hurt~~.

Why is it so difficult in many cases to get an organization, particularly an organization of size, to undertake any active accident prevention work? Simply that we have a tendency to neglect the hazards that do not appeal to us as outstanding, and continue to do mildly hazardous things, in spite of the fact that we know that if you do a dangerous thing often enough you will get hurt. The law of averages will get you in the end. There is no dodging it.

Now I have talked about why they don't. How are we to get the organizations that haven't yet seen the light to undertake an effective accident prevention work? I know of no way except to collar the executive or the executives responsible and rub his nose in it until he sees it. Gradually people are seeing it. I have paid so much attention to the saving because I believe that is the way.

In the early days of the safety movement we talked about the fine humanitarian principles. We lost sight, we failed to see practical safety from every consideration of good sense and good operation. It is not a special thing apart. It is not a special humanitarian appeal, but in the last analysis it is a chance to save money and a chance to make money. I believe in emphasizing that, because in the last analysis the most tender part of any man's anatomy is his pocket book. If you can hit that, you have got him.

Now suppose we convince our manager that he really is overlooking an opportunity for making money, and he says, "How shall I go about it?" The first thing I would say to this man is this: The first thing necessary for you to improve your accident record is that you yourself, as head of this organization, must want freedom from accidents; and you must not only want it but you must actively decide to go out and get it, because the path or the way to get freedom from accidents, the details and the endless work are so intimately tied with every operation of every organization that the drive must come from the top, the insistence must come from the top, the check-up must come from the top and the motive power must be furnished from the top.

The chief executive should plan the work. If the organization is big enough to justify a man in charge of safety, that man should report to the chief executive. He should work out his plans with the chief executive. Where it is a matter of authority, so far as is possible within the principles of sound direction of that authority, he should have final authority, and when it exceeds what it is proper to give that man the matter should be decided directly by the heads of that organization and nobody else, unless for some reason of plant policy he wishes to permit a committee to decide; and he doesn't want to do that unless he is willing to accept their decision and see that it is carried out.

Now so much for the start in the organization. He must carry on his work, plan his work with the idea that eventually the thing that he must do is to reach the mind of each and every employee in his organization. In other words, he

must weld his organization into a unit to carry out this policy of freedom from accidents. If he finds individuals in the organization—whether foreman or no matter what they are—who will not take such an attitude, he should no more hesitate, if he is unable to convert them, to separate them from his organization than he would if it was any factory management. In other words if you have an employee who refuses to cooperate in some profit making scheme the management has seen fit to follow, you don't hesitate to convert that fellow or fire him. The same rules apply for safety because I am going to show that safety work is as important as any other branch of operation that you may undertake.

I have no patience with the viewpoint that safety is a sort of special function of a committee or a safety engineer attached to a plant without much authority. It has to be a major function of the management of that plant, or it will not be effective. You will not get much in the way of results.

Each bit of work in the plant must be and should be analyzed. You should find out just what each man does, just what he has to do. As I mentioned at the start of my talk, find out what the hazards are, and find out the best way to prevent them. Right there we run afoul of a characteristic of human nature that is frequently operating to interfere with our accident prevention work; and that is, men dislike routine and monotonous work, like frequently to take chances, and we cannot, therefore, get quite as far as we would like to get. But it is entirely possible to show any man that he can afford to do monotonous work during his working hours in order to be able to do things that are not monotonous outside of his working hours.

Summing up again what I would tell this executive when he asked me what he should do and how he should go about it, I think I should tell him that he would need to use the following qualities in real liberal measure: Imagination, first because he cannot prevent an accident if he cannot imagine it happening. Second, attention to details. A tremendous amount of detail work has to be done by somebody, and probably in the ordinary organization will be done by many men under the direction of the big chief. Third, open mindedness. A man must be open minded to any and every suggestion and try to see all sides of every question. There have been some terrible accidents caused by lack of just that one fact, and I think perhaps more catastrophic accidents are caused by that than any other one thing you might mention. Such a thing as the Pittsburgh explosion which was probably caused by that thing. Such a thing as a tank car in which a number of people were injured and killed and which was probably caused by that.

A plant using a material that under certain conditions might give out inflammable fumes, had this called to its attention by the safety engineer, as a possible source of hazard. It was looked into rather perfunctorily and dismissed as a possibility. Some time later the thing that the safety engineer feared actually occurred. A tank car was put in the plant for emptying and because of improper distillation of the material it left flammable noxious vapors in that tank. One of the two men working in that tank car house crawled up on top and into it to look after something and failed to come out. His partner after a short time missed him and got up and looked in and saw the fellow down in the bottom of the tank and he crawled in and did not come out.

A little later a foreman in the next building wanting one of these men, sent a messenger after them. He came into the tank car house, looked around, didn't see them, crawled in and didn't come out. Finally the foreman came around and looked in and discovered them and called help and rescued them, using a mask and a rope. But two of those three men died.

There was a combination of lack of open mindedness on the part of the management. Failure to go thoroughly into the conditions because they didn't see. If they had probed thoroughly they would have seen the danger. Second; failure

on the part of the men on the job. Perhaps they had not been instructed and hadn't been taught to use common sense and reasonable precaution. The only man who did was the foreman who used it after it was too late to save two men and pretty nearly losing the third.

Next is the outside viewpoint. We all get blind spots. No matter what we are doing, working day after day along the same field we develop blind spots and fail ourselves to be able to see around them. Therefore, the value in having others criticize, comment on, and examine our work from time to time. The ordinary plant expects to have somebody from outside come in and audit their books from time to time, not because they expect to find anything wrong but because the subject is so important that they want the outside checkup and outside okay that everything is going as well as could be expected.

I believe the accident prevention game is so important that the organization, no matter how good work it is doing, that doesn't have such outside, unbiased checkups from time to time is overlooking a serious possibility of trouble.

The last qualification I would mention, and I mention it last because I think in the last analysis perhaps it is most important, is persistent patience. Some of the best accident prevention work that is being done today is being done in spite of the many and repeated previous disappointments and failures. I would point to the accident prevention work history of the Kimberly-Clark Co. As I got their story, they ran for a number of years trying hard to cut down accidents without much success. They finally showed one year in which they made a real reduction. The next year they were worse again. They rolled up their sleeves and kept on and finally they achieved one of the most remarkable no-lost-time accident records that we have today.

That is what I mean by persistent patience. You have got to keep at it and doing the little things and big things persistently regardless of the standpoint. We must keep our courage up regardless of whether we seem to get results, knowing all the time that we will get results if we keep at it. If you use intelligent effort, hard work and patience you get results.

In conclusion I want to say this: One of the most hopeful things in the safety game is that we are now beginning to realize and organizations are now beginning to realize the points I have made. Safety has got to be, by right and virtue of the profits to be made in accident prevention work, regarded as a fundamental feature of the executive direction of any plant, a fundamental feature of industrial work regardless of what you are doing. And I cap that off with this statement—that it is becoming and will increasingly become a measure by which the ability and standing of any organization will be judged.

In other words it won't be long until an organization that is not doing excellent accident prevention work will lose prestige and will be looked at as being not up to the reasonable standard in ability.

CHAIRMAN TOWN: As I have been listening to Mr. Blake I have been wondering whether he is a cement operator or a quarry operator. I think his talk remarkably fits all of our conditions and it is very interesting to get the viewpoint of a man who is not actually engaged in either one operation or the other.

ADJOURNMENT

October 2, 1928

D. C. SOUDER, Chairman

**Director, Insurance and Safety, France Stone Company
Toledo, O.**

F. E. TOWN, Chairman

**Superintendent, Manitowoc Portland Cement Company
Manitowoc, Wis.**

The afternoon session was called to order at two-thirty o'clock, Chairman F. E. Town presiding.

CHAIRMAN TOWN: One of the first things we will do is to reverse the order of business a little bit in order that we may take care of any unfinished business that might be necessary while everybody is here. I will ask Mr. Souder if there is any unfinished business that the Quarry Section would like to handle.

D. C. SOUDER (Chairman Quarry Section): There is one thing that the Quarry Section would like to ask. You are well aware of the fact that we are a baby industry in the National Safety Council, and the past three years we have affiliated ourselves with the cement industry in a point session, and we go on record as asking that we still be given consideration in that respect for next year. We want to be affiliated in this joint session with the cement industry as our men feel that they secure some information in this joint meeting that is very valuable.

The only unfinished business we have is asking for that affiliation.

Joint Meetings Important to Both Sections

CHAIRMAN TOWN: I am going to assume the responsibility of replying to Mr. Souder and state what I feel positive is the viewpoint of the Cement Section in respect to Mr. Souder's suggestion.

We know that in a large percentage of cement plants the quarry constitutes a vital department. There are a few plants, of course, that do not use limestone, but in most cases the quarry is the beginning of the industry, and sad to say our records show that the largest percentage of accidents in the cement industry is traceable to quarry accidents; the largest percentage of increase in accidents during the last eight months was traceable to quarry accidents.

This shows us that something is vitally wrong in the quarry. Because it is so vitally a part of the cement industry, I think there will be no one in the Cement Section that will not feel that it is of just as much importance to the Cement Section that we continue our affiliations in at least one session with the Quarry Section at these annual meetings as it is to the Quarry Section itself. I shall at least check up with the officers of the Section and hope that the Program Committee will see that it is made possible to continue these meetings in this way.

I think perhaps one of the benefits that can come out of these meetings is a mutual discussion of the problems that are existent in the quarry end of the game as well as those that are pertinent to other departments of the cement plant, because in a great many cases they are all traceable to fundamental conditions. Sometimes things that can be worked out to eliminate accidents in other parts of the plant, can also be used in a valuable way in the quarry.

Now we are privileged to have a paper by Mr. J. R. Cline, Assistant Superintendent Universal Portland Cement Co., Pittsburgh, Pa. I am sure that Mr. Cline can handle his subject in a way that will be of interest to all of us.

Putting Safety Across in the Cement Plant

By J. R. CLINE

Assistant Superintendent, Universal Portland Cement Company,
Pittsburgh, Pa.

"Putting Safety Across in the Cement Plant" could be better discussed by someone from any of the 34 plants that have gone without a lost time accident for the first eight months of this year; for at the plant where I work there have been only two lost time accidents this year, the same number that occurred last year. Our best record is a period of 369 days without a lost time accident from October 10, 1926, to October 15, 1927.

Never having had a perfect year in safety, it would be better to change the subject of this paper to "How We Try to Put Across Safety in the Cement Plant." The first requisite needed is to have superiors who are vitally interested in safety, higher-ups whose first question is not, "How much clinker have we produced?" or "How much cement have we shipped?"—but "How is our accident record? Are we still free of lost time accidents?"

The first thing done in our plant was the guarding of every known hazardous place. Substantial guards were put on gears, shafts, pits, stairways, ladders and railings, and additional ones are being installed on new places constantly brought to our attention. Guards once placed must be maintained in perfect condition, as they may shake loose, wear out or be broken. If not maintained they become a hazard instead of a safeguard.

After guarding the dangerous places the next thing done was the maintaining of a number of bulletin boards in conspicuous places, with the changing of bulletins at least once a week, to teach by word or picture the sources of danger that constantly surround all employees, and to maintain interest in this source of display.

One feature display on our bulletin boards is a calendar for each department and one for the entire plant, showing for each day of the corresponding month of the previous year the number of accidents, trivial, lost time, eye, or a clean slate, as the case might be, that occurred during that month and the record right up to date of the current month. The figures for the previous day are placed the first thing in the morning and create a lot of interest.

Cleanliness of the plant property is essential. All dirt cleaned up, scrap properly disposed of, passageways properly marked and kept free of obstructions, building maintained in proper repair and grounds kept clean and provided with grass plots and trees to make the general surroundings more pleasant to work in.

Proper lighting is essential for both day and night. Windows and openings should be kept clean to allow all the daylight possible to enter as no light is superior to daylight for general working conditions. For night lighting plenty of electric lights should be at all points in and about the mill so the hazards of darkness cannot exist. Numerous places for plugging in extension lines should be accessible over the plant so there will be no excuse for a man not having proper light to do any work required.

All the things mentioned so far have been physical necessities to put across safety in the cement plant. They are all essential and should be maintained to the highest point of efficiency, but there is still another phase that is far more important. This phase is the education of employees in the safe method of working and getting their cooperation to apply these safe methods at all times so they do not get hurt or hurt someone else.

This we have accomplished best by holding group meetings and getting the suggestions of the men present at these meetings and, as far as possible, carrying out their suggestions.

Our system is to have each department in its subdivisions hold meetings. Foremen usually preside and seldom over twenty men constitute the group present. Items of interest are brought up and any accidents that have occurred, or are known about, are discussed. The Portland Cement Association report on "Significant Accidents" is read at these meetings, as well as the report of any accidents that have occurred at any of the other plants of our company. Suggestions are asked for and as many as sixty suggestions have been received from one of these meetings. We insist that each department hold enough of these meetings so that each man in the department attends at least one of these meetings each month.

A general safety committee composed of all foremen meets once a week to discuss safety problems. Here any suggestions brought up at the group safety meetings, that cannot be taken care of in the regular routine of operation, are discussed and decision made as to their disposal.

A special group of selected men known as safety officers, about one for each twenty employees in the mill, meets, one-third of them, each week so each turn has its representation, and I talk to them concerning safety and any items of general interest that should be brought up at the time. Items they have to report are listed and answers made to any questions they or anyone in the group they represent send in concerning why something has or has not been done in the interest of safety. In addition to mill safety, stress is placed on community safety and no meeting is ever adjourned without the request for each member to "Take Their Safety Home."

Safety is also discussed at the superintendent's meeting. A chart is always on display at this meeting showing the number of accidents, trivial or lost time that have occurred in each department for the previous week and the subject is regularly discussed at its proper time.

Each item reported at any of these meetings is written up on a form provided for that purpose. This form is made in triplicate, the original for the assistant superintendent's office, second copy given by head of department receiving it to workman who signs it on completion of job and returns it to his head of department, and the first copy is signed by head of department and returned to assistant superintendent who has it filed as a record of job completed.

An idea of the number of items reported at the various meetings is obtained when I say that 2,125 were written up for 1927—89.6 per cent were completed, and this year items have been reported at the rate of 2,500 for the year.

In addition to the various meetings, with their groups constantly reporting items to be taken care of, a special committee of picked men is assigned to the job of making a thorough inspection of the entire plant each spring and fall; they report on conditions affecting safety, cleanliness, structural conditions, painting and, in fact, everything that is necessary or will improve the safe operation of the plant. Usually three days is required for this committee to complete its inspection and its reports have sometimes had three hundred items.

Other things we feel have a bearing on safety are good locker rooms; periodic physical examination of all employees in addition to physical examination of applicants; a nurse on duty every day who investigates all cases of employees reported off account of sickness and does considerable community welfare nursing; a doctor who spends one hour each day at the emergency hospital and is subject to call any hour of the twenty-four, all in addition to a well equipped first aid hospital that is completely manned at all times.

To maintain interest in safety we try to have our employees attend safety schools and safety lecture courses whenever possible. Several schools are run by the Western Pennsylvania Division of the National Safety Council, at Pittsburgh, about fifteen miles from the plant. We post the schedule of the meetings and with a little personal advertising are able to get about twenty employees to regularly attend these Pittsburgh meetings. For the last couple of years there has been a

group of meetings held at New Kensington, about 10 miles distant from our plant. We made a special drive for these meetings and provided bus transportation for those not having their own cars who were willing to go. For the seven meetings held last year we had a total attendance of 2,150—average attendance 307—maximum 386—and a total of 697 employees attended one or more meetings—233 attended the banquet and 211 received diplomas for attending at least five of the seven meetings.

This year we intend to hold a series of meetings at Universal. The number of our employees willing to attend a safety lecture course of this type has become so great that we can better arrange to bring the lecturers and entertainers needed to them than to safely transport the great number to other community meetings. We also feel that by holding a set of safety meetings in our own town we will better promote safety throughout the entire community.

We have had over 50 present at each of the meetings and dinners of the Portland Cement Association Regional Safety Meetings held in Pittsburgh the last two years. A representative of our plant has been present at the last four National Safety Congresses and has also attended the Portland Cement Association Regional Safety Meetings held in Allentown and state meetings held in Philadelphia for the last two years.

For the promotion of safety in the community we have each year interested all local organizations in the November Thanksgiving No-Accident drive, and have distributed great numbers of posters for conspicuous display and have seen that each school child in the district has a small picture of the general poster with an explanation of the purpose of the drive given by the teacher or someone from our organization. Occasionally we go through our files and pick out any safety posters that we think would be of use to school children and give them to the teachers to distribute or use in any way they desire to supplement their regular course of studies.

To obtain new ideas for the promotion of safety we encourage the visiting of other plants of our company or of other companies by leading foremen or heads of departments whenever possible. By this means they can see how the other fellow guards his machinery, conducts safety meetings or runs competitions to promote safety and come back with the ideas so they can be worked into our system or make some improvement upon what we are already doing.

Each part of this elaborate system to put safety across in the cement plant, we think, is necessary and has contributed to whatever success we have had; but the one point we feel is absolutely needed is foreman responsibility. The foreman is held responsible for his group. He must be in sympathy with the safety movement and see that every man under him is in sympathy with it. He must be an example to them in safety; order them to work in a safe manner, and then be sure they carry out all the safety knowledge that has been imparted to them. The foreman must see that his group meetings are held; that every trivial injury no matter how slight is immediately reported; encourage participation in all outside safety movements, and lead his men by being present at all outside meetings himself. The success or failure of any group regarding safety is entirely in the hands of the foreman.

"Putting Safety across in the Cement Plant" is not an easy job or one that can be done spasmodically, but it requires the effort of everyone in the organization to be everlastingly at it. That it pays, there can be no doubt, as is easily shown by the results published by the Portland Cement Association and the satisfaction to each of us. "And the end is that the workman shall live to enjoy the fruits of his labor; that his mother shall have the comfort of his arm in her age; that his wife shall not be untimely a widow; that his children shall have a father, and that cripples and helpless wrecks who were once strong men shall no longer be a by product of industry."

CHAIRMAN TOWN: I think Mr. Cline's paper has been exceptionally interesting. In fact, having gone very definitely into detail, he has undoubtedly given us a great many points that are of interest and great value to us.

Going back to unfinished business just a minute. Mr. Fortuin, will you please read your report of the Poster Committee for the benefit of the Cement Section?

Report of the Committee on Posters

By R. B. FORTUIN

Chairman

I was appointed chairman of this committee at the national meeting in Chicago, and in turn invited the following men to assist in the work of the committee:

Messrs. David Adam—Lawrence Port. Cement Co.

Fred Hunt—Nazareth Cement Co.

Paul Sandt—Edison Port. Cement Co.

Chas. Benner—Lehigh Port. Cement Co.

Chas. Roth—Plant No. 6, Penna.—Dixie C. Corp.

The chairman of the committee wishes to express appreciation for the fine cooperation of the members of his committee.

A form letter was sent to every member plant on the mailing list of the National Safety Council, asking suggestions for posters. Twelve replies were received, and acknowledgments made to these companies.

The committee adopted a policy that all cement posters should be made up from actual photographs of significant accidents that occurred in the past in the cement industry. To date a total of eleven suggestions, together with photographs, have been sent to Mr. Lee Gardiner, in charge of the Poster Division of the National Safety Council—two more suggestions and photographs will be sent in, in a few days, thus completing the work of the Committee for the past year.

It is very difficult for a small group of men to make up posters that are applicable to the industry throughout the entire country, and the committee would like to suggest that the member plants of the National Safety Council be more liberal in the future with their ideas of how posters should be made up, which will be entirely pertinent to accidents and hazards in the cement industry.

The chairman has considered it a pleasure to carry on the work during the past year.

MR. FORTUIN: I would like to say an additional word to that, gentlemen. It is very hard for any group of men to make up posters that are entirely pertinent to the cement industry and which are of particular interest to your individual plant. The committee sent out these form letters asking for, I believe, five suggestions from each member plant; and out of the 160 members of the cement industry we received only 12 replies. That indicates possibly a small interest on the part of executives in the cement plants, or it may indicate that the form letter did not get to the proper person in the organization.

I would like to ask for this committee that each one of you gentlemen here today make it a point to have some one in your organization send to Mr. Lee Gardner, of the National Safety Council, or to myself personally, suggestions for posters for the coming year.

The posters in the past have covered a wide field. Some of them have not covered the field adequately, and others in possibly the wrong manner. What we would like to do is to pick out the real hazards and significant accidents of the past and have them portrayed on a photograph and then have that made up into a poster. During the past year you have seen a number of the posters that we

made up as appeared in the *National Safety News*. Possibly these posters are not entirely in accord with your ideas, and if not, we certainly will welcome constructive criticism on your part.

The committee gave their time freely and willingly. I know that the members with whom I worked were very pleasant men to work with, and they did all they could to further the work of this committee, but their work is at an end and we need your help to give us further suggestions. I hope that all members will endeavor to let us know what ideas can be made up into posters this coming year.

CHAIRMAN TOWN: I wish to thank Mr. Fortuin for his report of the Poster Committee.

If he will permit, I would like to add a word. Any of you who have had anything to do with active work in the Council know very well that there must be time or energy spent in addition to your regular routine work with the company which employs you; and frankly after you have been looking after those odds and ends or those extra details of work absolutely outside of your regular company business, you realize at the end of the year that you have spent considerable time, with patience sometimes exhausted, and it seems at times like almost an uphill business, as it would be if it were not for the loyal support of active committees.

Two or three men should not endeavor or undertake to do all the work of a section. They haven't in the case of the Cement Section, but it has been delegated to altogether too few, and an important trend in our Section has been to expand. Add a committee once in a while, and now we are in the hopes that these committees by reason of the experience they have accumulated year after year are going to be able to function all the stronger in the succeeding years to come.

Knowing the efforts that Mr. Fortuin and his committee have put forth in this poster work, and also knowing something about the inside work of the National Safety Council I want to suggest that you take everything that Mr. Fortuin said strictly to heart, because the work of the poster committees of the Council depends almost entirely upon the individual efforts of the unit sections of the Council. If each Section is not able to pass in its ideas and suggestions in posters, then the work of the Council is going to be all the more handicapped.

Whenever you are appealed to for this type of work, it would be a splendid thing if you could plan for a competition within your own plant to see what can be done for the cause of this poster work.

I have just received a telegram which speaks volumes. There were three or four of the cement plants who sent word from the Pacific Coast that they regretted very much being unable to have any representative attend any of these meetings of the National Safety Council, because they are having a regional meeting or two out on the Coast this week. They are having one in San Francisco today, I believe, which includes all of the plants of the Northern Pacific District, and they send their regrets that they were unable to come on account of conflicting dates. However, I think the Cowell-Portland Cement Co. feel that they are here.

They have sent us a telegram addressed to this meeting which says:

"Today this company's plant completes 847 days without a lost-time accident.

Cowell-Portland Cement Co."

I say they are entitled to a glad hand.

R. C. FRAME (Alpha-Portland Cement Co., Easton, Pa.): I am going to ask (and you may take it upon yourself to call on me for money if necessary) that you send a telegram to the Cowell-Portland Cement Co. from the Cement and Quarry Sections combined, extending congratulations. I think the fact that they have thought of us and wanted us to know of their good success entitles them to our consideration.

CHAIRMAN TOWN: If you will do that, Mr. Frame, I will appreciate it.

Now we come to that part of our meeting that is always lively with interest and I am going to turn it over to Mr. S. Henry Harrison, Assistant Superintendent, Vulcanite Portland Cement Co., Phillipsburg, N. J. I hope nobody will find it necessary to leave because we want suggestions, ideas and good points from everybody in this part of the meeting.

Round Table Discussion

Led by **S. HENRY HARRISON**

Assistant Superintendent, Vulcanite Portland Cement Co., Phillipsburg, N. J.

I think we will all agree that mental causes of accidents are a problem of great importance and they are the most difficult to correct even to a comparatively small degree. A man goes to work burdened with domestic cares caused by sickness, financial troubles, or what not. Sooner or later his attention is divided, he is less alert or preoccupied, and as a consequence an accident occurs; for the same reason a locomotive engineer fails to see the danger signal set against him—he drives his train into a block into which he is forbidden to enter and frightful consequences ensue. This phase of the safety question is one of extreme difficulty to correct and one which is well worth our attention.

In starting the round-table discussion we will discuss the various other problems in connection with the safety first movement awaiting solution by the various member companies. Aside from the humanitarian phase of this question, and this is of very great importance indeed,—we find that no matter from which angle we approach the subject of safety first, we are always confronted with the same problem—How can we reduce the great non-productive expense—Compensation?

In the State of Pennsylvania alone for the first six months of this year the total compensation award was \$6,003,183.00, and the total for the year 1927 was \$13,329,557.00.

When one stops to consider the vast sums of money expended each year over the entire United States due to this vast economic loss, it is little wonder that the Executives in various industries have taken a united stand to reduce this item which necessarily must enter into the cost of manufacture of all the products of industry.

One of the large insurance companies has found that in analyzing 75,000 accident cases fully 98 per cent were preventable, and that if the industrial accident frequency could be reduced fifty per cent there would result an annual saving of \$5,000,000,000.00 to say nothing of the misery and hardship which would be avoided.

The splendid results which have been obtained by the Portland Cement Industry promise to be even more gratifying due in no small measure to the fact that the industry at the present time is in the transition stage. Mills that were using machinery of an inferior type are gradually replacing it with equipment of modern design.

Some one has said that the number of accidents on a railroad system is directly proportional to the length or mileage of the system. Such being the case it is only fair to assume that the number of accidents in a factory is directly proportional to the amount of machinery installed and also to the number of men employed.

In some of the older plants in the Cement Industry where the units were designed for comparatively small output per individual machine, it is natural to suppose that more men were required to operate a plant so designed. Today the small units are being rapidly replaced by larger units,—as for instance—Mills of the roller type turning out—say 140 bbls. of cement per day are being replaced by Mills of the Tube Mill type turning out over 2,000 bbls. per day.

The old reciprocating engine driven plant is rapidly fading from the picture.—In its place we have the modern steam turbine with its direct connected electrical generator. In a great many instances the power plant is entirely eliminated—the power being furnished by one of the great electric systems which are rapidly spreading their net work of wires over the entire United States. The old Cement Plant with its multitude of pulleys, belts, shafting, gears, chains, rope-drives, clutches, etc., is being modernized and in place of this hodgepodge of power transmission machinery we have the electric motor drive connected to its load direct or through a gear reduction device.

With the substitution of the wet process for the dry the screw conveyor is largely eliminated, and the centrifugal pump with its attendant pipe lines has taken its place.

The rotary kiln of small size is being replaced by kilns two or three hundred feet and over in length.

Even in the department where dry pulverized material is conveyed the screw conveyor is being replaced by pneumatic conveying systems.

All these changes cannot but produce beneficial results in so far as reduction of accidents is concerned. Incidentally, they also tend to show how much more difficult it is for a cement plant of the older type to come through the year with a clean accident record. Contrast one of the older plants in the Lehigh Valley with one of the modern plants in the Birmingham district and this fact becomes evident at once.

There is another question which it might be well to discuss, and that is the increasing number of low voltage electrical accidents. By low voltage I mean voltages of 220 volts and under. There seems to be a prevailing opinion among electrical workers that a circuit of 220 or 110 volts is harmless. Such is certainly not the case. With the increased use of electrical energy it is surprising that we do not have more industrial as well as more domestic accidents due to this agency.

Recently several fatal accidents have been mentioned in the press. In this city a few weeks ago a man was killed while carrying a bundle of wet hides in a meat packing house. The floor of the packing house was wet—the unfortunate man's clothing was moist, and in carrying the bundle of hides they accidentally struck an incandescent lamp which was broken—the hides came in contact with an electrical conductor with the result that the man was instantly killed. The voltage was 110 volts in this case. Other cases have occurred where men have been killed while working in the interior of boilers or other steam vessels. Death was due to contact with low voltage electrical conductors.

I am bringing this matter to your attention because there are innumerable places, especially in the basements of engine rooms, also in the vicinity of raw material blending tanks where if electrical extension cords are carelessly used fatal results are sure to follow. There have occurred too many cases of this kind where persons have been fatally injured to warrant us in treating this subject lightly.

In discussing this subject with one of the insurance companies their opinion was asked regarding a 35 volt line to be used as a special low voltage circuit in cleaning boilers,—they remarked that they were not prepared to regard 35 volts as harmless. It is all a matter of electrical contact. Perhaps it would be well to treat all electrical circuits as dangerous and have no one enter a boiler with an electrical extension cord, but to use a pocket flash light battery instead, as is the practice with most boiler inspectors.

One of the most difficult problems for the Plant Safety Committee to solve is the problem of converting the confirmed safety skeptic into an active enthusiast in Safety First. I believe that even the most obstinate cases can be cured by keeping everlastingly at them.

Another problem confronting Safety Committees is the problem of fake accidents. For instance—a man reports to work with a pain in his back,—what really ails him is, we all say, Lumbago, but he attributes his trouble to heavy lifting at his work. In this deception his physician often innocently aids him. Many a fine no-accident record has been shattered by this practice.

Perhaps the most hazardous department in a Portland Cement Plant is the Fuel Mill where pulverized Coal is prepared for burning in the Rotary Kilns. As is well known the pulverized fuel is introduced into the Kiln by means of a fuel feeding device and an air blast. Suppose while the device is functioning properly, for some cause or other there is a failure in the air supply *through* the air blast, the Coal will continue to enter the Feeder, the air blast having failed the Coal will be forced out of the Feeder and spilled on the floor in front of the Kiln where it may become ignited by the hot clinker dropping from the discharge end of the Kiln. Such cases have occurred and disastrous results have followed.

Would it not be well to automatically cut off the Coal supply immediately upon failure of the air blast.

Where the Waste Heat System is employed there is always more or less danger of back firing in front of the Kilns should the Exhaust Fans in the rear of the Boilers cease to function. Here too, in this case it may be well to automatically cut off the pulverized fuel supply due to failure of the Exhaust Fans.

It may not be out of place while we are discussing the danger due to pulverized Coal, to consider the subject of "skylarking." I have in mind where a workman while passing from one building into another was struck with a paper bag filled with pulverized Coal, a lighted torch placed on the ground nearby ignited the powdered Coal causing painful burns to the workman's arm and neck. The Coal was thrown from the upper platform in the fuel grinding room and was, doubtless, intended not to injure the man but to give him a dose of coal-dust. It is hard to understand why men indulge in such silly capers, but they do now and then. Needless to say a case of this kind should be treated as a criminal act and the offender dealt with according to law.

However, in a properly supervised Plant "skylarking" does not exist, or rather it is reduced to such an extent that it may be said to have almost entirely ceased. This I suppose is the case with most of the Cement Companies, and is, I believe, one of the beneficial results of no-accident campaign drives.

Before closing these few remarks I would like to dwell for an instant on the question as to the best method of securing reports of injured persons—I refer particularly to accidents which for the moment are considered as insignificant and unnecessary to be reported, as for instance slight cuts or scratches which later develop into infected cases. No reports having been made out in the first case it is difficult to determine whether the injured was really injured at work or at home, or another place outside of working hours. In this case a dishonest workman could claim compensation and the payment of his bills for medical attention, etc.

There are representatives here from many Cement Companies located in different sections of the United States, and we should be able to obtain some valuable opinions regarding the subjects to which your attention has just been called, as well as on subjects which I have not mentioned.

MR. HARRISON: We will now go on with the discussion, but please confine yourselves to three minute talks.

DR. PARLETTE (Pittsburgh Limestone Co., Pittsburgh, Pa.): With reference to fraudulent claims, the Pittsburgh Limestone Co. has a check-out board, and one side has a sign reading, "Check out uninjured" and the other side, "Check out injured." There are blanks there which have to be made out, and if the man has

been injured during the day the first-aid station will report on that patient during that day. When he checks out injured, providing he has not been taken to the hospital, his superintendent or foreman visits his home and that is followed up.

If he comes to work the next day and he claims that he was injured sometime during the day without having checked up as he should, his claim, of course, doesn't go.

I think that is probably the best scheme that I have ever heard of.

MR. HARRISON: I would like to call on Mr. Frame, of the Alpha-Portland Cement Co., and hear what he has to say.

R. C. FRAME (Alpha-Portland Cement Co., Easton, Pa.): This, I think, has been another of the very splendid discussions of safety problems which have been put on for a number of years by the joint session of the Quarry and Cement members of the National Safety Council.

The Alpha-Portland Cement Co. has made wonderful progress in the reduction of accidents at their many plants. We don't have to look back very far before we can clearly recall where we had something like 300 to 400 lost-time accidents in one year. When looking at the records the other day the best that we could count for the first eight months of this year is 24. This remarkable reduction, gentlemen, has only come about through the intense interest of the management in enlisted cooperation, enthusiasm, genuine all-around good work respecting accident prevention and every phase in which it appeals to us.

It seems to be a rather easy matter, after the superintendent of the plant or foreman and safety committees all get started in this work, to post a record of each plant from month to month. Each plant sees what the other one has accomplished, they realize more their own shortcomings and they wonder why they cannot do as well at their plant as their neighboring competitor has done. After all when they start thinking we can look for results.

Mr. Brown told you this morning that the Alpha Co. last year won two trophies from the Portland Cement Association. One of the plants was at Ironton, Ohio.

I give great credit to the telegram which our chairman read a few moments ago from the Cowell-Portland Cement Co., in California, who had their last lost-time accident in May 1926, and I have every confidence in this Cowell organization from what we have learned of them that they are going to continue the splendid record through to December thirty-first.

Alongside of that wonderful performance the plant at Ironton, Ohio, had their last lost-time accident in December, 1926. They won a trophy last year and so far this year the record is clear. Of course, we hope the god of luck and goodwill are with us in our continued effort and that we too will join with Cowell, and that there will be still some other Portland Cement plants that will come through on December thirty-first, so that we will not only have two, but we may have six or eight or possibly more that will win this wonderful trophy for the second year.

Aside from this record-breaking performance at our Ironton plant we have still other organizations to which we can point, such as Bellevue, Michigan. This Bellevue plant some years ago, had their long string of lost-time accidents, permanent injuries and fatalities, but once they started in earnest, they quickly demonstrated that they could cut their safety program off the same pattern. This Bellevue plant has not had a lost-time accident since April, 1927, with every indication that they are going to be a trophy winner this year.

We have been operating a plant at Manheim, West Virginia, since 1908. They have had many problems down there, the principal one being due to mining operation. They have driven columns into the side of the mountain, which brings a problem peculiar to that line of work. With improved conditions, transportation, and light, and all the other elements that go into it, Manheim, not to be outdone

by her sister plants in the Alpha organization, is working heart and soul to attain their trophy for 1928. Their record, as it stands today, shows the last lost-time accident occurred in August, 1927. So they have already finished 365 days without a lost-time accident, but according to the Portland Cement Association code, nothing brings you the prize until you do the calendar year.

It has been felt by those in charge of the Portland Cement Association activities that it is better to set a measured time in which to make this record. Something like a horse race when they all start from a given point and finish at a given point. It seems to me that it takes a little more effort and the record means a little more to us when we get out to accomplish something within a definite period of time.

It may be of interest to you to know the viewpoint of our management at Ironton. You may ask the question, I wonder what is back of this Ironton Organization? I wonder what they are doing out there? How do you go about to produce this wonderful safety record? And it is a wonderful safety record for this reason: Instead of having the ordinary quarry from which many cement plants obtain their rock, they have a mining proposition; no ordinary job. If I remember correctly, their shaft is something in the neighborhood of 600 feet deep, from which they lead out into the rooms, take out the stone, blast the load, bring it to the shaft and hoist it to the surface. They employ some 80 men in this mine.

The records on mining have shown you gentlemen long years ago that it is of a hazardous nature. I venture the open quarry has many advantages over the mining operation, and when this mining operation at Ironton has done so well, in fact has kept pace with the plant operation on the outside, I think we should give them a certain amount of credit for their help in putting over the results.

I am going to read you just a few lines that come, I might say, from the heart of the plant management at Ironton.

Letter from the Alpha Co. Plant at Ironton, Ohio

We trust we are right in assuming that the majority of the plants represented here are members of the 1928 Trophy Club and hope they will be able to complete the year without an accident and win a trophy.

The Cement Association Trophy is a thing of beauty and means so much to those who fought for it that it is only fitting that no expense be spared in providing a suitable dedication. The Ironton plant's trophy was dedicated on May 9, 1928, and this day will be long remembered by the plant employees and the men, women and children of Ironton.

While making arrangements for our dedication we did not lose sight of the fact that accident prevention pertains not only to the cement industry but to the country as a whole, so with this in mind we decided to throw the dedication open to the public at large. Special invitations were sent to the various civic clubs as well as to our neighboring industries. Arrangements were made with the local high schools, both public and parochial, whereby the students were dismissed at noon with instruction to report back at the school at 1:30 p. m. At this time the entire high school student body, about 1200 in all, were formed in parade formation and, headed by the school fifty-piece band, marched to the plant. The day was ideal and our ceremonies were honored by the attendance of five or six hundred little fellows who had heard that there were to be "free eats" at the plant. They began to arrive about noon and immediately captured all the strategic places around the refreshment stand, which they held from noon until the refreshments were served at about 4 o'clock.

The speakers of the day included Mr. Barbazette, manager of operations; Mr. Brown, president; Mr. McKelvy, vice-president, all of the Alpha Industrial Commission of Ohio; Mr. Butler, terminal superintendent, Chesapeake & Ohio Railway

Company, and Mr. Morgan, C. & O. Y. M. C. A. secretary. All of them touched on the wonderful record the plant made and also on the value of safety not only in the mill or work shop, but in the home, on the streets and everywhere. There is no doubt in our mind but that many safety converts, if we may call them such, were made as a result of the stirring speeches.

The refreshments which followed the speaking consisted of the following:

- 2500 packages of Cracker Jack
- 2000 packages of Pop Corn
- 2000 packages of Peanuts
- 120 gallons of Orangeade
- 120 gallons of Lemonade
- 1500 bottles of Pop

Everybody had plenty to eat and drink and left the grounds hoping that the plant will be able to go through another year without a lost time accident.

The question is continually being asked us, "What did you do to win a trophy?" and we will briefly outline our method of handling the job of accident prevention although we feel sure that you find it very similar to the methods used in other plants.

Successful accident prevention is the result of cooperation between every member connected with an organization. We of the Alpha Company point with pride to the cooperation that exists within our company and we doubt whether there is a greater safety enthusiast in the country than our president. The spirit of safety is contagious only when it starts at the top and works downward. If the president of a company is a believer in safety the general manager will be also. Once the general manager is converted the superintendents will not be far behind and you will find before you hardly realize it that the foremen and men are right in line. The management must show a willingness to spend money for things that produce results. Guard rails, etc., should be installed wherever needed as we have found that men can't be convinced of a management's interest in safety if they see on all sides of them unguarded gears, etc., just waiting for a chance to bite them.

Some safety engineers argue that the installation of guards tends to make a man careless and less on the alert than he would be if the guards were not there and he would realize that the slightest sign of forgetfulness on his part meant injury or death. We cannot, however, agree with this point of view and make it a practice to guard everything or place that may cause trouble.

Our safety committee, composed only of foremen or heads of departments, is similar, we believe, to the majority of other committees. We did considerable experimenting before so organizing our committee, but found that the foreman is the logical member of a safety committee.

Regular meetings are held once a month with special meetings added whenever necessary. At these meetings the condition of the plant as a whole is discussed and various recommendations considered. Especial attention is given to the reports issued by the Portland Cement Association and in our opinion the monthly report on "Significant Accidents" is one of the most valuable bits of information put out by this organization. This report is given a thorough study in our committee meetings and an attempt is made to visualize each accident mentioned or in other words we imagine the injured man as being one of our men. If we then find that a similar accident is liable to occur at our plant we take immediate steps to head it off.

Each foreman is given a copy of those "Significant Accidents" and in addition to this we make out another report of the accidents which are peculiar to his department. The latter are first read and explained to the men and then posted on the department bulletin board.

The Alpha Management made its plant committee's work easier when it started direct advertising by paying a safety bonus. Under this plan 1 per cent of a man's

earnings is added to his check whenever the plant goes through a month without a lost-time accident. While this bonus does not amount to much for each man still it means quite an outlay for the company in a year's time for all of our plants. The average monthly bonus for each man at our plant would be about \$1.25, but it is surprising how our men count on this addition and how they appreciate it.

Prior to 1925 we were having a great number of eye accidents, men were being struck by flying chips of stone and steel and three men each lost the sight of one eye. The committee realized that something would have to be done and done quickly if we did not want the nickname of being a one-eyed plant. So a compulsory goggle rule was put in effect in April, 1925, and each man was given a pair of goggles and a letter explaining the reason for giving them and also instruction as to when they must be worn, as well as the penalty for not wearing them.

These goggles were purchased by the company at \$1.10 a pair and this amount was deducted from each man when he received his pair. The company keeps the goggles in repair free of charge and when a man leaves the service his \$1.10 is refunded to him, providing he returns his goggles, no deduction being made for the condition of the goggles when they are returned.

At the beginning we had some trouble getting the men to wear them and we were given all the stock excuses, such as, "I can't see through them, they give me a headache," etc., but we kept driving away and each time a man turned in a pair of goggles the glasses of which were shattered by a flying chip or were covered with exploded metal we put them on our bulletin board with a full description of just how near so and so came to losing his eye sight. Such advertising proved a big help and now it is a rare case to have to call a man's attention to his goggles. We cannot say just how many eyes or lost-time accidents have and are being saved by this rule, but we do give the goggles a big share of the credit for reducing our accidents.

It is impossible to place too much emphasis on the part played by the plant doctor in holding down the number of lost-time accidents and the record we have made could not have been accomplished had it not been for our doctor.

It is a rule at our plant that every new man must be given a thorough physical examination before he is given a job and each old man is given a periodical examination. By this arrangement the unfit are kept out of our plant and a line is kept on our employees so that if anything develops which might make them unable to take care of their regular job as they should, we can transfer them to another job which they can handle with safety.

The real company doctor is one in whom the men have confidence. He should be a ready and sympathetic listener to all their troubles, both real and imaginary so that the men will be anxious to come to him for treatment. Most men think it effeminate or babyish to run to the first aid room for every little scratch, but the doctor can do more to correct this idea than anyone else. Infection, which may follow the most innocent looking scratch, is responsible for more lost time than any other one thing and will continue to be so unless the men can be educated to the importance of first aid.

In conclusion I might say that the record we have made was not due to any elaborate program carried on in the plant. The methods we use are similar to those used in most plants, but the success of any safety drive is a matter of cooperation and education, convince your men that they are the real beneficiaries of this safety movement. Inculcate in them a determined winning spirit so that they will point with pride to their personal safety record, the record of their department, of their plant and of their company as a whole.

We have won a trophy and have gone 657 days without a lost-time accident, but they only serve as an inspiration for even greater accident prevention effort in the future and we are going to prove to the world that our adopted plant slogan, "Accidents are Unnecessary," is something more than a mere pretty phrase.

In short gentlemen, what I have outlined is only a very brief review of the safety activity that is being carried on in many plants belonging to the Portland Cement Association. The wonderful record that Chairman Town mentioned this morning very ably supports this and I feel certain that the work is going to grow.

The district safety meetings as well as those of the National Council are being well attended, and the free discussion of everything pertaining to the prevention work has been the means of putting Portland Cement where it stands today.

MR. HARRISON: I see we have Mr. Fred Hunt with us, of the Nazareth Cement Co., and we would like to hear from him on the electrical side of the safety first question.

F. B. HUNT (Nazareth Cement Co., Nazareth, Pa.): This is unexpected, but I want to emphasize that whether you fellows know it or not approximately 20 per cent of the accidents occurring in the cement industry last year were due to electrical causes, and at least six—I am not familiar with the number that have occurred since June—but during the first four months of the year six of the fatalities in the Portland Cement Co. were from electrical causes. As Mr. Harrison has brought out in his report, it doesn't necessarily mean when you speak of electrical hazards that it refers to high voltage. In fact several of the accidents this year have been due to low voltage, down as low as 110.

You folks are all familiar with the accidents that occur in the home, such as a person coming in contact with the water line and electric socket at the same time. Well, get in direct contact perhaps with some high tension side or high side of a transformer which you know absolutely nothing about. You may think there are only 110 volts in there, but maybe there are 22,000 or 33,000.

No doubt you know that last evening the papers carried an account of a joke that was intended for a fraternity initiation down at the University of Texas. This is entirely out of the cement line, but you can see what it may lead to.

For a fraternity initiation down there they took two bedsprings and connected the two sides to 110 volts and put a resistance in there. They put the first four men on these springs and gave them a little shock. That was funny. All the other fellows got a big kick out of it. But when the fifth man went on the springs, it wasn't quite so funny. That man died just four hours later from the shock received from those springs. That was supposed to be 110 volts.

Going further into the boiler question, a number of plants have considered the installation of a transformer, dropping a line from 220 or 110 down to 32 for using an extension while cleaning boilers. I believe that is also wrong. Just as Mr. Harrison said, the insurance companies will not agree to even a 32 volt installation.

Go into your boilers with high powered flash lights. It may cost a little more for batteries, but it will be a saving of human lives in the long run.

Just before closing I would like to ask some of the men, especially Dr. Corlett, regarding plants that have gone into the physical examination and examining every man in the plant, what results they have obtained, and whether they have any definite information or definite figures showing what those physical examinations have done?

DR. CORLETT: I just don't know how to answer that. I examined 1,700 men and I found heart conditions 28 per cent, 13 per cent hernia, 78 per cent pyorrhea, and I have forgotten the other figures.

Last week I examined quite a number of men between the ages of forty-five and sixty, rather above forty-five years of age; and 98 per cent of those men had high blood pressure, valve leaks and hardened arteries.

The Carnegie Steel Co. has put on a drive to have men in the high places physically examined at least once a year, and those over sixty years of age examined twice a year, and I think that is entirely proper.

Those with hardened arteries and high blood pressure who have to climb to high places may become dizzy, and they even suffer strokes of apoplexy if required to climb to those high places. It is very hard to tell some times whether the man has died as a result of a fall or the result of apoplexy.

MR. HARRISON: While we are on the subject of electricity, I saw it stated somewhere that a current of about one-tenth ampere, going to the vital parts of the body, is sufficient to kill the person.

DR. CORLETT: That is a question. I was talking not long ago with quite an electrical expert and he told me that 110 volts certainly would kill if the person didn't happen to be in normal physical condition. I am not prepared to say.

It may be possible for us to tell whether a man is in perfect physical condition from the standpoint of the salts in the blood stream, valvular leakage, which uncompensated makes very little noise, and from other standpoints. I do know, however, that 110 volts have killed a sufficient number of people in the United States that we should consider 110 volts hazardous on all occasions.

MR. HARRISON: I have seen it stated also that in judicial electrocutions where 1,500 volts were applied to the head and the lower extremities, a current of ten amperes passed through the criminal's body would indicate that his bodily resistance was only fifty ohms. If such is the case, a 150 volt circuit, if properly applied, would produce one ampere and that surely ought to be sufficient to do away with anyone.

R. C. FRAME (Alpha Portland Cement Co., Easton, Pa.): Some years ago I visited Dr. Lauffer, of the Westinghouse Co., who is an authority, I think, on the resuscitation of those electrocuted. He showed me the apparatus and told me of some experiments he had made to determine the resistance of a person's body. He found the resistance varied with different men's measurements, such as testing a man through the body by his two fore hands, by putting on gloves soaked in brine, etc.

He was able to get resistance as low as 60 ohms, and in his opinion one-quarter of an ampere would kill any man. In other words, I think the evidence is very definite that a man not in the very best of physical condition, if he gets the right kind of contact can be killed easily.

I have personal knowledge of a man being killed on as low as 56 volts direct current. The man got in contact with a large plate of zinc when he was standing in water to his knees, and the current passed through him. He was so cramped that he was not able to get away from it. We don't know how long it took him to lose consciousness—he probably lost consciousness gradually—but he was dead when we found him.

We must regard any voltage above 50 as undoubtedly dangerous under the right conditions, and so handle our low voltage work that we can avoid this condition as much as possible.

MR. HARRISON: I haven't the names of the gentlemen in the Quarry Section but we would like to hear from some one in that Section.

A. C. GOOD (American Limestone Co., Belfont, Pa.): The matter of extension cords is a very vital subject to practically every plant, and I would like to inquire whether anyone has ever used or whether there is such a thing on the market as a cord totally shielded? There are a number of cords which have a ground wire strung through them intended to ground the socket at the end of the cord, but I wondered whether a cord had ever been developed which had a shield around both the conducting wires?

H. W. FRAZER (Charles S. Warner Chemical Co., Wilmington, Del.): One of the greatest difficulties of the quarries is to get a good ground. In cases where the stone deposit has only one or two feet of dirt, one of the hardest problems is to get a good safe ground.

MR. HARRISON: We would like to hear from Mr. Fortuin, of the Pennsylvania-Dixie Co.

R. B. FORTUIN: (Pennsylvania-Dixie Co., Nazareth, Pa.): There is one point I would like to bring out, but before going into that I would like to give you an idea of our experience this year.

In our seven plants we had approximately 50 lost time accidents in 1927. To date in 1928 we have had exactly 10, which I believe is a very good reduction.

During the last three months we conducted a three months' No Accident Campaign among our four plants in the Ludington Division, in addition to the Hercules Cement Corporation, the Nashua Cement Corporation and the Lone Star Cement Corporation, all those plants being located in the Nashua Division. In 1927, we had 20 lost time accidents in those plants, and in 1928, we have had exactly three.

Now the point I want to bring out is this: I firmly believe that our success in accident prevention work is entirely due to bringing out the old idea in new clothing. Each year and each month we bring out the old idea of safety work and accident prevention in entirely different form.

The first of July, for example, we were at a loss to know what we could start or what we could change to make it new. So we started what is called our "Good Housekeeping Campaign." Each month a man is drawn from each of the plants in another division (there are four in number), and that committee goes to each plant and thoroughly inspects it from start to finish. They inspect for sanitation and safety hazards and then cleanliness; and I don't believe there is any single thing that we have ever done that has given greater impetus to the reduction of accidents than those inspections each month.

Cleanliness naturally takes into consideration cleaning up all sorts of debris around the plant. Tidiness takes into consideration the storing of machinery parts throughout the entire mill. Fire hazard takes into consideration the fire hazards in the various departments such as waste paper baskets and the accumulation of combustible rubbish. Sanitation takes into consideration rotten apples and milk bottles that still hold some milk, and all sorts of garbage that may be distributed through the plant by the workmen. Safety hazard takes into consideration those machines where guards have been supplied and are not in place at the time of inspection.

The committee does not recommend new guards or new safety arrangements no matter where it may be.

This inspection runs in competition between departments in the individual plants and in competition with the other plants in the organization, and I want to say that the interest is very keen and no one department wants to have a lower percentage than any other department. Our superintendents are here today and they will vouch for that statement.

Another thing we created this year was a three months' No Accident Campaign running through the months of June, July and August, and had in addition the three independent plants; and the campaign has an appeal not only to our own organization but to the members of the independent organizations. It was something that had never been carried forth before and it created an interest which was unheard of in the past.

When we started the campaign, we had a mass meeting of the employees of all the plants and we finished the campaign in the same manner; we had as speakers men who talked the language of the men in the mill. Our main speaker for the opening of the campaign was Mr. Thomas Quigley. We ended the campaign with the executives of the cement plants only and we awarded a trophy to each plant completing the three months without a lost time accident.

For next year we have in mind our campaigns and also to go into the matter of physical examination. We are preparing that now and expect to put it into

effect on January first. It is the old ideas that we are trying to bring out in new clothing, and that I believe is the reason for the interest that we have carried along in our organization since the inception of the Pennsylvania-Dixie Cement Corporation.

MR. HARRISON: We would like to hear from some of you gentlemen in the Quarry Section. I haven't a list of your names so I cannot call upon you individually.

The Industry in Pennsylvania is Praised

THOMAS J. QUIGLEY (Department of Labor and Industry, Harrisburg, Pa.): By invitation of Mr. Fortuin, I got up here. I want to say that I feel at home in this meeting because looking around me I see so many Pennsylvania people here.

When it comes to accident prevention work, not because this is the cement meeting or joint cement and quarry, I want to say that no industry in the state of Pennsylvania is doing more for accident prevention work than the cement industry of Pennsylvania. They tell you about the wonderful records that some of the steel mills have established in Pennsylvania, the railroads in Pennsylvania, and other industries; but I say that the cement industry doesn't take second place to any industry in the state of Pennsylvania for accident prevention work.

During the No Accident Campaign in the month of June, it was my pleasure to attend about 44 different safety meetings in the interest of the No Accident Campaign. Not only did I attend meetings of the general quarrying industry, but limestone and everything else. For the first eight months of 1928, as compared with the first eight months of 1927, we have shown a reduction of 25 per cent in fatalities in the state of Pennsylvania. For the first eight months of 1927, we lost 28 lives in the quarry industry, that is quarries of all kinds, and for the first eight months in 1928 that number has dropped to 21. In 1927, we had 2,483 lost time accidents in the quarrying industry and for the first eight months of this year, we have dropped down to 1,318.

If we can continue in the quarry and cement industry for the balance of this year as we did for the first eight months of 1928, the cement and quarry industry of Pennsylvania, I believe, will lead all other industries in percentage of reduction in accidents, fatal and nonfatal.

To accomplish that we have had the most wonderful cooperation from all of the quarrying and all of the cement industries. Last week I attended eight meetings in the Western part of Pennsylvania. I went into a new field, into virgin territory to preach accident prevention work.

I went in among the refractory corporations. Never before had safety meetings been held; never before had any person attempted to talk safety to them or to show them how accidents could be prevented in refractory industries. Every plant that I visited had closed down their plants for one hour, paid all the men for their time and some of them even paid the contractors for their loss in the day's earnings to attend the safety meeting. When you get that kind of cooperation, gentlemen, whether it is in Pennsylvania or in Texas, in Missouri or Michigan, you cannot fail to have real, honest-to-goodness results. You are bound to make a success of it. You certainly cannot fail when you get that kind of cooperation.

But to the Cement Association in Pennsylvania belongs the credit for getting all the other quarrying industries working for safety. We can point with pride to the record made by the cement industries and they never failed to come with testimonial and information whenever we called upon them. I say that the records made in accident prevention in the state of Pennsylvania this year and the reduction which we have shown have been accomplished only through 100 per cent cooperation from the cement and quarrying industries; and I am satisfied that our new program which goes into effect January first for a continuous drive for

twelve months in 1929 will put Pennsylvania on the map and we will make the most remarkable showing for accident reduction that has ever been accomplished in this country.

MR. HARRISON: We would like to hear from Mr. Adam of the Lawrence Portland Cement Co.

D. A. ADAM (Lawrence Portland Cement Co., Northampton, Pa.): I just want to say a word this afternoon about something I have talked on before. That seems mighty easy, because if you repeat a thing several times, the sub-conscious mind comes into play and you don't need to care. But I do this because I see today, quite a number of new faces. Not new in accident prevention, but new in our cement and quarry meetings.

Interpreting Safety in Simple Terms

Some three years ago the idea occurred to me: Do the men grasp and know thoroughly what it is the foremen tell them? We all appreciate that the foreman is the key to the accident prevention work in a plant. I thoroughly agree with that; but when we place the responsibility on the foreman we put him in a position that he must answer for every man under his control.

Now, as I said, three years ago the idea occurred to me: Do the men in our particular industries know exactly what the foreman means or what he says? It puts me in mind of a story that illustrates the point.

It was at a dinner party and it was very quiet. One of the guests, to break the monotony, said to the hostess, who was a wonderful piano player, "Would you play for us?"

She played a selection of the great Wagner's and when she finished there was a dull lull. You all know. You have been in circumstances, where a dull silence comes over a company, and anything might happen. Well, that happened there. The lady who had been playing the piano said to the gentleman on her right, who was rather deaf, "Would you care for another before your dinner?", and he said, "No thanks, I had two before I came in." So I think the men sometimes do not really know just what is being said.

So, I decided to call the men together at twelve o'clock just after the dinner hour is over; I sit down and just talk for half an hour. I try to show those fellows why the foreman tells them to do certain things and why they should do them and also the reason why the foreman tells them to do them.

I also ask ever so many of our men questions about the regulation of our plant. "Do you know why you are asked to do that?" "No, I don't know. The boss said to do it."

That is the wrong attitude. If you tell a man to do a thing mechanically, you are certain to get results to a point, but you do not get the full cooperation that you ought to get and must necessarily get to put safety across.

It is the man who does the work that is apt to get hurt and not the foreman, and I felt that I was doing in my humble way a service to help the foreman, on whom we put the responsibility. I don't know whether it is these Thursday talks, but our accidents have tumbled down faster than ever before.

Ladies and gentlemen, we often hear people say, "Well, what is the good of going to a safety meeting? There's nothing new." I agree there, and I feel that when I come to a safety congress, I don't come with the intention of taking something new back to my plant in the way of ideas. But I do feel that I want to come to these meetings to go back with the encouragement and the endorsement given me by those meetings which are sponsored by the National Safety Council and those meetings which are sponsored by the Portland Cement Association.

I feel that when I go back I am on the right road, and it is up to you and me

MR. HARRISON: Will Miss Weeder, of the Jay & Portland Cement Co., tell us something of the welfare work they are doing?

MISS J. A. WEEDEE (Jay & Portland Cement Co., Egypt, Pa.): I have nothing special or exciting to add to what has already been said. We are not members of the trophy club but we hope to become so during the coming year. We are gradually coming down from a rather high record to two in 1928, and we are going to make every effort to get one of those trophies.

MR. HARRISON: Mr. Cline, of the Universal Portland Cement Co.

J. R. CLINE (Universal Portland Cement Co., Pittsburgh, Pa.): We give every man in our plant a physical examination. This week we have just finished the second examination for the second year. It pays. The men like it and there have been a number of them benefitted by the suggestions given by the doctor. The first few of them who knew they had physical weaknesses of some kind, tried to keep from being examined, but they have come around with suggestions of how they can be benefitted.

We also have group life insurance.

MR. HARRISON: Is Mr. Switzer present?

E. C. SWITZER (Petoskey Portland Cement Co., Petoskey, Mich.): Our experience has been that in 1925 we had a very bad year in lost time accidents and one fatality. We have since that time been improving our record; in 1926, we had three lost time accidents and in 1927 two, and we have had one so far this year, so that we are making progress. We hope to get in the trophy class. Our expectations are to keep at the thing and work until we do. The contest for the trophy has been a very great incentive to progress in safety work with us as with all the other plants of the Association.

Accident Frequency the Important Guide

H. W. HEINRICH (The Travelers Insurance Co., Hartford, Conn.): I want to say just a word in regard to the value of the so-called lost time accidents as a guide to effective accident prevention work in the quarry and cement industries.

It is inspiring to hear man after man get up and recite the experiences in his particular plant. I have no quarrel with that. Surely the reduction of lost time accidents is a very good measure of effective safety work. It is the result we hope to attain, but as a guide to accident prevention and lost time accidents, it is, not so good a point to use. It is not so good for instance as frequency of all accidents.

In the very interesting meeting the Metals Section had this morning, one of the speakers referred to the common type of traffic accident where a man driving an automobile across a railroad grade crossing is injured by a passing train. It was referred to in one sense as an unavoidable accident. I want to use that as an illustration in regard to the value of lost time or serious accidents.

In the case of that kind, it is possible of course that a man may, the first day he buys a car, the first mile he drives it, and the first railroad grade crossing he passes, be struck by a train; but it is much more likely that he has driven across railroad crossings many times without stopping to look or listen and is finally struck.

The point I wish to make in connection with that is that the one accident that finally results from a long series of unfortunate mishaps is merely the result of a great many setups of the same situation, and so when it finally does occur, a man is hardly justified in saying that this is the first time I have ever driven across a railroad grade crossing without stopping to listen. He has done it many times before. An effort has been made to determine how many times a man does the same thing that finally results in an accident, or finally results in injury (let me put it that way), and it has been estimated to be from 30 to 40 times.

The point is that there are 30 or 40 opportunities for a good live supervisor who has accident prevention work at heart to see and to control and to observe and to correct these conditions that run along so many times before they finally result in accident.

To go back to my first point, as a better guide to effective accident prevention work, I would take any accident, because not having an accident is nothing but luck and cause is nothing but luck. The accident, however, is not luck. The accident is controllable, but whether through inattention or through some extraneous circumstances, whether the accident results in a serious injury or minor injury, is purely a matter of luck; then why choose the one accident out of 30 or 40 as a guide to prevention instead of 30 or 40 all of which are the same and all of which may lead to a serious accident?

If a man slips and falls or drops something or knocks against an obstruction, those are so-called causes of accidents. A man fumbles something in his hand and lets it drop; it may result in only striking the foot, it may strike one toe and cause a slight injury, and it may strike his instep and cause a lost time accident; but either there is no accident, a slight accident, or a serious accident, and all three of these are a better guide than the one accident which happens to result in lost time.

Improper Use of Electricity Causes Accidents

In this meeting reference has been made to electrical apparatus as a cause of accident. I want to point to the fact that electrical current is a friend to industry if properly used. It is a powerful, effective and useful giant, and a friendly giant. Far from being the cause of accidents, if properly used, electricity might be easily considered the reverse. I understand thoroughly the position of the gentleman who made the remark about 20 per cent of the accidents in the cement industry being caused by electrical current, but he used the term "caused" and although the mere matter of words is of little moment, yet it means something in so far as we use causes in order to correct the conditions that promote injuries.

Electrical current in the instance that he cites was properly not the cause at all. If, through mishandling, electricity causes injury, then the mishandling is the thing that we want to drive at and we needn't necessarily be afraid of current. If the wiring was improper, if sufficient ground was not provided, or if the installation was imperfect, those things of course through the medium of electricity may cause injuries; but I assert that the cause is something other than electricity. And so again in closing, I want to say that the value of any accident, the value of minor accidents, the value of all accidents is a much better guide than is the lost time accident.

The result that we are aiming at is, of course, the reduction of lost time or the serious accidents which we can achieve through concentrating our efforts upon all accidents.

CHAIRMAN TOWN: Mr. Harrison, has anyone any suggestions that he can give to help us out concerning the screw conveyor accident? We all know that the screw conveyor constitutes one of the greatest hazards in the cement industry, probably around some of the crushing plants and quarries, but certainly around cement plants. Has any one anything favorable to offer on the proper avoidance of accidents due to screw conveyors?

WILSON W. RITTER (State Workman's Insurance Fund, Harrisburg, Pa.): Being quite familiar with conditions from an accident and frequency standpoint throughout Pennsylvania, if I were to leave this meeting without saying a word of commendation to the cement industry in the Allentown district, I would really feel condemned.

My friend Mr. Cortell, from Pittsburgh, has said quite frequently that there is more safety per square foot in the Pittsburgh area than any place in the United States. I cannot agree with him. I want to say that there is more safety per square foot in the Allentown district than any place, I believe, in the whole world.

Now, why are they obtaining such remarkable results? Briefly, simply because every man from the general manager on down to the fellow in the ranks is 1,000 per cent strong for safety always. They are obtaining these results by proper safeguarding, by education, proper medical facilities, etc.

A. E. SNODGRASS (Louisville Cement Co., Louisville, Ky.): We are not members of the trophy club but we have a record of thirteen months without an accident. The reason why we are not in that bunch of plants is because we endeavor to get it within a calendar year.

We have our regular monthly meetings and discuss the near-accidents, and it is very amusing to hear the men talk about those accidents which might have been serious but which got by without hurting anybody.

One of our men spoke about putting three or four tons on a one ton chain block, and they put it up to the foreman: "If you saw your men putting a three or four ton block on a one ton block, what would you do?" The foreman said, "I'd tell them to go ahead this time but don't do it any more."

This gentleman's remark impressed me that we are playing in mud rakers. In other words it's the frequency that we should work on. We had 608 accidents in 1926 and one lost time accident; and in 1927, we had 354 accidents of all kinds and one fatality. So it is the number of near-accidents or minor accidents that is the barometer. In other words we had 354 chances and killed one man, and we had 608 chances in 1926 without killing a man. So, I think, as the gentleman who preceded me says, it is the number of chances we take rather than the severity that measures our progress.

An Exception to the Word "Luck"

G. E. DAVIS (Universal Portland Cement Co., Chicago, Ill.): I cannot help but take exception to the word "luck" being used in accident prevention. If we are going to accept it as luck, we had better stop right now. Accident prevention and the reduction of accidents must be the result of work. We must get behind this movement. We must reach the working man.

We all realize that we must start at the top, with the management. We have been doing that for the past twenty years in the United States Steel Corporation. Start right at the top and go right down through the superintendents and the foremen. That is the key to success, but you must get down to the man himself, and that is the question and the problem today—how to keep interesting the man in safety?

I often tell our men that there is a right way to do everything. There is a right way and there is a safe way, and we keep working to that end, working to prevent all accidents no matter what they are.

H. W. HEINRICH (Travelers Insurance Co., Hartford, Conn.): May I reply to that gentleman? I know that I have difficulty in expressing my thoughts, but I am quite sure that the audience in general hasn't taken the same interpretation of my remarks that the gentleman has. However, it may be so and I would like to repeat again I most certainly agree with this last gentleman who has spoken.

Accident prevention is not luck, not by any means. Accident prevention is not luck, not by any means. Accident prevention is a science. It is based upon known laws, and boiled down to its simple fundamentals, it is nothing but finding the cause of a certain trouble and removing that cause if possible.

What I did say about luck, however, was just this: That once the accident happens, which we gentlemen are here to prevent not through luck but through work

—once that accident has happened, its degree of severity is largely a matter of luck.

A. J. EALES (Bessemer Cement Corporation, Bessemer, Pa.): With regard to that, I take exception. I think there is such a thing as luck. While we want to cut out accidents and are working for that, the only accident we have had this year in the cement plant was when a laborer from outside came in to work on the fountain. He put in some cast iron pipe and there was a small piece on the pipe that we wanted out. We just knocked that chip off and it struck one of the workmen in the eye and laid him off for a month. I might call that a luck accident. It was done by an outside man entirely. It loses us a chance for the trophy this year, and that might be luck.

A year or two ago, I saw a safety film showing the method of grating and chaining a hole as we used to do in our quarries. That is take four pieces of fusc and a stick of dynamite on the end and drop it into the hole. That was shown as a safety practice. Until two years ago, we had a man doing the same thing. He had been doing it for six or seven years when one day something attracted his attention and he didn't drop the stick of dynamite in the hole and it went off in his hand and killed him.

We have changed that now. We have a small battery to lower the charge down in the hole and then set it off.

In the early part of the discussion, the mental attitude of the workers was mentioned. We don't know the mental attitude of the worker in this particular case. After he was killed his fellow workers said, although he had been handling that job for six or seven years, he was always afraid of the dynamite. He always figured that he would be knocked off with it. We never knew that or we might have changed it.

A short time after the accident occurred we had a man in the packing department who was riding a car down to the packing house and he sideswiped another car and the man claimed that he had his one leg crushed between the two cars. It did not show any bruises or any damage to the limb at all, but yet he would not put the foot to the ground at all. Feeling that the best thing to do was to have an x-ray taken, we loaded him in the car and took him to the doctor to have an x-ray taken. He screamed when we carried him in the x-ray room and put him on the table to have the picture taken. I waited for the picture to be developed and it showed no break at all. I said, "There are no bones broken and you are all right." He got off and walked to the car and went right back to another car. This shows the mental attitude of the men which you must take into consideration. There are some men whose mental attitude is strange.

The fellow is an excellent worker and we kept him on the job. About two weeks ago he got some cement dust in his eyes. It was taken out locally but still he claimed there was some in his eye, and so I said, "We'll load you in the car and take you to town to an eye specialist." We took him to an eye specialist and he said there was nothing there. He put a few drops in his eyes and the man went back on the job satisfied.

So there are mental attitudes that we must take into consideration. Otherwise, we will get some real lost time accidents.

We have been very fortunate in the accidents in our quarry although we have had some fatal ones. We have been trying hard for the trophy and we rather seem to have a different spirit entirely. Last year we had one accident which cut us off from the trophy. We had one this year that cuts us out.

We had a case where the local doctor said he could not get the chip out of the eye. We took the man downtown to the doctor and the steel wasn't magnetic enough and we couldn't get it out with the magnet there. So we took him over to Youngstown where they have a larger magnet, but they weren't able to get it out either. The eye specialist suggested taking the eye out and said that was the only thing that could be done. This was over twelve hours later and no infection had

set in so I wouldn't let them take the eye out. That afternoon we took the man to Pittsburgh. They put him under an anaesthetic, turned the eyeball out and took the particle out and that man has his eyesight today.

MISS J. A. WEEDE (Jay & Portland Cement Co., Egypt, Pa.): I am awfully sorry to have to get up, but I see the doctor isn't here. You have to know all the inside story of a case in order to appreciate it.

The eye is a very delicate organ, and while the one eye may be all right, there is such a thing as having an injury in the other eye and by sympathetic action it is possible to lose the sight of both eyes simultaneously.

An Unfortunate Accident in the Quarry

G. W. BROWNELL (North American Cement Co., Hagerstown, Md.): I just want to say a word in connection with the element of luck. We have three cement and lime plants, and after plugging mighty hard for safety in 1925, we were awarded the safety trophy. In 1926, our Berkley quarry operation was awarded that trophy, and then again in 1927, our Security Mill operated from January first until November sixteenth without a lost time accident. The accident that made it impossible for us to finish the year as a member of the trophy club was undoubtedly due to bad luck. Again this year we went up until July thirteenth. It was Friday, July thirteenth, without a lost time accident.

In the case this year it was the safety man who lost his life. The first thing in the morning, about six-thirty just before the pillars and shuttle operators went to work, this man being accustomed to go over the place and look for dangerous spots in stone, was at a place where there were several over-hanging stones. He was standing above them prodding down with about a ten foot rod in, I believe, the most approved safety manner, and the stone he was standing on slipped.

About three or four ton of material, of clay and stone, dropping from above, wouldn't have been a hindrance had he been over a little ways and only thirty feet up the face, but he went down with that slide and a small stone, comparatively small—probably a cubic foot—hit him and gave him internal injuries and he died five hours later. I contend that was luck. The man had a reputation for safe working. He was doing a safety act and doing it in an approved manner. I think that was bad luck that kept our Security Mill from finishing any year to date as a member of the trophy club.

MR. HARRISON: One November, we ran 27 days without an accident and the engineer one day stuck his finger in the releasing lever. That ruined the November accident record. We thought we could obtain a clear record during December but on the second of December in going through the engine room, I asked the chief engineer how the accident had occurred and he stuck his finger in it and we had one more accident and one demonstration.

I have read Mr. Heinrich's paper on the Origin of Accidents, and I think anybody reading that article will thoroughly agree with Mr. Heinrich.

(Chairman Town resumed the chair.)

CHAIRMAN TOWN: I think that we will all agree that these discussion periods are highly interesting and educational. It occurs to me that we may possibly have fallen short in a measure from the amount of good we might have obtained, had we laid out our lines of discussion in certain definite directions, and possibly appointed a man to start a discussion along certain definite lines which had been causing the greatest trouble and perhaps been conducive to the greatest number of accidents around the plant, and then drawing out of the discussion ways of preventing those accidents. That possibly could have been worked out in a satisfactory manner and may be something for the Program Committee to think of for next year's session.

A. J. EALES (Bessemer Cement Corp., Bessemer, Pa.): Where we have a free open discussion we hear the other fellow's accidents and they logically come one from the other and I think we get further ahead that way than assigning subjects.

CHAIRMAN TOWN: Just the way they have done this afternoon. Then there is one other thing that occurs to me—one afternoon is far too short for discussions. They are certainly very interesting and much good can be derived from them.

A. C. GOOD (American Limestone Co.): I would like to voice a protest which I understand was made at your meeting this morning, and that is that the future meetings of the Quarry Section and the Cement Section not be held at the same time because there are many of us who want to attend both and we cannot.

CHAIRMAN TOWN: I think that is a very timely remark. As you say, it was mentioned this morning and I believe it will be possible for the Program Committees of the two sections to confer with each other and concur in the program arrangements which will enable those of either section to attend interesting parts of the meetings of the other section.

Is there anything else to be brought before the meeting adjourns?

I feel that this has been a very helpful session and we look forward each year to making the program more and more interesting.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Refrigeration Section

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B. B. McCULLOCH, Bureau of Safety, Chicago, Ill.
E. G. HITT, Chicago Ice Producers Mutual Liability Company, Chicago, Ill.

October 2, 1928

VINCENT WAKEFIELD, Chairman

Treasurer, City Ice Company of Kansas City, Kansas City, Mo.

The session of the Refrigeration Section at the Seventeenth Annual Safety Congress, was called to order at two-fifteen o'clock by the chairman, Mr. Vincent Wakefield, Treasurer, City Ice Company of Kansas City, Kansas City, Mo.

CHAIRMAN WAKEFIELD: The Chair takes a great deal of pleasure in welcoming all of you to this session. It is the first time in the history of the National Safety Council that those who are vitally interested in refrigeration, and those industries using refrigeration, have had the opportunity under the auspices of a meeting of their own to sit down together and discuss a common problem. Therefore, the Chair takes a great deal of pleasure in not only thanking you for your presence but in expressing the hope that this is merely the forerunner of meetings that will be repeated at sessions of the National Safety Council to come.

This meeting has been organized by the Committee so that those of you who are using refrigeration would have some idea of what can be accomplished through an organization of a section within the National Safety Council. It was felt, therefore, that it would be the wisest thing for some one who had had a great deal of experience in organizations such as this, and for some one who had a great

deal of experience in organized safety to come and tell us something of what it has been possible to do in other industries.

A man we all had in mind when this subject was proposed was Mr. Charles B. Scott of the Bureau of Safety of the Middle West Utilities System, president of that organization and a past-president of the National Safety Council. When I asked Mr. Scott if he would make this address to us today, I found that he had turned down already many requests to address this Congress. Nevertheless, in his kindness of heart, he consented to do it. I think that we are extremely fortunate in having the opportunity to hear Mr. Scott today. I know of no one who is more capable of pointing the way in the refrigeration industry or any other branch of safety than he. I, therefore, take a great deal of pleasure in introducing Mr. Charles B. Scott of the Bureau of Safety, a pioneer of safety work, and my personal friend.

Address

By CHARLES B. SCOTT
Bureau of Safety, Chicago

I was constrained to accept your chairman's invitation, notwithstanding the fact that I preferred not to do so, for several reasons. The first was the personal friendship to which the chairman referred, and the fact that it was difficult for me in view thereof to decline. The second was that I doubted my ability to do justice to the subject assigned me. The third was my desire, in attending the convention, to be more free to enjoy the advantages that many of you have of listening rather than being listened to. All these things considered, it seemed rather unfortunate that I should be selected to discuss this subject.

It occurred to me however, that perhaps I could tell you some of the reasons why a refrigeration section of the National Safety Council should be organized, and that I might be able to point out to you some of the advantages of such an arrangement. My sincere conviction is that this industry, the refrigeration industry should have such an organization as is contemplated by this first meeting.

The reasons for that feeling are: First, that it would be beneficial to your industry as a whole to have some organized arrangement by which you and those less fortunate than you, who have not had the opportunity of coming in contact with an organization such as the National Safety Council, could be helped in a work that I know they would like to carry on. The companies with which I am associated are interested in the refrigeration business, and from that point of view, I can realize the necessity for such an organization as is proposed.

In this period of new development in industry, in this age when we no longer think of industry as we formerly did, there is hardly a necessity for anyone to say to you that the efforts which you are making should be well organized. There is no successful industry but that has some machinery or channel of procedure by which its activities and work is correlated and standardized. There is hardly a successful company or corporation, that does not feel the necessity for contact with organizations engaged in similar work. This is a day and age when this fact is recognized, and when people engaged in a particular business, or men engaged in any particular work, realize more fully than ever before the advantage of knowing what the other fellow does.

My company has a very liberal policy with respect to association activities. During the past sixteen or seventeen years, I have spent about twenty per cent of my time, aside from the regular duties of my job, in helping along the organization work of industry, particularly the work of the National Electric Light Association, our company being engaged mostly in the power generation and distribution busi-

ness. For thirteen years my employers have insisted that I should keep the chairmanship of the Accident Prevention Committee of that national organization.

During that same time, and concurrently with some of the thirteen years, I was chairman of the Accident Prevention Committee of the American Gas Association and the American Electric Railway Association; and through the entire history of the National Safety Council I have been one of the representatives of our company in that organization and have served on its Executive Committee.

If my employer should ask me today if he and his stockholders received proper compensation for the money that has been spent in all those years my traveling over the country attending meetings, and the time that I have spent in these activities, I should honestly, frankly and conscientiously say to him, "Yes, a thousand fold; a thousand fold have you been paid."

There are occasionally those who accept responsibilities in these national organizations, prompted by pride, ambition, and the fact that they get before the public, but they are very few. The men in the National Safety Council have given years of their time, much of their energy, and expended from their own personal funds a large amount of money. They were not prompted by the conspicuous place they might get in the organization, nor by the personal pleasures that would come to them from such activities. These men have done these things for the advancement of the cause which the organization represents.

The present standing of the National Safety Council, the work it is doing and this Congress here today—all is due to the influence of the volunteer workers who have put their energy, their time and money into this work. What I have said of this organization is also true of these other organizations. If the executives of our companies, and if the industry at large knew the real spirit that permeates these national organizations and these national efforts, there would be an even greater support of these organizations by all companies. If these executives and these companies knew of the benefits that accrue to themselves and to the interests which they represent by reason of group meetings, they would get together and see to it that this correlation of ideas and this interchange of opinion is greatly enlarged.

You ask me how I, charged with the accident prevention work of a group of public utilities, was justified in spending so much time and so much money with the National Electric Light Association. You may ask in your own minds whether or not the experience I had there really and truly was of benefit in my own job. Let me refer you to just a few accomplishments of that organization to prove what I have said.

My mind first turns to a book that was prepared by some six or eight gentlemen from different parts of the country. It was designed to teach linemen how to do their work safely. This was prepared as a textbook, and it serves the purpose of a textbook on the properties where groups of linemen are brought together under the direction of their foremen and their line superintendent. They take a course of training in the proper methods of construction and maintenance of distribution lines. The book was prepared so that there would arise within the mind of the student or of the reader, questions as to whether some of the methods of procedure were correct or whether they were safe. The book was purposely written to bring up this interest and discussion on the part of linemen. That booklet has been adopted on all of the properties with which I am connected. Every winter, linemen's safety schools are held all over the country in which the foremen or the superintendent is the teacher, and the linemen are the students. They are taught safe ways in which to do their work.

In 1922 we made a calculation from the records of our company, which showed that 75 per cent of the fatalities and 75 per cent of the accidents in the electrical industry were due to electric current. This booklet and these classes have enabled us to lower the severity record until today instead of electric current causing 75 per cent of the fatalities and serious accidents, it is down to perhaps less than 60

per cent. That course of instruction was prepared by representatives from different companies coming together, correlating their own ideas, and developing this book of instruction, which has been of great benefit to us in lessening the number of serious and fatal accidents.

If the whole thirteen years had resulted in the saving of only one lineman's life out of the group I represent, my company, and I myself, Mr. Chairman, would have been justified in spending the time which was spent on this work.

This same committee, during the thirteen years of my association with it, also developed the proper type of gloves for linemen to wear. Prior to that time a miscellaneous lot of gloves of questionable value were used. These engineers made a study and a laboratory test and succeeded in getting out specifications for gloves that would fit the hands, gloves that resisted the current and gloves of proper length. Now every firm in the electrical industry knows the standard specifications for gloves. If the committee in the thirteen years had only developed that protection for these men, a protection very much needed, this electrical industry would have been justified in spending the money and the time expended in that development.

I also had the honor and privilege to serve on the Committee on Resuscitation for the gas and electrical industry of this country, that was conducted under the auspices of these national organizations. If the gas business and the electrical business had had no national organization, this resuscitation method never would have been developed.

Only a few years ago on our own properties there were hundreds of men, in fact, hundreds of locations, where they had never heard of the Schaefer method of resuscitation. If my companies want to measure the value of my services, I am perfectly willing that they measure it only by the work that has been done on resuscitation and the results of that work. In the thirteen years we have saved the lives of 100 linemen because of the knowledge that our people had of resuscitation, knowledge which they got through these national organizations.

If time permitted I could tell you much more. Here is a list of a whole page of the outstanding accomplishments in accident prevention made through the National Electric Light Association, any one of which would have fully justified the time and the money expended by our company in this work.

You might say, "That is all right in the electrical business, but the refrigeration business is a different business. We do not have electricity to contend with." (Perhaps some of you fellows will think this is a wild statement I am going to make.) There is not in my opinion a refrigeration manager who knows the comparative hazardousness of the refrigeration business as compared with other industries.

Yet the National Safety Council, notwithstanding it has had no refrigeration section, has kept a record as to the dangers of the refrigeration business. They have worked out a comparison of your business with other businesses as to the hazards of it. When I read these figures you are all going to be very much surprised. The accident frequency per million hours of work in the ice industry (that is, the frequency of accidents per million hours work in the ice industry) is 81.48. In the public utility business, the accident frequency per million hours work is 31.11, or about one-third of your own accident frequency. Your accident frequency is 81.48 per million hours of work and the accident frequency of all other industries combined is 26.82. That surely says that the refrigeration industry should get busy on the question of accident prevention.

You might say, "Well, I believe that; we do have more accidents, perhaps, than any other industry, but they are all trivial accidents. They are mostly caused by a piece of ice falling on somebody's toe or by the tongs slipping out." Let us put it then on the basis of severity. The severity per one thousand hours of work in the refrigeration industry is 3.22. In the public utility business, that dangerous business where men handle electric current and where the current kills and injures

in 75 per cent of the accidents, it is 3.59 as against your 3.22. And in all the industries combined it is only 1.76 as against your 3.22.

You gentlemen who are in the refrigeration industry don't know how you stand as compared to these other industries, and you don't know the possibilities of what can be done by organized efforts to reduce these ratios. If this refrigeration section is organized and if the same intelligent, earnest interest is given to the ice problem as has been given to the steel industry and to the electrical industry, I stake my reputation as a prophet that in two years from now you will have reduced that severity rate 50 per cent. By doing what? By getting together the men in your own industry that are interested in the saving of the lives of your employees and delegating to those men the duty of providing methods by which accidents can be prevented.

If there is any indictment against the industry of this country of which it ought to be ashamed, it is the indictment of the loss of life of workers in that industry. And any industry that does not take an active interest in doing that, is not worthy of the sympathy it should have and the cooperation it should receive, because it is neglecting one of the most important phases of industrial life.

I hope the talks that will follow this feeble effort of mine will convince the men that are here to such an extent that they will go back and convince the men who sent them here that this ice industry needs the support of the executives of these refrigeration companies—not a passive interest but such interest as will influence them to do the things that my chief executive had me do; namely, that they will give their men and spend their money in developing plans for the control of the accidents that you are having. They are just as easily controlled as they are in any other business and perhaps easier than in some of the other industries.

Do you know what safety work has done for the companies with which I am associated? Do you think that about all the benefit I have contributed to the companies with which I am associated has been to devise some papers, specifications and rules that have resulted in fewer accidents, more safeguards on our properties and such things as that?

The big men in our industries have yet to see this safety matter as it really is. In the public utility field, the big men, the chief executives, have yet to take into consideration the effect of this work on the public relations, on the good opinion of the people, their customers and the people with whom they come in contact. I don't believe they yet know the motorman on the street car has through safety work been transformed from a gruff, impudent, uninterested employee to a gentleman, with kindly feelings, with a sense of regard for the lives of the riders. They do not know as yet the true value of the training that these men have had through the avenue of safety work by which they have been taught to appreciate the bigger things in their job.

These men, these motormen, these linemen, fully appreciate the value of safety work. They think of it in terms of whether or not they have been injured or whether they have a good safety record. They fail however to take into account some of the things that safety work has done for them, that have made them better fathers and better husbands and better citizens in the community in which they live.

We who are engaged in the work have not yet learned to measure the true value of the thing we are seeking. We who have spent our lives at it have not learned the true value it has been to us as an individual in making us better fathers and better husbands, better men, better friends, better citizens, more upstanding men. These are some of the by-products of safety work that are going to come to us, if you want to value them as company assets. These are some of the values that are coming to these men back home that are having these accidents and these foremen that form your family in the company with which you are connected.

These are some of the benefits that come to you as individuals for taking a part in doing the thing you ought to do.

There is another measure, perhaps not so important and not so productive of good results, and that is the measure of increased efficiency. We have better people working down in the valley of Texas than we had five years ago. We have more efficient men. Our losses are less. The upkeep expenses are less. The quality of our ice is better than it used to be. That is partly due to the spirit that produces better work and better things and by the men doing their work right. The increased efficiency is a by-product of safety work and should not be lost sight of in estimating the value of it.

There are other benefits, there are other reasons why you should go into it. I said a while ago that the industry of today is not the industry of ten years ago. It isn't. I don't know how long I will be permitted to continue my services in the field of industry. I don't know what test will be applied to all I have tried to do when the time comes for me to step aside. There is one test I want those men to apply to my services, and by that test I am willing that the justification for my employment shall be made, or it shall be unjustified. I want them, when they measure my worth to my company, to ask this question: What did he do to humanize the industry? And by that test, and that test only, am I willing that I should be judged. If by these years of effort through national organizations such as the National Safety Council, they are able to say, "He did contribute to the humanizing of industry," my years of service shall have been justified.

When Mr. Wakefield persuaded me to make this appeal to you I made up my mind that I would base it on business reasons; that I would stay away from the thing I am now touching on. I thought I would. A few minutes ago, when I came up to the hotel, I took a kind of a hitch on myself and said, "I am going to keep away from the other things that I am always preaching." Now, I am tempted to do the thing that I said to myself I wouldn't do.

But men, listen to me, forget your business for the moment, forget the economics of it, forget the strivings that you are making to develop your industry along the lines of efficient operation, forget those things just for a moment, and then ask yourselves this question: If I interest myself in this, can I contribute to the welfare and the happiness of my people back home? Just put it on that basis. Say to yourself, "Can I save one of the fellows that works for me; can I contribute to the happiness of one of the families that form my industrial local service; can I do something for Jim Jones, his wife and his children back home if I interest myself in this?"

Let the answer to that question tell you what you are going to do about having your industry come to the front and join the other industries and take a part in this work. And whether or not it pays, whether or not you develop standards and regulations and rules, if it saves the life of one of those working with you, it is worth all the effort that you put into it.

I hope that your industry, the refrigeration industry, will join hands with these other industries and say to the world, "We believe in the human side of this industrial question; it means something to us. We are going to line up with you and do what we can to carry on this work."

CHAIRMAN WAKEFIELD: I am sure that all of you who listened to Mr. Scott cannot help but have one striking thought as a result of that address. I know that the Chair feels that he has been participating in an industry that in the face of the figures that Mr. Scott has laid down indicts us as a careless and thriftless industry, when we can run frequency and severity records greater than a dangerous business, such as the power and light business.

Before Mr. Scott leaves the room, I want to extend to him on behalf of the Section our very heartfelt thanks for that address.

We have heard from Mr. Scott on what organization can do, and in looking around over some of the industries who have felt their way along by individual effort and without directed effort from this headquarters of safety, we found there was a large organization in the City of New York known as the Knickerbocker Ice Company that had done considerable work. Therefore, we felt it would be interesting to you to have an executive from that organization talk to you and tell you why he believes in a safety organization in his company. I am, therefore, very pleased to introduce to you at this time, Mr. Wesley M. Oler, Jr., Vice-President of the Knickerbocker Ice Company.

Why We Believe in Safety in Our Company

By WESLEY M. OLER, JR.

Vice-President, American Ice Company, New York City

I can't help feeling like the Irishman who knew he would get ahead in life, because he started off as a conductor and now he's a motorman; for it is certainly quite a step forward from the garages, stables, coal yards and dressing rooms of our plants, where I do most of my speaking, to this handsome room in the Hotel Pennsylvania. Talking to the boys in our own organization is more in my line than public speaking, but when the invitation came to tell why we believe in Safety in our Company it struck a chord so close to my heart that I just couldn't turn it down.

Lord Tennyson said in one of his famous poems: "I would that my mouth could utter the thoughts that arise in me." If the great poet had difficulty in expressing himself, you can imagine my feeling in tackling a subject that has played such a tremendous part in industry, and that, up to the present, at least, has received such criminally scant attention.

Safety is such a simple word, and yet I know of no single word that embraces as broad a field as that one word "Safety." It is larger than what is commonly termed "Industrial Relations" because it includes it; it goes way beyond accident prevention, that is part of it; the development of loyalty, efficiency, interest in the job, all have their place in safety; and the vital happiness of every family is wrapped up in it. Safety is no appendage to any organization. It is no side-show to the circus. It is the big white tent that shelters all under it and makes possible the constant running of the whole show, no matter what the stormy conditions are outside.

That sounds like a sweeping statement, and yet the results gained from experience, together with the reports you are hearing at this convention, if thoughtfully scrutinized, must convince you that it is no exaggeration.

I am asked to tell you "Why We Believe in Safety in Our Company." The shortest and most complete answer is that we look upon safety as a distinct obligation; and we believe in discharging our obligations.

Having spent some time and effort running here and there trying to prevent accidents of one kind or another by the installation of various kinds of mechanical devices, by scolding or discharging offending employees and apparently getting nowhere in particular, we decided we had better sit down awhile on the old log and think things over. Remembering from boyhood that the only way to get rid of a lot of bees was to hunt out the nest and tear it down, instead of getting all out of breath chasing the individual bees all over creation, we began to take a witness-box examination of what it was all about. As a result, we discovered the following startling facts, each of which though apparently unrelated to the others, yet has an important place in the whole scheme of safety.

First: The Department of Commerce told us that \$800,000,000 is lost to industry annually through accidents. Second: We knew from experience that our injured

employees draw only part pay when on compensation and that this works a distinct hardship on them and their families. Third; Roger W. Babson's statistics showed that at the age of 50 years over half our male population is down and out through laziness and indifference. And finally: The National Safety Council told us that over 20,000 little children lose their lives every year through accidents of one kind or another.

These facts alone ought to appeal to the imagination of most business executives and ought to open up a pretty broad field for thought.

The staggering loss of 20,000 little lives a year with the attendant anguish and heartaches to twice as many unhappy parents certainly should become the personal obligation of every individual. Even to suggest such a thing strikes me as a travesty on the intelligence of every thinking person, and yet it is surprising how little real effort is being made to check this terrific loss. But it is clear that if something isn't done, as traffic conditions grow worse, this unfortunate "Legion of the Condemned" is bound to increase.

The Department of Commerce has done a great piece of work in saving to industry millions of dollars annually through the elimination of waste and duplication. Now it tells us that \$800,000,000 a year is lost because of accidents and that much of this loss may be prevented through treating the problem of safety as seriously as we have treated the problems of waste and duplication.

It is even questionable whether the combined loss through duplication and waste approaches the vast sum lost through accidents, and yet, while we strain every nerve in our quest for efficiency to eliminate the former, we allow safety to go merrily on unchaperoned. Are we going to continue pouring at the top of the barrel and allowing it to run out at the bung hole, or are we going to strive to keep as much as possible of this 800 million dollars where it belongs, in the treasuries of our companies? Stepping over dollars to pick up dimes is what business, as a whole, has been doing in this respect.

The progress that safety has been making up to very recently is comparable to the old darkie who was striving along a country road in a very rickety old buggy with large wobbly wheels and a raw boned, emaciated old horse named Maggie. He was apparently in unknown territory and seeing a stranger inquired:

"Say, boss, kin you all tell me how far it is to Centerville?"

"About 14 miles," replied the stranger.

"Thank you, sah!—git up, Maggie!"

About an hour later he met another stranger and made the same query.

"About 14 miles straight ahead," was the reply.

"Thank you, sah!—get up, Maggie!"

At the end of still another hour he asked a third man:

"Boss, kin you all please tell me, sah, how far it is to Centerville?"

"Yes, it's just about 14 miles straight ahead."

"Thank you, boss, well git up, Maggie, and never you mind, old horse, we's holdin' our own anyhow."

It's high time, gentlemen, that safety did a little more than hold its own in industry today.

It strikes me as a mighty shocking reflection on us as a nation when we are told that only one man in 50 in America ever thinks, that only one out of 500 ever originates anything, and what is still more startling, that at the age of 50 years, 53.5 per cent of the male population of America are down and out because of laziness and indifference.

We can't take much pride in the knowledge that at 50 years, the best time in any man's life, over half of our male population are down and out because at no time during that 50 years did they ever give a damn. And therein, gentlemen, lies the crux of this whole subject.

Old John Burroughs, the great naturalist, once said: "Men may stagnate as truly as water may stagnate; and just as motion and activity are the remedy for one, so are purpose and direction the remedy for the other."

We expect our employers to be cheerful, loyal, conscientious workers and blame them if they are not. But our experience has been that you can't get something for nothing in this world and that the responsibility for the lack of these qualities in our employees, and for the fact that so many men are down and out at 50 years of age, rests squarely on our own shoulders.

The world doesn't owe any of us anything, a fact that many fail to appreciate. On the contrary, the higher up we get the greater our obligation. As executives, the opportunity to see beyond the day's work and to vision the future lies open to us; and as executives, part of our obligation is to grasp this vision, but an equally important part is to carry that picture to the rank and file.

Safety is one of the bright spots on the highway of the future. It stands out as a beacon; and to those who are willing to follow its rays far enough will be shown this picture of future industry, an industry clearly characterized by the absence of careless workmen; an industry where this class of men has been eliminated along with waste, duplication, and obsolete machinery by the sheer force of necessity in the struggle for economic existence.

Is this elimination to be a "driving out" of the indifferent and untutored through the survival of the fittest, or is it to be a "lifting out" through education and guidance? That is the question that we have to answer.

The Greatest Asset in Industry

Gentlemen, "the greatest asset we have in industry today is an able bodied man, and the most neglected asset in industry today is that man's attitude toward his job." One of the most important phases of safety is the opportunity it offers executives to encourage their men to make friends of their jobs. The man who realizes that his job is the best friend he has in the world and that it does more for him than all the rest of his friends put together is not bumping his truck along over rough roads, he is taking it slowly to avoid wrenching his chassis. The contented workman is not rushing headlong down the street leaving it to pedestrians and children to look out for themselves, he is giving the others some rights on the street too. The contented workman is not quarreling with his fellow workers or with our customers, he is unconsciously spreading cooperation and good will. "Safety," gentlemen, "is a by product of interest in the job, so is efficiency and so is loyalty."

It takes a lot of hard tireless work to educate men, to change their mental attitude toward their work and their company, but it pays big dividends. Just as honesty is the best policy regardless of the moral issue, so safety is the best policy. It is simply good business sense.

Our task in solving this problem of safety will be much simplified if we will just recognize two fundamental facts.

First, that in the majority of cases both the cause of accident and the cure lie in a man's mind. The involved employee is either a new man who is nervous and not properly instructed, he has sickness or trouble at home, he is sore at his boss, or he just doesn't like his job anyway. And, second, if this is true (and statistics indicate clearly that it is), then the cure lies in correcting this condition of the mind, turning this man from a discontented to a good humored and contented workman. As mentioned previously, it is not the employee with a smile who is neglectful of equipment, heedless in the matter of accidents, and quarrelsome with his associates and customers. But it is the same old story. In politics it runs: as Maine

goes so goes the Country. In Business it runs: as the boss goes, so goes the organization. We can't have a happy, contented organization with a thoughtless, inconsiderate, short-sighted administration.

This contagion of contentment is well illustrated by the first half of that old axiom, "smile and the world smiles with you." The other half, "cry and you cry alone," doesn't prove out, for one is just about as contagious as the other. My small daughter taught me a lesson in this respect one day recently when she was curled up in my lap having a little heart-to-heart talk. She said to me: "Daddy, I'm always glad when you come down to breakfast smiling and happy in the morning because when you do everything seems to go right all day long, Mother is happy and the nurse and the cook and everybody seem to have a good time all the rest of the day; but when you come down cross, then Mother gets impatient with us and everybody and everything in the house just seems to go all wrong all day."

Human Nature Always the Same

If that is true in my house, I guess it is true in every other house, and it doesn't much matter whether it is in the home or in the office. Human nature is about the same the world over, and this gospel of a cheery smile is right at the bottom of the whole safety movement.

But very seriously, the one thought that I should like to leave with you this morning is that safety is a broad gauge, comprehensive proposition. It is playing a much greater part in the business of each one of us than we have any idea of. It is playing a helping part or a hindering part according to the importance we are attaching to it.

It is not alone the humanitarian appeal, although this should be ever uppermost in our minds; it is not even this appeal together with the economic loss in dollars and cents, which might well be saved, that makes safety so important; it is the tremendous influence that this work brings to bear in the building of morale, in the development of efficiency, and in the making of the employee not only a loyal, conscientious, careful workman for his own organization, but a more thoughtful and a more valuable citizen in this broad land of ours.

CHAIRMAN WAKEFIELD: We surely appreciate that very much indeed. If there are any questions or any discussion you would like to go into on any one of these papers, I want everyone of you to feel entirely free to stand up and claim the floor and give us the benefit of your comments.

A Good Registration Is Shown

Very probably you will be interested in knowing that there are some 135 members registered at this meeting. They come from the following States: New York, New Jersey, Pennsylvania, Illinois, Maryland, Massachusetts, Missouri, Indiana, Wisconsin, Ohio, West Virginia, Delaware, Connecticut, Florida, Michigan and Oklahoma. That territory is represented in this room at the present time. It is rather a hopeful sign; I thought you would be interested in it.

I want to introduce to you for a brief paper at this time, Mr. F. E. Matthews. Mr. Matthews is Chairman of the Refrigeration Safety Code Committee sponsored by the American Society of Refrigerating Engineers. Mr. Matthews has been working on an angle of safety for quite a while along the lines that we are considering this afternoon. I take pleasure in presenting Mr. Matthews.

Address

By F. E. MATTHEWS

Chairman, Refrigeration Safety Code Committee

I welcome this opportunity to speak to an audience genuinely interested in the subject of safety in refrigeration. There has been too much reluctance to speak of safety in the past for fear of suggesting its antonym, danger.

Now, lest I be considered a terrorist for advocating means of promoting safety, I wish to state that, in the nearly thirty years of active connection with the refrigeration industry, a large part of which had to do with large refrigerating and ice plant operation in seven of the largest cities of the United States, I have personally witnessed only one really serious accident.

While such experiences speak eloquently for the care that has been exercised by plant owners and operators in the past, accidents do occasionally occur, resulting in loss of life, limb and property and sometimes entailing precipitate and ill-advised legislation, which until it can have been made practicable through long experience attained through effort at enforcement, often works undue hardships on both machinery manufacturers and plant owners.

Naturally enough, demand for regulatory legislation in this connection first sprang up in the more congested centers where the effect of such accidents is likely to prove most severe. Demand for a municipal safety code for refrigeration appears to have arisen first in New York City. This was in 1914, at which time a small committee of four was appointed by the American Society of Refrigerating Engineers to assist in the formulation of such a code.

In the fourteen years that have elapsed there has been a code committee constantly maintained and the original American Society of Refrigerating Engineers code, the outgrowth of that formulated for New York City and adopted in 1915, has been repeatedly superseded by other codes from time to time to meet the constantly changing demands imposed by progress in the art. In fact such action is now required by the rules of procedure of the society which, while revision may be made annually, require that the current code be considered for revision at least every three years, during which time either the main committee or a small standing committee, appointed for the purpose, continues active to look after current public requirements.

A newly revised code developed under the above procedure has just been reported to the council of the society and presumably will be offered for approval by the American Engineering Standards Association at an early date. During the revision of this code, a number of the committee cooperated with the Bureau of Fire Prevention in the City of New York in the preparation of its revised code which was passed by the Board of Aldermen this year.

In the time that has intervened since the formulation of the first New York code, thousands of copies of the A. S. R. E. code in different stages of development have been distributed gratis to interested parties, especially for the guidance of prospective law makers by whom it has been embodied in whole or in part in many state and municipal measures.

The movement still suffers for want of proper publicity channels and to some slight extent, unfortunately, from adverse advertising on the part of its enemies. This is to be expected, however, as it is impossible to satisfy demands in radically different directions. We still have to depend largely on the inherently slow process of percolation, by which means only, unfortunately, much valuable engineering as well as other technical information finally reaches a more or less lethargic public. With the rapidly broadening outlook on national safety being created by the National Safety Council and to be supported, it is hoped, by publications in all

fields, progress toward safety in refrigeration should become soon greatly accelerated.

As to just how this can be best realized, probably no two men would offer the same answer, when it comes to details. From the speaker's standpoint, however, it would appear that all must agree that it can come only through the elimination, so far as is possible, of both the personal and the mechanical weakness factors involved in the machine and its operation. This calls, in plain language, for safety designed and fabricated refrigerating apparatus, safely installed and safely operated. This is purposely an all-including formula which in turn indicates the only theoretically all-inclusive (but practically limited) means for its realization a highly developed national standard refrigeration safety code. Admittedly in the class of "cure-alls," there appears to be no other nostrum having like possibilities.

Whether or not, when, and to what extent, this unattainable ideal is realized will depend, as do most things, on ability to sell. To sell a national standard refrigeration safety code will require:

1. A realization on the part of the refrigerating machine user of the need for some code. The urge for protective measures in this class, unfortunately, comes only locally and spasmodically when the user, or some of his immediate associates, suffers an accident in his plant. It is also promoted to some slight extent by the ever present insurance rate.

2. A realization on the part of the refrigerating machine builder of the advantages to be gained by a standard code. Here the urge comes most forcibly via his selling and erecting staffs as they encounter widely varying as well as rapidly increasing regulations in different states and municipalities. The builders of large machines have long since come to this realization. Some of those of the infant small machine industry remain yet to be convinced.

3. A realization on the part of advisers to law makers that the national standard code prepared by the best talent that can be brought to bear on the subject, operating under the highest authority having general jurisdiction is worthy of embodiment in their laws. Many states and municipalities are now coming to this realization.

More specifically, the authors of the national standard code are the members of the sectional committee organized and now functioning under American Engineering Standards Association authority and procedure and American Society of Refrigerating Engineers sponsorship. This committee now comprises 41 delegates with alternates duly appointed by 29 member organizations all interested in the art of refrigeration. Under American Engineering Standards Association rules a proper balance of representation of various interests is assured at all times and under American Society of Refrigerating Engineers rules either the main or a proper sub-committee must be always available for such matters as interpretation of the code, temporary rulings on new situations and exceptions. Periodic revisions of the code are mandatory, thus capitalizing the experience of the standing committee to keep the code proper abreast of the art.

It is believed that a movement so organized and functioning for so important an end is worthy of your full endorsement.

I just want to say that practical means for the capitalization of accidents for their subsequent prevention are proposed in the author's discussion of the paper of L. C. Smith entitled "How Can Individual Refrigerating Plant Operators Learn from the Experience of Others?"

SECRETARY FOX: You have just heard the speech of Mr. Matthews. Mr. Matthews has given this subject very close study. It is a subject that is very close to his heart. I know that as the new refrigeration section of the National Safety Council goes along and progresses that we will hear more from the codes committee through Mr. Matthews. That committee will be of great service to the furtherance of safety in the refrigeration section.

It now falls my lot to introduce Mr. Wakefield. Mr. Wakefield spoke about the time that I had given to the preparatory work that was necessary for the calling of this section, but I can assure you that the little I have done is far outshone by the immense amount of work that Mr. Wakefield has done. I take pleasure in introducing to you Mr. Vincent Wakefield, Treasurer of the City Ice Company of Kansas City.

How to Install a Safety Organization in a Refrigerating Plant

By VINCENT WAKEFIELD

Treasurer, City Ice Company of Kansas City, Kansas City, Mo.

In speaking of the subject assigned to me for discussion this afternoon, I would draw your attention to the fact that I, necessarily, labor under some difficulty because of the different nomenclature used across the country as a whole when referring to positions held by supervisory employees. Therefore, in so far as I may refer to specific positions, I ask your indulgence to the end that you will mentally substitute the title obtaining in your territory for the one that I may use.

I would also draw your attention to the fact that it is not possible for me to lay down a definite ironclad procedure that is capable of being utilized in any industry using refrigeration in any part of the country, for the reason that there may be, necessarily, vast differences in the methods of operation and the number of plants operated, and I can only outline, therefore, a rather loosely-knit organization, the underlying principles of which, however, will be adaptable to your local situation.

In approaching the subject of organizing for safety, it has been my experience that it is better to separate your employees into two divisions, namely, those serving in supervisory capacities on the one hand, and those of the rank and file on the other. Having done this mentally, or on paper, whichever will be the most convenient for you, I suggest that you select from the supervisory forces a committee of either three or five men from each plant you operate. I would then take occasion to talk individually to each of the three or five men that you have selected on the importance of organized safety in industry and of the benefits that can be derived therefrom. In short, in your personal conversation with these men, try, without showing too clearly what you are doing, to instill in their minds the necessity for and benefits obtainable from organized safety.

About a week or ten days after you have had the last of these conversations, I suggest that you call these groups of three or five men into your office and tell them that, after giving the matter very careful consideration, you have decided that it would be a very beneficial thing to have a safety organization in your plant, and that you have selected them as the safety committee. You should place upon their shoulders the responsibility of organizing themselves by electing a chairman and secretary, and the chief executive should not take any official duties on that committee or even accept membership thereon. This committee should be charged squarely with the responsibility of all safety activities within the plant and should be known as the "Plant Safety Committee."

If you operate more than one plant, this plant safety committee should be organized at each one of the plants that you operate and, as I have mentioned before, should consist of three or five of the supervisory forces. In the smaller plants, where you may not have enough supervisory forces to draw upon, it will be permissible to put in one of the older and what you might term key-men

of the rank and file. So much for the organization of the plant safety committee, which you will note has been done, with the exception of the preliminary educational work, practically by executive order. The committee should be required to meet regularly and on company time, not less than once a month.

Now as to the employees—these should be organized separately; should have their own separate officers, chairman, vice chairman and secretary, but the method of organization should be exactly reverse to the method employed in organizing your committee, that is to say, let the men themselves request permission and assistance in organizing, rather than have you tell them they must do so.

We have found that you can, through the plant safety committee, infiltrate through the ranks of the employees a constant flow of safety propaganda, emphasizing benefits that accrue to the employee and employer as a result of organized safety effort, and so, by the force of suggestion, imposed upon some of the natural leaders within the forces of the rank and file, after a short period of time, it is comparatively easy to insure their approaching the management with the request that they be allowed to organize the employees for safety. By getting this action from the employees themselves, who, naturally, think that it is their own idea, you will find the movement will be more enthusiastically embraced and it will start off with far greater chances of success than if you arbitrarily ordered them to organize themselves and hold meetings regularly. This body can be styled the XYZ Plant Safety *Organization*, as distinct from the XYZ Plant Safety *Committee*.

In order to make it easy for the safety organization to function, they should be given a charter and by-laws, which they should follow and which provides the usual regulations for such types of organizations. If any of you would care to have a copy of the Constitution and By-Laws we use in the City Ice Company of Kansas City, we shall be glad to send them to you on request.

We now have a safety organization, taking care of all employees, a plant safety committee, consisting of supervisory forces, and if you have a very large company operating in a number of different places, it will be found desirable to add what may be termed a "Central Safety Committee," who should meet regularly and pass on matters referred to it by the various plant committees, and also to formulate safety policies and pass down to those committees so that they may be put into effect. The central safety committee necessarily must consist of executives, and it is most heartily recommended that the president or chief executive of your company be the chairman of that committee.

Having thus set up your entire safety organization, it cannot be said to be organized until there is a reasonably clear understanding in everyone's mind on the work that is to be done and the method that is to be followed in doing it and, with your permission, therefore, I will outline briefly some of the major activities of each of the groups I have suggested.

Starting at the bottom, and considering the work that should be done by the employees themselves, it is suggested that they should be furnished with a copy of all accident reports and that at each one of their monthly meetings, these reports should be read and discussed by those present, with a view to determining the cause of the accident. In this way, the cause of accidents becomes more generally known and employees warned against that particular type of accident. They should have an inspection committee which, at periodical intervals of less than one month, should go over every part of the plant and make a report on a printed form provided for that purpose. This inspection should have as its object three purposes, namely:

- (1) General cleanliness or, as I have heard it better termed, good house-keeping. This is important from the fire prevention angle, as well as the accident prevention angle.
- (2) Physical hazards of either structure or machinery.
- (3) Improper performance by employees of their duty, thus exposing themselves or others to injury.

The written report of this committee on the form referred to should be before the body for their consideration, so that they can feel that they are taking an intelligent part in managing the safe conduct of the plant and themselves.

The chairman of the plant safety organization should assign to two or more of his men the job of reading a paper, lasting two or three minutes, dealing with various phases of accident prevention in relation to specific hazards of your particular plant. Each one of the papers should be followed by discussion.

The organization should also elect one member to serve for a suggested period of three months, whose duty it shall be to maintain in a clean and orderly condition safety bulletin boards, which should be provided by the management. This individual must be responsible for the posting thereon of safety bulletins, which should also be furnished by the management and which are obtainable from the National Safety Council. It has also been found practical and desirable to have a committee of three men, whose duty it shall be to see that first aid kits, gas masks and other safety appliances are maintained in good order and fully stocked. This committee can also be charged with part of the educational program in educating employees in the use of the appliances and first aid kits. It will be found that a greater success will be achieved if the safety organization has a committee of three or five members, which shall be known as the program committee and whose duty it shall be to prepare at least one week in advance of the meeting an attractive, well-designed program. In this connection, particular attention is drawn to the fact that it is usually possible three or four times a year, or even more often, to obtain an inspirational address by some speaker who is not connected with the company, but a man of some prominence in your locality. The local Safety Council of your city will, I am sure, be delighted to assist you in locating men of this type.

By following these suggestions, your meeting will have definite business in front of it and will proceed in an orderly way. It is suggested that the meeting should not be permitted to last longer than an hour and a half, and it will be better if it can be conducted in an hour. An opportunity should be given at each meeting for any individual in the audience to draw to the attention of that body any hazard that he feels exists. The body should be permitted to legislate by passing resolutions, after carefully considering a hazard, said resolutions making specific recommendations wherever possible to cope with the hazard under discussion.

As to the plant safety committee, it will be found to be wise to hold them in much the same relation to the safety organization that the United States Senate is to the House of Representatives, in that every resolution and recommendation made by the safety organization must come before the plant committee for its approval or disapproval. If it is disapproved, it is returned with an explanation as to why it is disapproved, and if it is approved, it goes on up to the chief executive officer for his attention, and may I say a word here that, if, when your chief executive receives that recommendation and does not approve it, should promptly return it, assigning his reasons for disapproval. It is very important that safety organizations making recommendations should be advised that they have either been approved or disapproved; otherwise, it will undoubtedly promote a loss of interest.

The plant safety committee is also charged with seeing that the safety organization and the activity of the safety organization is functioning properly; of

staying behind the scenes, as it were, and yet, actually steering the work that is being done; seeing to it that the meetings are held regularly and making sure that when those meetings are held, a regular program is ready and that it is followed in proper order and properly handled.

It is also the duty of the plant safety committee to take every opportunity that they can to constantly preach the safety gospel among employees, and show its practical application from day to day.

Another, and one of the most important duties of this safety committee is to make certain that new employees are educated on how to do the work that is assigned to them in a safe manner.

There are, of course, many activities of both the safety committee and safety organization which time will not permit me to touch upon here. If, however, you will follow the procedure I have outlined, you will have at each one of your plants or, if they are too small, at each natural geographical group of plants, a safety organization of all employees, a safety committee of three or five supervisory forces, and, possibly, a central safety committee to steer the whole. I know from experience in my own company that this type of organization, provided its work is carried on regularly and with enthusiasm and enjoys the enthusiastic support and approval of the management, will give most amazing results of cutting down accidents of all types.

CHAIRMAN WAKEFIELD: Gentlemen, the next and final number on this program is to be presented to us by Mr. Leslie C. Smith. Mr. Smith has been sitting here in the corner listening to these various papers. He is going to talk to us on a very appropriate subject, "Where Do We Go from Here?" In introducing Mr. Smith, I do so with a great deal of pleasure because we who have been in the ice business for any length of time regard Leslie Smith as the father of the ice business.

Where Do We Go from Here?

By **LESLIE C. SMITH**

Secretary, National Association of Ice Industries, Chicago

We have been told how this movement can be done, how it has been done; we have been told about the success which has followed it, of its impression, vital and strong; about the men who have fostered this movement, of the clear thinking and analysis which these men have brought to it and of the sanction of their expenditure of time, energy and capacity in promoting it. We have heard capably analyzed for us its economic soundness, its justification, first of all, from the material side. None of us could hear that analysis and not wonder why we were not organized thoroughly to promote that type of cooperation in business. Then, we have had told us both by Mr. Scott and Mr. Oler this vital thing that is growing more potent in American business every succeeding year.

There is an old adage that the tendency of mankind is toward a race of friendly men. It has been rather difficult to follow the reasoning, I confess, over much of history. It is none the less difficult to follow its reasoning in some branches, some industries, in our great American commercial life. The obstacles established against it have been, first of all, the indifference; and secondly, the greed behind business.

I can bring this to no man who knows of my position in my work, long established and constantly poured out, who will not understand exactly what I mean. There is nothing the matter with my business. There is nothing the matter with my industry, except the greed of the men in it. These men are thinking in terms

of friendly men; human interest is commanding attention today as it never has before in business. The interest of the mass, the interest of the composite whole has now begun to transcend the interest in the individual or in the personal success.

With that progress before us, with this thorough knowledge of the fact, we repeat that it has been done successfully with full compensation in every particular, with the idea of its economic soundness, of its human interest; and then instances such as our excellent chairman has just recited of the simple ways and means for putting it into effect; it strikes me, we have one serious weakness, and that is, where shall we turn in this multi-scattered phase of our industry, where shall we turn for guidance in these matters? My 6,382 plants have not heard Mr. Wakefield's establishment of methods. Most of them know absolutely nothing



about it. I think that applies in very large measure, particularly in those of greater number, in all the ramifications or branches of the refrigerating industry.

Isn't the next sound step for us to take the organization of that source of authoritative information to which we may turn for guidance in this work? I have discovered long since that if I want to put a proposition across to my people, I have to carry them a concrete plan. If I do not, it is lost in the maze of individual thinking. I believe that is true here. Nor can I find the slightest possible prospect of conflict, howsoever we may establish these points of interest. In other words, a safety code is perfectly sound and should be there, but it should offer no obstruction or no cross-current to the man who is out on the platform or in the storage house or out on the street. So, when that becomes thoroughly understood and in larger practice, we shall find it as Mr. Fox has said, entirely of assistance to the major thinking; for after all, it is doing the thinking that is right both for ourselves and for those who in large measure are dependent upon our direction both for their safety and physical return.

My conclusion is just this: I shall take this project back to my industry in its entirety; I shall bring to that presentation the best I can find, to make it clearly

understood to them exactly what we are trying to do; and then I shall persistently insist that it is a normal, natural, proper step in the evolution of the ice industry of America.

There is my concrete plan. We are discussing drawing ourselves together under the guidance of this organization which so long and in so many ways and ramifications has proven its capacity to direct, has proven its authority for information which we may need—then what other things, I repeat again, does there seem for us to do than put our interest, put our determination behind this movement and forward it with all the driving power we can?

Many of us are responsible to groups, I to a very large one, you perhaps to an individual company; and yet, if you are a member of my organization, you will be very glad indeed to know that you can be made directly helpful to what other people might do.

I said it is growing to be a race of friendly men. May I give you an illustration of that? Sixteen years ago, a man who recently came into this business in an executive capacity, seeking information, went to one of the very large successful companies in America. He was told that what they had amassed in information about making, handling and distributing ice had cost them a lot of money and they didn't propose to give it away to anybody. That was sixteen years ago. Today, I doubt very much if there be a plant or company that would not even go so far as to open its books to any sincere, unselfish inquirer. The secrecy in business, in industries, is rapidly passing out, and should pass out. And so, it is the being helpful, each to the other, that is binding us together.

In the organization and by and through it, we shall rapidly learn where some one can find information of direct importance to him, which he can make productive of the big interests involved in bringing it into application in his own contact. I can find no reason, I have heard none, which should not make all of us richly eager to get into this movement and to do what we can to bring Mr. Wakefield's better success, Mr. Oler's broader vision, Mr. Scott's wide scope of experience and observation, back to the thing for which you and I are responsible.

Resolution to Found a Refrigeration Section

F. S. ARMSTRONG (Central Illinois Public Service Co., Springfield, Ill.): At this time, with your permission, I would like to offer the following resolution:

Whereas, On this second day of October, 1928, there are in meeting assembled a large number of people who are vitally interested in organized safety for those industries using refrigeration; and

Whereas, At this meeting there has been clearly shown the great need for the establishment of a Refrigeration Section; now therefore be it

RESOLVED, That this meeting does hereby recommend to the Executive Committee of the National Safety Council to officially authorize the establishment of a Refrigeration Section of the National Safety Council.

I move the adoption of this resolution, Mr. Chairman.

CHAIRMAN WAKEFIELD: You have heard the resolution. Do I hear a second? (The motion was seconded and carried.)

C. B. RYAN (Northern Indiana Power Co., Indianapolis, Ind.): May I present a resolution?

BE IT RESOLVED, By the Refrigeration Section that the organization committee which functioned in 1928 be hereby authorized to continue its functions with full power to elect officers until the annual Safety Congress of 1929.

I move you the adoption of the resolution.

CHAIRMAN WAKEFIELD: You have heard the resolution. Do I hear a second to it?

(The motion was seconded.)

CHAIRMAN WAKEFIELD: The resolution is to the effect that the committee which organized this section should be empowered to carry on its activities, if the Executive Committee of the National Safety Council approves this section; and if necessary it will have authority to elect officers of this section until the next convention next year.

(The question was put to a vote and carried.)

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Rubber Section

New Section Officers

- General Chairman*—M. A. QUIRK, Morgan and Wright Plant, United States Rubber Company, Detroit, Mich.
- Vice-Chairman*—E. R. LAWLER, United States Rubber Company, Hartford Plant, Hartford, Conn.
- Vice-Chairman*—PAUL VAN CLEEF, Van Cleef Brothers, Chicago, Ill.
- Vice-Chairman*—E. A. HOENER, The Firestone Tire and Rubber Company, Akron, Ohio.
- Secretary and Publicity Committee Chairman*—S. MANSFIELD, The Goodyear Tire and Rubber Company, Akron, Ohio.
- Poster Committee Chairman*—J. T. KIDNEY, The Goodyear Tire and Rubber Company, Akron, Ohio.
- Program Committee Chairmen*—A. L. VILES, The Rubber Association of America, New York City; and
C. E. OTT, Seiberling Rubber Company, Akron, Ohio.
- Slide Committee Chairman*—R. H. COCHRAN, Kelly-Springfield Tire Company, Cumberland, Md.
- News Letter Editor*—J. E. LYNCH, The Fisk Rubber Company, Chicopee Falls, Mass.
- Membership Committee Chairman*—P. M. WOODEN, The Mansfield Tire and Rubber Company, Mansfield, Ohio.
- Statistical Committee Chairman*—HOWARD W. LOW, The Miller Rubber Company, Akron, Ohio.
- Health Committee Chairman*—L. J. D. HEALY, Federal Division, The Fisk Rubber Company, Cudahy, Wis.
- Engineering Committee Chairman*—C. L. HUNGERFORD, Firestone Tire and Rubber Company, Akron, Ohio.
- Safety Contest Committee Chairmen*—E. W. BECK, United States Rubber Company, New York City; and
A. D. KUNZE, The Rubber Association of America, New York City.
- Advisory Committee*—H. T. MARTIN, The Fisk Rubber Company, Chicopee Falls, Mass.
E. W. BECK, United States Rubber Company, New York City.
W. L. SCHNEIDER, The B. F. Goodrich Company, Akron, Ohio.
R. C. SALISBURY, The Fisk Rubber Company, Federal Division, Cudahy, Wis.

Retiring Officers.

Chairman, R. C. SALISBURY, The Fisk Rubber Company, Federal Division, Cudahy, Wis.; *Vice-Chairman*, M. A. QUIRK, Morgan and Wright Plant, United States Rubber Company, Detroit, Mich.; *Vice-Chairman*, PAUL VAN CLEEF, Van Cleef Brothers, Chicago, Ill.; *Vice-Chairman*, E. A. HOENER, The Firestone Tire and Ohio Railroad Company, Richmond, Va.; *Publicity Committee Chairman*, E. R. LAWLER, Hartford Rubber Works, Company, Hartford, Conn.; *Poster and Slide Committee Chairman*, HOWARD W. LOW, The Miller Rubber Company, Akron, Ohio; *Program Committee Chairman*, HARVEY WILLSON, The Rubber Association of America, New York City; *News Letter Editor*, L. W. DURKEE, The Goodyear Tire and Rubber Company, Akron, Ohio; *Membership Committee Chairman*, R. H. COCHRAN, Kelly-Springfield Tire Company, Cumberland, Md.; *Statistical Committee Chairman*, S. MANSFIELD, The Goodyear Tire and Rubber Company, Akron, Ohio; *Health Committee Chairman*, DR. J. NEWTON SHIRLEY, Hood Rubber Company, Watertown, Mass.; *Engineering Committee Chairman*, T. F. HOUSTON, The Firestone Tire and Rubber Company, Akron, Ohio. *Advisory Committee*: H. T. MARTIN, The Fisk Rubber Company, Chicopee Falls, Mass.; E. W. BECK, United States Rubber Company, New York City; W. L. SCHNEIDER, The B. F. Goodrich Company, Akron, Ohio.

October 1, 1928

R. C. SALISBURY, Chairman

Manager, Health and Safety, The Fisk Rubber Company, Federal Division
Cudahy, Wis.

The first session of the Rubber Section at the Seventeenth Annual Safety Congress was called to order at one-thirty o'clock by the chairman, R. C. Salisbury, The Fisk Rubber Co., Federal Division, Cudahy, Wis.

CHAIRMAN SALISBURY: We are fortunate in having as our speaker this afternoon a man who is vitally interested in the safety movement, a man who is known not only in Wisconsin but in other States as well as an authority on the subject of safety. He is a man of broad sympathies and splendid understanding.

Mr. Knutson is a commissioner of the Industrial Commission of Wisconsin and, as such, is brought into close contact with thousands of persons who have had the misfortune to be injured.

He has reviewed thousands of accident cases and from those cases he has been able to draw conclusions which give him a fund of valuable ideas in all that pertains to industrial accidents.

He has addressed many meetings of the National Safety Congress in former years and safety conferences in many parts of the United States. He always gives his audience his best. I take great pleasure in introducing Mr. R. G. Knutson.

Safety Moves Forward and Why

By R. G. KNUTSON

Commissioner, Industrial Commission, State of Wisconsin, Madison, Wis.

We have come to a point long past the time when the employer and employee worked side by side, when their relationship was that of neighbor and comrade. Then their interests were practically identical. They were engaged in small industry and their hazards relatively small. With the advent of "big business" and mass production, now we have on the one hand, management

with its primary interest in mass production and its accountability to its stockholders for profits; and then on the other, the workers who have become more or less a part of the big system used in production.

Employer and employee are no longer neighbors and their interests are no longer identical. To accomplish its end, industry to be profitable has made necessary the use of large numbers of men working in one building of huge and rapidly moving machinery. These factors in turn have created hazards to working men which have resulted in many injuries with their resultant losses in earning power, followed by suffering and anguish.

It is well recognized that this condition which modern industry has produced, must be carried by industry as a cost of production. Such cost of production is then, in turn, borne by the public, the consumer, which constitutes the state. Upon this hypothesis, what should be the proper attitude of the state in accident prevention work?

The state is interested in the development and maintenance of a high standard of living. Its ideals are assured only when its citizens are strong, virile, independent and self-respecting. The state must, not as its right, but as its duty, do that which is necessary to build the strength and wealth of its largest class, the worker. It cannot by indifference permit itself or its institutions to be jeopardized by poverty, devitalized labor and the economic wants of manpower which are the result of industrial accidents. To accomplish these aims and purposes, a state department of labor has a real job before it.

Compensation laws, in a measure, softened the results of injury, but the most important field in which a state, or its agency, the labor department, can engage is in the promotion of industrial safety. I use the term promotion of safety rather than accident prevention because it conveys the idea that the state should be actively engaged in positive and constructive work.

First of all, and as a base from which to operate, the state must declare by law that all places of employment shall be reasonably safe and require that an employer shall not permit or allow dangerous practices to be used. The primary obligation as to safety should be upon industry. Upon this declaration of principle, the administering body should act as much as possible in a helpful and advisory capacity. Its purpose should be not that of a police officer having in view prosecution for a violation of a law, but rather that of a salesman, selling the idea that compliance with the law promotes safety and avoids the harrowing results of an injury.

There are two kinds of investigation, which a state department should make, first, general inspections of places of employment, and second, special investigation of particular accidents.

In general inspection work it is very essential that it be done thoroughly and cover the entire state. If the work is not thorough, that is, if not all violations of law are discovered, it follows that some dangerous points have been overlooked and perhaps the employer lulled into a false sense of security. An incomplete inspection is worse than none, because it leaves a cause of injury uncorrected, gives the opportunity to shift the responsibility for making places and practices safe, and if an accident occurs, furnishes an alibi to the employer who is apt to assert volubly that the inspector should have discovered the dangerous condition.

This kind of work should likewise be state wide and apply to all industries to avoid a charge of discrimination. All employers in a given field should be required to comply with the law and to correct like dangerous conditions. To do less in any case, gives the competitors just cause for complaint. The intent of safety regulation is to set up minimum standards for all and to raise the level of competition so that the "good employer" is not subjected to the cut-throat competition of the unscrupulous.

General inspections should be made periodically and written reports made to point out to the employee those conditions which are dangerous and which do not comply with regulations. In making such inspections, the state official should insist that a competent person representing the management accompany him. After the inspection is completed, the items enumerated should, if possible, be discussed with the management. A copy of the report should, of course, be left with the employer.

Proper completion of such inspection necessitates a follow up, conveying to the management the idea that the department is interested in getting the conditions remedied.

The second type of inspectional work is the investigation of all accidents, particularly serious ones, with a view of avoiding similar accidents in the future. It is then much easier to convince an employer that machines and practices be changed after one of his employees has been hurt. Personal experience is always more eloquent than impersonal knowledge gained from other sources as to particular causes of accidents, and therefore the occurrence of an accident furnishes the opportunity to deliver a master stroke in the promotion of safety even though, as one contemplates the results of injuries, it seems like a rather sad commentary on human relationships to think one must wait sometimes to "lock the barn after the horse is stolen."

Of course, from a practical standpoint, all accidents cannot be individually investigated, but reports of accidents can be analyzed as to causes and a letter written making inquiry as to what steps have been taken to prevent similar accidents. Furthermore, it is desirable that the field representatives be advised of such matters. Recently in the reports received in one day, fourteen were sent in by a tie treating plant, nearly all indicating injuries to feet due to the dropping of ties because of their slippery condition. It was found that no inspection had been made of this plant and therefore a list was sent to the field representative. He was well received and steps were taken immediately, trying out several methods which should prove helpful in preventing accidents.

While the primary obligation to provide safe places to work and to avoid unsafe practices is with the employer, he frequently is required to give so much attention to production that he is not able to get the same viewpoint as an outsider as to how certain accidents can be avoided. In such cases, as well as when "safety is a stranger," there will be no great difficulty in having recommendations carried out if the inspector "knows his stuff." The responsibility for the proper promotion of safety, for welding the idea, must be placed squarely on the shoulders of the inspector. By acquainting himself in his district, both as to conditions and persons, by personal visits to plants with proper words of advice and compliment when and as deserved, he can build up a spirit of confidence, so that employers will invite advice and counsel.

It is well recognized that a very important phase in the promotion of safety is educational. In this field the state can and should play a leading role. It can maintain an information service so that employers may have the advantage of expert assistance in remedying unsafe conditions and practices. Perhaps a state that has done most along this line is New Jersey, under the leadership of Dr. McBride. This state maintains a wonderful and elaborate safety museum wherein are shown the latest practical devices for guarding machinery and parts and also the proper means of avoiding and preventing dangerous conditions. Here is a practical demonstration to employers as to how things can be done to make work safe. Such work is really construction. It developed a better attitude on the part of the employer by showing that the state is more interested in helping him solve his problems than in merely detecting violations of law.

As important as discovering unsafe conditions and practices, is the bring-

ing home to both employers and employees knowledge of what constitutes unsafe conditions and practices and a development in their conduct, particularly as it relates to co-workers, of a safety consciousness. Judging from the sudden and great increase in accidents since 1920, it would seem that the most important factor in safety is psychological rather than mechanical or technological. In other words, accidents are due to carelessness and thoughtlessness of persons, manifested chiefly in the way they do their work rather than in the way machines are constructed and guarded. An analysis of the accident experience in Wisconsin, or any other state, discloses the fact that only 15 to 20 per cent of all accidents are machine accidents, as compared to the 80 to 85 per cent caused by falling objects, and the like. Many, if not all, such accidents can be avoided, but only by an active living mental alertness on the job and a knowledge of how to work safely.

A very effective means to attain this end is the promotion of regional safety conferences. These conferences can be held in those localities where the employers themselves are willing to get behind the movement and actually put it across. In Wisconsin we have found it desirable to give such conferences regional names as Fox River Valley Conference, Wisconsin River Valley Conference, Rock River Valley Conference, rather than the name of a city. Cities conveniently located are grouped with a view of bringing together employers and employees known to each other and who therefore are more apt to exchange experiences freely and take to heart the information they receive.

It is probably better to hold one day conferences so that men will not be away from home over night and will lose not more than one day from the plant. At the first meeting a single program is most desirable. In the Fox River Valley, where the fourth annual conference was held on June 6, four sectional programs were held in the forenoon simultaneously, namely, wood-working, metal trades, paper and pulp and public utilities. At each of these, problems were presented pertaining to the one particular industry. In the afternoon and evening the program was general and of interest to all. Such conference may be made self-supporting by charging a registration fee.

Such conferences are valuable in themselves, but our experience has been that they serve as a means to a great end and that is that they are usually followed by Foreman's Safety Schools. These schools are usually sponsored by various local organizations and are aimed to bring together the key men in various plants one evening each week for from seven to ten weeks. So successful have these conferences and schools become that employers in other localities have requested and urged similar organizations for themselves.

To be effective, whatever is done by a state department must be predicated upon an existing body of safety laws or orders. In Wisconsin the department is charged not only with administering safety laws, but also with formulating safety regulations. The legislature has established the general standard requiring all places of employment and all practices to be safe and has placed the responsibility upon the department of defining within such rule what is and what is not a safe place or a safe practice. Within this power various regulations have been adopted and are known as safety orders and are collected into various codes.

In the process of developing these codes, the department must of necessity give recognition to the interests affected and therefore advisory committees are organized consisting of representatives of industry, labor and the public and are also made to include experts. After careful study, investigation and agreement, such codes are recommended to the department in the form of regulations and are usually adopted. Such orders then have the full force and effect of law. The advantage of such a system is that regulations are

adopted upon expert advice and may readily be changed to meet changing conditions and new methods and processes.

When a state department is fortunate enough to be charged with the administration of the workmen's compensation act as well as with safety regulations, it can do much more effective work in the promotion of safety. This is true because it has available all the experience which comes from compensation cases. Such experience not only furnishes a wealth of information as to the causes of accidents, but also gives a strategic opportunity to do effective safety work. The accident is an object lesson and with proper investigation the lesson may be brought home more thoroughly.

Two features of law are effective in the promotion of safety. These are first, that when an accident occurs because of the violation of a safety order, the employer is required to pay 15 per cent increased compensation, which obligation he cannot insure; and conversely, if an employee is injured because of willful failure to use a safety device, furnished by his employer, compensation is reduced, and second, that he is given credit in his compensation premiums for the record in his own plants. By these two provisions of law, for purely selfish reasons, the employer and employee both are urged to comply.

After all, a state department can do only that which, under a wise expenditure of money, its budget permits it to do. The attitude of the state, however, should be that sufficient funds should be appropriated to make possible those efforts by way of investigation, inspection, study of safe processes and practices, demonstration and education that will produce a safety rule and a safety consciousness that will reduce accidents to a minimum, that will save to the state a strong, virile, citizenship unhampered by deformities, that will save millions of dollars and will assure to workers and to their families, life and happiness, rather than the pain, suffering and anguish that comes as the result of avoidable accidents, but in all its work recognizing and maintaining the principle that the primary obligation to make places of employment safe is with industry.

P. M. WOODEN (Mansfield Tire & Rubber Co., Mansfield, Ohio): You spoke a moment ago about sudden drafts coming in on the men. How would you determine what the result was from a sudden draft coming in on the men?

MR. KNUTSON: Usually pneumonia.

MR. WOODEN: There would be no question as to when a man has pneumonia. Suppose he had a stitch in his back that laid him up for a couple of weeks, five or six weeks?

MR. KNUTSON: The back injuries, the back aches are about on a par with hernias.

MR. WOODEN: I agree with you.

MR. KNUTSON: Because I have made inquiry of several doctors who reside in rural sections wherein there are no industrial centers, and they tell me that they never have any of these back injury cases, which indicates to me that about the best cure for those, in so far as the individual is concerned, is the gold cure, and he takes compensation as a means of trying to get it.

E. W. BECK (U. S. Rubber Co., New York City): I would like to ask the Commissioner how his State handles the aggravation of pre-existing conditions?

MR. KNUTSON: If you have in mind a specific case, perhaps I could enlighten you more.

MR. BECK: I have in mind individuals who may have worked in, say, a coal mine or a slate quarry and are employed in a certain plant may be exposed to draft, fumes or what not, and then the case comes up as an aggravation of a pre-existing condition, which is compensable in some States.

MR. KNUTSON: Tuberculosis, for instance.

MR. BECK: Yes.

MR. KNUTSON: We are in a rather unusual situation with respect to that identical question in our State today. I will tell you how this came about. We had a case of tuberculosis of a man who had been employed for twenty-six years as a stone polisher. At the time (I don't recall the dates now) of his disability, there was an insurance company on that risk who had been on that employer's risk for three months. The previous insurance carrier had been on for two years, and the one preceding that for several years. At the trial of this case before us, the parties at interest stipulated that this man's disease was the result of his injury. So, the only question left then was which insurance company was going to pay for this fellow's disability?

Up until that time, we didn't realize that we had no provision in our law to take care of that, no specific provision to take care of a case like that. However, in the discussion of that case between the members of the Commission, it was my opinion that the insurance company who was on the risk during the period of time when this man could have quit that particular employment and gone into some other employment and not have become disabled as a result of tuberculosis, should not be held liable.

MR. BECK: Which employer, the last employer?

MR. KNUTSON: There was only one employer but three insurance carriers on that same risk.

My argument against that was this: That this employer had complied with the provisions of compensation by having had his risk insured; he had paid his premium for this compensation or protection as fixed by the State, and that it wasn't just to hold him responsible after having complied with the law and then sue these insurance carriers, to recover the damages that were involved. The decision went against the employer, not the insurance carrier.

The case went up to our Supreme Court. Our Supreme Court held that the insurance company that was on the risk at the time of disability was liable. This man had been in that same occupation for twenty-six years for this same employer.

A short time after that decision by the Supreme Court, we had a case come before us of another stone cutter who had been employed by another employer for practically the same period of time and became disabled from tuberculosis six weeks after this employer had filed a non-election not to be subject to the compensation law. Do you see the difference in the situations you have there? Now, if we were to abide by the Supreme Court decision in the first case, this poor devil wouldn't get a cent of compensation after having worked in that industry for twenty-six or twenty-seven years.

I want to tell you that I am not an attorney; I don't profess to know anything about legal technicalities, but my guess is that our Supreme Court is going to reverse themselves on that first case and lay down some new laws that will take care of these situations.

With that litigation pending, I am unable to answer your question definitely, because we are absolutely at sea now.

The aggravation of an old condition you get in a number of different instances. Take, as an illustration, a man who is infected with syphilis. Oftentimes they are ignorant of the fact. As I understand it, the syphilitic germ for some reason, or other, affects certain individuals in different ways. In some cases I have known where they have gone blind from it. Others die of what they call heart disease, syphilitic heart. Others become insane. Why it affects different individuals in different ways I am unable to explain. In still others, it affects the bony structure of the body. We had a case one time where a fellow while pushing a truck fractured the clavicle in the shoulder. The doctor set it and prescribed the usual course of treatment. After they removed the splints, there was no union. They took a Wasserman test, which showed 4-plus. That man receives compensation.

If a man comes in on the border line of tuberculosis—we have had a couple of those cases where men have just been on a job a few weeks and become disabled with tuberculosis. Of course, their cases are dismissed, because we do know, as a result of actual experience, that that type, at least, of tuberculosis does not develop within the course of a few weeks; it is usually a period of months and oftentimes a period of years that it takes the disease to develop.

Apparently there are different types of tubercular germs. In some cases, I have been told by doctors who have made a life study of it, tuberculosis can sometimes produce death within the course of two or three months from the time of its inception.

MR. BECK: My thought, Mr. Commissioner, was along the line of a man who may have worked in your stone quarries for twenty years and then he should come to Akron or Detroit and we should hire him, and then after an exposure of eighteen months or two years in our plant, his condition is aggravated. He may claim it is due to the dust or fumes or draft.

MR. KNUTSON: Regardless of which way you handle a case of that kind, in my opinion, it is ultimately evened up, because you may be sending another man from Ohio into Wisconsin, where the same thing occurs.

MR. BECK: Mr. Commissioner, the State may. I agree with you from a State point of view. They have limestone mines in Indiana and they send the men up to the grinders of Connecticut. But in the rubber industry we haven't those particular hazards that will aggravate a condition, that will really cause tuberculosis. We are employing those fellows who are already in the second stage of pneumoconiosis.

MR. KNUTSON: If they become disabled under those circumstances while in your employ, they must establish some definite conclusive evidence that there actually was a hazard in the employment you gave them that could readily have aggravated the condition to the extent that they became disabled from it. There must necessarily have been some hazard there, some additional hazard than that which we usually honor, that would actually have some direct bearing on the case, otherwise I would say he is not entitled to compensation.

W. F. KEOHAE (Beacon Falls Rubber Shoe Co., Beacon Falls, Conn.): Under the laws of Wisconsin, would a worker developing a duodenal ulcer come within the scope of the compensation law?

MR. KNUTSON: No.

E. P. MCHUGH (Mechanical Rubber Co., Cleveland, Ohio): I would like to ask the speaker if in this typhoid case, the plant purchased the water from the city?

MR. KNUTSON: No. Had they purchased the water from the city, there would have been a typhoid epidemic in the city.

MR. MCHUGH: Suppose they did purchase it in the city and found there wasn't any more cases in the city?

MR. KNUTSON: There would be no liability, because then the hazard would have been just as great within their homes as within the place of employment.

If you had seen the source of this water supply you wouldn't have wondered. I don't think they are entitled to much consideration when any person could have actually seen that water supply, the source of their water supply. It is a wonder to me that they all didn't die from something or other.

A. M. DIETZ (Pennsylvania Rubber Co., Jeannette, Pa.): I want to get back to that hernia question. Unfortunately, or fortunately, we are one of the companies that have to take care of 90 per cent of our cases. I got a thorough understanding of your demonstration, but I want explained this question: Is it possible through a man's work that there is some condition that he can develop hernia through some lift or something?

MR. KNUTSON: My answer to that is this: That you can best determine from the story that the man himself tells as to whether or not he actually got that hernia at the time he alleged to have received it. I think, at least I tried to illustrate to you, that the bulk of these fellows have an incomplete hernia to start with.

MR. DIETZ: Do you mean at birth?

MR. KNUTSON: I say, all these hernia cases, outside of those resulting from direct trauma, are the result of a predisposed condition that was there at the time of birth. By that I don't mean to say that it is impossible to produce a traumatic hernia. But, the bulk of these fellows have that predisposed condition there, either weakened abdominal walls, flabby muscles, or they have enlarged rings, depending upon the type of hernia that develops.

MR. DIETZ: With those conditions you are speaking about, is it possible to bring them about by the work they do?

MR. KNUTSON: Do you mean over a period of time?

MR. DIETZ: Yes.

MR. KNUTSON: Well, I don't know. We have allowed compensation for occupational hernia, but have allowed very few of them, where the testimony showed that this individual had a job that required excessive physical exertion extending over a period of some years.

MR. DIETZ: If you have a doctor examine a new employee and he does not find any hernia developments, could you feel assured that the company is responsible for that hernia?

MR. KNUTSON: The examination after he had it?

MR. DIETZ: When we employ a man we have a doctor examine him. If he comes into our plant under that doctor's examination all right and a hernia develops, should we feel reasonably assured that we are responsible?

MR. KNUTSON: Not necessarily. I don't think that should be the determining factor. However, I think an examination at the time he enters your employ would have been highly beneficial. If that doctor is honest in the making of that examination and gives an honest record and in addition keeps a record of the man and the man is given a copy of the results of that examination so that the man, if he isn't satisfied with it, can go and be examined by his own doctor, too.

MR. DIETZ: If after the doctor defines his condition can the man waive his rights and be hired under those conditions if hernia develops?

MR. KNUTSON: Not in our State. The only exceptions in our law are in cases of people who are blind, both eyes, or subject to epileptic fits. He may file a non-election absolving the employer from paying compensation resulting from injuries directly traceable to the handicap that he has. For instance, if the epileptic was standing at a machine, at a press, and it repeated and cut off his hand, certainly he should receive compensation the same as the other fellow. On the other hand, if while standing around or doing something, he got an epileptic fit and fell, struck a piece of moving machinery and was killed, of course the condition of the man there is responsible for the injury. They can only non-elect for those injuries that can be directly traceable to the handicap.

W. T. MEAD (U. S. Rubber Co., Providence, R. I.): Upon a doctor's examination showing a man having a very lax ring, could a hernia be produced if a man was pushing an object and his foot slipped?

MR. KNUTSON: I don't know. Perhaps it could; but if it did occur at that time, I could tell you in ten minutes by asking that man some questions. I would be interested in what he has to say as to what happened immediately following that, because if he actually did get the rupture at that time, there are certain things that must necessarily follow. If he didn't get it at that time, why, of

course, he doesn't know about these things and you can determine that by the way in which he answers those questions.

MR. MEAD: What are some of those things?

MR. KNUTSON: I wonder how many of you men here have ever had a boil or carbuncle that bursts as a result of having applied poultices?

I had a carbuncle on the back of my neck one time. I applied poultices to that. We were living away out in the country, about twenty-five miles from any doctor. At the time that carbuncle burst, I want to tell you men that I was so sick that honestly I would have welcomed some one coming around there and shooting me. All that carbuncle had to burst through was the tender skin on the back of my neck. I am telling you I thought I was within an inch of my grave. Having in mind a hernia, whether that protrusion goes down through the canal or whether it comes out through the abdominal wall, you have, I think it is, three layers of muscles across your abdomen, and if you are going to get sufficient intra-abdominal pressure to shoot a bunch of your intestines out through a hole there, in my opinion, you are absolutely done working right there, the pain would be so severe that at least the bulk of us would cry out with pain and agony.

The usual story you get is, "I went into the toilet, took down my trousers and here was a lump the size of an egg. I came back and went to work again." Another story is, "When I got home I discovered a lump; when I laid down in bed, the lump disappeared, and when I arose again the lump reappeared." All of those things are important in determining these hernia cases.

C. A. OSTBY (U. S. Rubber Co., Bristol, R. I.): I would like to ask if you don't experience difficulty in laying the reason or the blame somewhere as to what causes eye troubles?

MR. KNUTSON: Do you mean a loss of vision or some disease of the eye?

MR. OSTBY: That ultimately happened in one case, but it must have been some disease to cause blindness, I should say.

MR. KNUTSON: I think we are fortunate in Wisconsin in having what, in my opinion, are some of the best eye specialists in the country. The eye men have learned more definitely about what causes eye conditions than the general practitioner has been able to determine in so far as the other parts of the body are concerned.

Oftentimes we have cases of injury, we will say a direct blow to the eye. The man comes in afterwards and claims as a result of that blow his vision has been affected. These eye men, men that we have learned to trust, because we are satisfied their only mission in coming before us, whether at the request of the insurance carrier, the man or the employer, is in giving us an honest opinion. Those eye specialists can determine by examining that eye whether or not this 50 per cent loss of vision the man has is the result of that injury or whether it was a condition existing prior to the injury. They can determine that accurately and definitely.

When you speak of eye diseases, that, of course, would depend largely on what the man had to start with. First, you should have a definite diagnosis of his condition by a competent man. Second, you have to go into that man's history, his experience in that particular employment, and whether or not it can to any degree of reasonable probability be said that there was some condition in connection with his employment that produced this. We know that you can by wiping your eye with a towel, if there is some bacteria there, set up an infection.

I think you must have in mind quite definitely what the man's actual condition is, a diagnosis of his case. I am telling you frankly, eye cases are the least of my worries as far as compensation is concerned.

GEORGE A. HOLMES (U. S. Rubber Co., North Canton, Ohio): In Connecticut, one of the provisions for hernia compensation is that the man is unable to work after he receives an accident. Is that also true in Wisconsin?

MR. KNUTSON: Yes, in accidental hernias.

MR. HOLMES: Are there any exceptions to that?

MR. KNUTSON: Personally, I cannot conceive of anyone being an authority on compensation. If I were working in Connecticut and wanted to slip something over on you and read that law over, surely if I had a pain in my side I would go home.

MR. HOLMES: We thought along those lines, too. I was wondering if that was one of the provisions on which you make your decision. Is it necessary that a man receive a traumatic hernia? Do they always have to quit work? Can a man continue his work?

MR. KNUTSON: No.

E. R. LAWLER (U. S. Rubber Co., Hartford, Conn.): I was very much interested in Mr. Knutson's remarks on hernia. I have learned a lot today. In connection with Mr. Holmes' remarks, I have a clipping that might interest those particularly from Hartford. For a long while we have had a lot of trouble with hernia laws. Last year, in July, they changed the compensation law. The Supreme Court has just rendered a decision. It was in *The Times* in Hartford last Saturday night. The Chief Justice dissents from the opinion of the other four judges. The whole thing hinged on the word "immediate." The four judges approved of the Commission throwing out the case, stating that it meant "at once," and the Supreme Justice himself said that that was an inhuman clause in the law and should be changed. That is for the information of those that live in Connecticut; you have got to watch your step because there is going to be a change in the law.

I think Mr. Knutson's remarks have helped us all considerably in getting a better view of the hernia law.

MR. KNUTSON: About eight or nine years ago, our Supreme Court rendered a decision on a hernia case that has been known ever since as the Meade case. Our court set forth definitely what the necessary requirements were in a case of hernia where a man was to get compensation. We followed that decision. Here about a year ago we dismissed a hernia case and the applicant took an appeal and went on up to the Supreme Court with it; and in this last decision the Supreme Court said that, in their opinion, the members of the Industrial Commission were far better able to determine whether or not this man received an accidental hernia than the court. That is in substance what they said. We are, as a result of that decision, free lancers.

About three years ago, an insurance man came to me and wanted to know what I thought about their publishing in pamphlet form to distribute among their insured, the contents of the Supreme Court decision in the Meade case. I said to him, "In my opinion, that would be the most foolish thing in the world for you to do."

He said, "Why?"

I said, "Because every one of those fellows who has a hernia or gets one afterward is going to come in before our commission, and he is going to testify absolutely according to the decisions in that case." And he would. That is why I say I don't think you ought to have that provision in your law.

P. M. WOODEN (Mansfield Tire & Rubber Co., Mansfield, Ohio): I would like to relate a personal experience or observation. I had occasion to look over our files the other day. I found that in that period there were 67 men who had an existing hernia that they didn't know anything about. That is absolutely true, gentlemen. You can see from that that some men don't know when they have a hernia.

C. S. CHING (U. S. Rubber Company, New York City): I think this body owes Mr. Knutson a vote of thanks. I therefore move that we extend him a rising vote of thanks.

(The members arose and applauded.)

MR. KNUTSON: Gentlemen, I appreciate your courtesy very much. I was glad of the opportunity.

CHAIRMAN SALISBURY: I am going to pass among you a list that has been compiled, and comprises the answers to the questionnaire, sent to you about four months ago and to which 28 companies generously replied. There are results here that will be well worth going over. I am confident that this questionnaire will provoke a good discussion which will be beneficial to all of us. I am going to pass out only ten of these. You may divide them up. I want to have them all returned until I have your permission that they may be given to you permanently. In other words, I am using material here that has not been authorized by our Executive Committee.

We want to cover just as much ground as we possibly can. With that in mind, I am going to get right into this. I want to tell you again that 28 companies replied to that questionnaire. It shows that 12 of those 28 companies conduct departmental contests, that six of them conduct interplant contests, that five of them have bonus plans. It shows that 27 of these companies issue safety rules and enforce them, 25 by reprimanding their men and one by lay-offs. There are 19 of the companies using foremen's safety committees, six exclusively worker's committees and nine worker's and foremen's committees combined. There are 22 of the companies who claim to have a systematic method of instructing new workers and 16 claim that they instruct their transferred workers into the hazards with which the employee is unfamiliar. It shows also that 12 companies conduct safety mass meetings, that 12 hold courts of inquiry with management, and only four with management and workers combined; that 12 companies classify their accidents by basic cause, and 16 who state that their foremen in some manner or other list the various hazards by operation in the departments in which they work.

The other information asked was in connection with bulletin board material. I find that seven of the companies are using Elliott Service in addition to that of the National Safety Council; one uses the Mather Service and numerous and practically all of us use the home-made type of bulletin.

I am going to skip at random to start this discussion, because this is your three-quarters of an hour. It is entirely up to you to get something out of this. I shall endeavor to get something for my own selfish self. Is there a representative of the Overland Trail Rubber Company, of Omaha, Nebraska, in the room? You will observe that they hold a court of inquiry of the management and workers combined. Is there a representative of the U. S. Gutta Percha Rubber Company in the room? The Pennsylvania Rubber Company state that they hold courts of inquiry with management and workers combined. There is a representative of that company in the room. I am going to ask him to tell us just what they do.

A. M. DIERZ (Pennsylvania Rubber Company, Jeannette, Pa.): We take our lost time accidents for a complete month. At the safety meetings, we call the individual workers in one at a time. It takes us sometimes all day to do this. We ask him how he was injured, and if he has a method to prevent it or if he can offer some suggestion to safeguard himself and his fellow workmen. After that procedure is over, we immediately appoint him on the safety committee for three months in that department. He has to report at each meeting something that he has done. If he does not have a recommendation we send him his card back and ask him for it, and we invariably get it. We believe it is doing the company a lot of good.

CHAIRMAN SALISBURY: Are there any other representatives present who will talk on courts of inquiry?

Mr. Schneider, you are listed here as conducting courts of inquiry; will you tell us your plan?

MR. SCHNEIDER: We follow practically the same plan as the Pennsylvania Rubber Company. Of course, each case is decided on its own merits. Some of our groups employ different methods. We don't use the same method in every department. I find that the complaints have to be adjusted to the various men we have to deal with. Some foremen have peculiar ideas. I think the result is better than fixing one set plan all the way through our plant. I have found that that is true. We call a man in for violation of a rule, or if he has had more than one accident. The foreman must bring him in. The inspector must also accompany him and explain how the accident happened, and how it could have been prevented; and if there is any need for discipline, it is dealt out at that time. No man can report to work without first reporting to the superintendent under those measures; his clock card is pulled. The foreman has instructions that he must be sent to the superintendent's office. In some cases we have exacted pledges from the men. In other cases we have appealed to them for their cooperation. We have no general plan, as I said before. We use various methods, whichever we feel works the best.

CHAIRMAN SALISBURY: This sheet conveys to me the only known methods of educational accident prevention work. There appears to be nothing added to the questionnaires that were sent out. We have in front of us then a list of every known preventive educational measure. It strikes me that we could have a real discussion in connection with this phase of safety work if you probably had had a little more time to peruse the sheet.

This sheet shows that 12 companies out of 28 conduct some form of contest, interdepartmental or interplant. Six of them conduct an interplant contest. Is there anybody here that would like to have some information about contests?

MR. DIETZ: We tried to run our factory and the various departments of it in the contest for six months. We found that the shipping department and the receiving department and some of the other departments where the hazards aren't so great were always sitting on top. In our curing department, where 75 or 80 per cent of our accidents occur, they were at the end of the list. We talked to those men. They told us that they could cut their accidents but couldn't get away from the end of the list. We discarded that competition throughout the factory and put it on shifts, and that department cut its accidents about 65 per cent in three months. Sometimes we gave a bonus, sometimes we gave a box of cigars. The foreman ran the contest himself.

E. R. LAWLER (U. S. Rubber Co., Hartford, Conn.): In Hartford, we gave each department a base rate. We took the previous twelve months' lost time accidents and minor accidents and gave each department a base rate. So, you see, if those departments have had a fine record they have to do unusually well in order to improve that record. We found that the departments that have the most hazards are the ones that generally win the prize.

You will find invariably if you base it upon their past record, they will improve their record. In your receiving and shipping departments, they don't show a lost time accident sometimes for two years. In one case, we had in one of our departments not a single man reporting to the hospital for two years. When they get a scratch out there they never pay any attention to it, because they don't want to mar their department.

MR. SCHNEIDER: There is another way that can be handled, I believe, and that is to set your departments up into groups, and pit one group against another. We are doing that. We find there is a great deal of rivalry, because you will have

that many more prizes; you will have a group prize and an individual prize for the individual departments.

I think the method that our good friend Mr. Lawler told us about is perfectly just and fair.

C. E. OTT (Sciberling Rubber Co., Akron, Ohio): What kind of prizes do they give out?

CHAIRMAN SALISBURY: What do you do, Mr. Beck?

E. W. BECK (U. S. Rubber Co., New York City): Mr. Chairman, I have an address to give on that very subject this week.

The question of prizes is one that has stumped me to a certain extent for some time. I feel that you want to give a prize that is practical, you want to give a prize that does not require a great deal of attention to keep it looking good, you want to give a prize that will last, something not perishable.

We have tried to get the opinions of others on the question of prizes. We this last year gave four bronze trophies which were cast at the Gorham Company in Providence. They are beautiful plaques that can be fastened on the inside or outside of a building. On that plaque is the name of the company winning the prize and the reason for their winning it.

We take as a base rate the three previous years, and the prize is given to the plant that shows the greatest percentage of improvement over their average experience for the previous three years.

To answer this gentleman here, we base each of our severity cases according to what we believe is the importance of each factor. Severity we weight 50 per cent, the frequency of lost time accidents 5 per cent, the frequency of minor accidents only 5 per cent and the cost factor 20 per cent. The cost factor is the cost per thousand man hour's work, not the cost per hundred dollars of pay roll. We use the thousand man-hour's of work, because it gives us a cost per exposure to accidents, while the pay roll figure is not a fair figure, because in a State like South Carolina, you have an entirely different wage rate than in a State like Michigan or Massachusetts.

In the year 1926 we tried a new scheme of taking the original hand paintings that are used for the National Safety Council calendars and we gave those original paintings as prizes to the factory showing the greatest percentage of gain over the previous three years. Those paintings are not only pieces of art but they tell the safety story. I might say that they have been very well preserved at the factory that won them. They have been placed in a conspicuous location where the employees will see them.

The paintings can be had from the National Safety Council today. Each year the National Safety Council has 12 paintings and those paintings, while I know what they cost, sell for about one-fourth of what the original cost is. They are a bargain. They are beautiful pieces of art.

MR. CHING: If you will exclude the U. S. Rubber Company from answering, I would like to know what the other companies do in the way of prizes?

CHAIRMAN SALISBURY: I want to give an experience. A number of years ago when safety work was in its infancy and when I was serving an apprenticeship, we used to give prizes to departments, or run a departmental contest and award prizes to every man in the department. We gave as prizes six-foot rules, cuff links of more or less inferior quality, whetstones, etc. We deviated and gave two cigars to each man in a winning department and five cigars or ten cigars to the foreman and assistant foreman in charge of those departments. That plan was worked very successfully over a two-year period by the Joliet works of the Illinois Steel Company. They today have an enviable safety record. I don't know whether they are doing that sort of thing today or not. I presume they are not. I have often felt such a plan would stimulate a lot of interest in some of our departments.

I am going to ask some other of the companies to answer Mr. Ching's question and relate their experiences.

C. L. HUNGERFORD (Firestone Tire & Rubber Company, Akron, Ohio): The Central Alloy Steel Company are giving out as prizes certificates which give the winners either \$15 or \$20 worth of anything they want from shoes for the baby to new parts for their Ford car; they can buy anything they want, but they have to take it in goods from some of the local concerns. We at the present time are running a contest, and we are going to give out cash awards, money.

MR. CHING: To each man in the department?

MR. HUNGERFORD: No, just to the individual.

MR. CHING: How much will they get?

MR. HUNGERFORD: It is a safety slogan contest, and the winner will be given \$20. There is also an award to be given to the department showing the greatest percentage of slogans.

MR. CHING: Then, you are going to have two prizes.

MR. HUNGERFORD: Yes.

MR. BECK: What are you giving the department?

MR. HUNGERFORD: We are planning to give them \$50.

MR. BECK: I was talking about interplant contests. We have 20 to 30 plants. What kind of a prize is best to give to the twenty or thirty plants?

CHAIRMAN SALISBURY: That is rather difficult to answer because none of us have that many plants.

I have a suggestion that may be worth something to you, Mr. Beck. We conducted a divisional contest in our own plant on a weighted proposition. At the start of the contest, we gave each employee in the department a card with some pertinent wording on the back relating to safety and on the front the information relating to the contest, and a detachable part of the card in the form of a lottery ticket. In the division winning the contest based on lowest frequency of all accidents every employee is entitled to drop his card signed with his number into a box and we drew a raffle for \$100. We divided that \$100 into five prizes graduating down from \$30 to \$10.

We found that plan very good because everybody in the plant received one of those cards that told the safety story. When the contest was over, we announced the division that won and we had all the men congregated and see for themselves that the drawing was fair. Only five men received prizes but it had the desired effect.

I want now to go to basic causes of accidents. I have a list here of accidents that are basic causes. I will refrain from using names until I get permission on this thing. One company classified the causes of its accidents as follows: machine accidents, conveyors and gears, belts and pulleys, piling machines and other machines as basic causes of accidents. I don't think for one moment that those constitute basic causes of an accident. I have more lists.

Another company reports the following as their basic causes: handling material, handling tools, chips from tools, falling material, tripping. Those, to me, are not basic causes.

Most of you know that the Travelers Insurance Company has done considerable recently in bringing out genuine basic causes. I want to know if those are basic causes or if these are. The insurance company lists the following as basic causes: (1) Instructions—none, faulty and not enforced. That is, in my opinion, a basic cause of an accident, a possible basic cause of an accident. (2) Disobedience to instructions; improper discipline; interference by others; use of unsafe short cuts or improper practices; chance taking and haste. I don't altogether like chance taking as a basic cause. The man simply took a chance and he was hurt probably by some other condition. It is in here as a basic cause. (3) Inattention; attention distracted; inexperience; ignorance; lack of skill; poor judgment; improper

mental attitude of employee. It would be rather difficult to ascertain that that was a basic cause, but it certainly, in my opinion, is a basic cause. (4) Fatigue, mental or physical. I don't know whether we are going to be successful in establishing a number of accidents as a result of mental fatigue or physical fatigue, but we are going to try and do it.

(5) Mechanical exposures unguarded. That is not a very difficult basic cause.

(6) Poor housekeeping; congestion; improperly piled or stored material; unsafe layout of machinery or of operation; unsafe building conditions; improper fire protection or exits; improper lighting, sanitation or ventilation; goggles, masks; lack of proper equipment; conveyors, elevators, tools. I don't altogether approve of the elevators as a basic cause. There may be elevators combined with one of these other conditions.

(7) Defects in tools, equipment or materials; unguarded, partially guarded or hazardous electrical steam, chemical or other physical exposures. I was in hopes that Mr. Martin of our eastern plant would be here to talk on this, because he has an experience now of six months of foremen listing the predominant causes of the accidents on these forms. When this was first presented, I rather objected to it on the ground that no foreman would consistently or continuously report that accidents were occurring in his department as a result of lack of instruction, because if he did he would be simply reporting on himself. But, in taking it up in our regular meetings with our foremen, I believe we are really going to be able to get them to report these conditions, if they exist.

I would like to hear from somebody in connection with this, if for no other reason than to satisfy myself that we are on the right track.

MR. HUNGERFORD: We have been using that for the past three months. It has been received very well by all of our supervisors. Just before I came away, I finished an analysis of the reports. By the way, we are getting the foremen to list every accident no matter how trivial it is. They didn't like to do that at first. They thought they would have to spend too much time in the office. The managers like it very well, because it is giving them a view or a picture they never had before.

The trouble I find is that 75 per cent of our foremen are putting down checks where they shouldn't, that is, putting a check opposite "didn't follow instructions" rather than "instructions were not given." However, that is being corrected by personal investigation on my part and by the superintendents. It is getting results that we have never had before. I think it is due to the fact that we are taking the basic causes. You forgot to mention there that eighty-eight per cent of those causes were directly supervisory.

CHAIRMAN SALISBURY: Yes, that is true.

MR. HUNGERFORD: We like it.

P. M. WOODEN (Mansfield Tire & Rubber Co., Mansfield, Ohio): Poor judgment—doesn't that cover a multitude of sins?

CHAIRMAN SALISBURY: That would come under the main caption of "inexperience." Where you have an inexperienced operator, there is the possibility of poor judgment being used. The foreman might check off "inexperience" as well as "poor judgment."

MR. WOODEN: Also the caption of "more intelligent" and the man "taking a chance."

CHAIRMAN SALISBURY: Yes. I have also a more simplified list of basic causes.

M. A. QUIRK (U. S. Rubber Co., Detroit, Mich.): After you get all these lists, what do you do with them? Do you compile them and look them over afterwards?

CHAIRMAN SALISBURY: We haven't had enough experience with them, as yet. The system, as I understand it, at our eastern plant is to compile it and use it regularly. If there are too many causes of one condition, the foreman is called in and checked up on it.

MR. QUIRK: Take a plant that is giving instructions. They know they are instructing their new employees. That is the first job they have to do. Let us say that you have sixty-seven accidents in your tool department in one month due to falling objects and so forth. At the end of the month are you supposed to look over the classifications and centralize your efforts on the accidents that are giving the most trouble? As I see this thing, when you get all finished you don't know what the real causes of your accidents are other than issuing proper instructions.

CHAIRMAN SALISBURY: Take our curing room as an example. The majority of mechanical causes of accidents are conveyors. There may be a falling or dropping hazard or something of that sort. We know those conditions in a curing room. We know our conveyors are guarded properly, that is, the driving mechanism. We know that our presses in many instances have been the cause of a lot of accidents. What are the causes of the majority of your accidents? Let us say, for example, conveyors and probably overhead equipment. Now, get down to a basic cause in that department, that your foreman has "failed to instruct" his men properly or they are not following instructions or there has been inattention. Your final monthly report will show the basic cause plus the condition responsible, such as "falling objects."

C. A. OSTBY (U. S. Rubber Co., Bristol, R. I.): You asked for an answer as to whether those are basic causes or not. My opinion is that the equipment that we have (I am talking from rubber experience) is not the basic cause of accidents. It is very seldom that a piece of equipment falls and causes an accident. I think it is needless to say that all accidents or ninety per cent of them surely are caused by either carelessness on the part of the foreman or in not telling the employee where the hazards are, or carelessness on the part of the employee after he has been told. The equipment you name are the hazards and not the causes of accidents.

CHAIRMAN SALISBURY: I think so.

MR. WOODEN: Is it true in all cases?

CHAIRMAN SALISBURY: What would be the cause, in a safety stop failing to work?

MR. HUNGERFORD: That would be the cause of the injury and not the cause of the accident. That is the point I think should be brought out. We get mixed up on the cause of an injury and the cause of an accident. If a man falls over a ladder and breaks his arm, what caused him to fall over the ladder is what we are anxious to get at so we can stop it.

CHAIRMAN SALISBURY: That is what we are endeavoring to do with this basic cause list.

MR. HUNGERFORD: Is anybody willing to tell me how they discipline supervision that is on salary?

MR. CHING: How do you do it?

MR. HUNGERFORD: Let me give you a specific case. A man was taken off as a foreman and put back on a piece work job. That was pretty serious. There was a lot of other things involved besides the safety feature.

MR. CHING: How would they discipline you?

MR. HUNGERFORD: The safety department fortunately so far is not responsible for accidents. We hold the foreman absolutely responsible.

A. M. DIETZ (Pennsylvania Rubber Co., Jeannette, Pa.): There is one thing I would like to know. The Pennsylvania Rubber Company is only a baby in this safety work. Only within the last eighteen months has it been given any serious thought at all. Everything we have is pretty crude. What I want to know is how do you start your man after he is injured; what is the procedure? What do you require your men to do? What form do you have in making up the report is what I would like to have some information on.

HOWARD W. LOW (Miller Rubber Co., Akron, Ohio): As I understand the question, you mean after a man has an injury and he is unable to work any more that day or do you mean a little minor injury?

MR. DIETZ: A minor injury.

MR. LOW: At Miller, a man with a minor injury reports to the hospital without any pass whatever. He orally tells his inspector or the first man in authority above him that he is injured and is going over to the hospital. He goes over there and receives treatment and goes back to the job. I think what you are trying to drive at is how we can get the men into the hospital without reporting. The hospital makes a notation on their registers of any man who does not report an injury the same day it is received. We go to the hospital register every day. I report such cases immediately to the department head. I am glad to say they go back at them. We charge the injuries to the departments. We have our division heads sold on the fact that a man who develops an infection in a minor injury will run up the expense on his department \$100 where a minor injury would be fifty cent charge to that department.

MR. DIETZ: Where do you start? Does the injured man give the nurse the cause of the injury?

MR. LOW: The man gives the nurse the cause of the injury. We don't keep any track of the causes of minor injuries. The nurse writes down that he got his finger bruised or something of that sort. All cases are reported to the State. There is rather a complete record made of the nature and cause of injuries that we report to the State. In every case of that kind the foreman makes a written report to the safety department showing the cause of the injury and usually what can be done to prevent it.

CHAIRMAN SALISBURY: I want to bring up one point here. According to this questionnaire, 25 companies enforce their safety rules by reprimand. I am wondering if there is any record made of the reprimands in any way, shape or form to show you have disciplined employees. I have in mind this: In Wisconsin there is a 15 per cent penalty clause in our act that works both ways. The employee may be penalized 15 per cent through his wilful failure to comply with the regulations. If we furnish a man a pair of goggles and say, "Wear them," and he does not wear them, we cannot penalize that man 15 per cent of his normal compensation because we must show conclusively that we do enforce our safety rules. Merely to put a rule on the wall stating all men working at emery wheels must wear goggles and satisfying ourselves that we have complied with the rule by giving him a pair, does not necessarily follow that that rule is enforced. But, we are now, particularly in our machine shop, enforcing our rules through reprimand, discharge and layoffs, and recording them on our employment records; so that in the event a man should sustain an injury through the failure to comply with reasonable precautions, we may have a record on that man once or twice or three times, where he has been laid off, reprimanded or discharged and our case would be ever so much stronger. I am wondering if anybody has any system of recording such violations of the safety rules in the employment records.

MR. HUNGERFORD: Regardless of what the suspension is for, a suspension slip must be immediately sent to the employment department where it is filed as a permanent part of his record. We don't simply say, "suspended for carelessness," or "suspended for poor workmanship;" we insist that a very definite story of the exact offense is stated fully.

ADJOURNMENT

October 2, 1928

R. C. SALISBURY, Chairman

Manager, Health and Safety, The Fisk Rubber Company, Federal Division
Cudahy, Wis.

The second session of the Rubber Section was called to order at 9:30 o'clock by the chairman, R. C. Salisbury.

CHAIRMAN SALISBURY: Gentlemen, I want to make a few remarks concerning the activities of the Rubber Section—what they have been, and probably what they should be.

The Executive Committee during the past year met twice, once in Akron and again in New York. The Akron meeting was very successful. There were sixteen members present and we met at the Goodrich and Firestone plants—two-day session. Then again in New York in April we were the guests of the U. S. Rubber Company and there were eleven present, with six visitors, also a two-day session.

Various chairmen of the committees have been very active and, if you will remember, last year when I was given the honor of becoming your chairman I stated then that my success would be assured because I was surrounded with a splendid executive committee, and that proved to be a fact. All members have functioned wonderfully well and have cooperated to their very best extent. Special mention should be made of the *News Letter* Committee. We were unfortunate in the early part of the year in having to accept the resignation of Mr. Schreiber, of Goodyear, due to a change in his position, but he immediately filled that position for us through Jimmie Quirk (the vice-chairman in charge of *News Letters*), by providing Mr. Durkee, also of Goodyear. You have read some of Mr. Durkee's *News Letters*, and I am sure they proved very interesting and instructive.

The Membership Committee has rendered an excellent report, as follows:

Report of Membership Committee

By R. H. COCHRAN
Chairman

Number of Members in Rubber Section 10-1-27.....	48
New Memberships During the Year.....	10
Memberships Cancelled During the Year.....	5
Total Number of Members in Rubber Section to Date.....	53

List of New Members	No. of Employees	Date Received
E. M. Smith Company	125	9-30-27
The Lima Cord, Sole & Heel Company.....	48	11-24-27
Johnson & Johnson	1,600	12-13-27
Corduroy Tire Company	365	3-19-28
Avon Sole Company	150	5-10-28
Cambridge Rubber Company	1,500	5-22-28
Johns-Manville Corporation	4,500	7-18-28
Ohio Rubber Engineering Company.....	.....	7-30-28
Michelin Tire Company	1,900	8- 9-28
Utility Manufacturing Company	35	9- 6-28
List of Memberships Cancelled:		
Essex Rubber Company .....	.....	10-28-27
McCreary Tire and Rubber Company.....	.....	4- 7-28
Bickett Rubber Products Company .....	.....	12- 7-27
Mason Tire and Rubber Company .....	.....	8- 6-28
Canadian Johns-Manville Company	200	8- 8-28

Several other companies seem favorably impressed with the National Safety Council and its activities and probably will join in the near future if they are properly urged. They are:

The Gates Rubber Company, Denver, Colo.
 Manhattan Rubber Company, Passaic, N. J.
 Belmont Packing or Rubber Company, Philadelphia, Penna.
 S. S. White Dental Company, Prince Bay, N. Y.
 Quaker City Rubber Company, Philadelphia, Penna.
 Lambert Tire and Rubber Company, Akron, Ohio.

During the past year, five committeemen were appointed to assist in the membership campaign. They were: Messrs. Reed B. Harkness, Cupples Company, St. Louis, Mo.; L. J. Glascock, Dunlop Tire and Rubber Company, Buffalo, N. Y.; J. M. Hunter, U. S. Asbestos Company, Manheim, Penna.; Wm. T. Mead, U. S. Rubber Company, Providence, R. I., and R. A. Bullock, Corduroy Tire Company, Grand Rapids, Michigan.

In the early part of the year I received a list of non-member rubber companies from the National Safety Council. A circular letter was written and, together with some pamphlets from the National Safety Council, was sent out on our company stationery and envelopes to all the different non-member rubber companies. Mr. Bushnell made this suggestion and I thought it a very good one. Seven replies were received from different companies—most of them favorable.

My intention at that time was to divide the United States into five sections and give each member on my committee a list of those companies located in his section and then about three weeks after I sent out my circular letter, have them write to each company in their particular section. Then in about a month I planned to have the National Safety Council send out another letter. The lists were not sent to the members of the committee on time but were sent out to them about two weeks ago and, of course, this does not give the committeemen an opportunity to do very much before the convention in New York. However, the National Safety Council, and especially Mr. Bushnell, has been corresponding with the non-members and cooperating with this committee in an effort to get new members.

The number of new members for this year was ten, but the number of cancellations was five, so we have only five new members—equal to that of last year. However, as stated before, the companies mentioned in the first part of the report seem very favorably impressed with the National Safety Council and the new Chairman of the Membership Committee should or may get started early this year securing these companies to become members before starting a campaign for other new members; that is, he will have something to work on, and should get an early start.

CHAIRMAN SALISBURY: That speaks well for your Membership Committee.

I took the time to read that report because I do know that Mr. Cochran has been very active in his efforts to secure new members. It is only through the enlargement of this section and the bringing into it of the other companies that we are going to get the best results.

The vice-chairmen of the section were all active and carried out their work to the best of their abilities.

The Health Hazards Section has some very good information lined up and you will get the benefit of this work tomorrow.

It is necessary to get right down to business. Our time is limited.

Mr. Smith, the speaker at my left, has asked that a change be made in the program, because of the fact that he must provide for a Wisconsin dinner, and he has asked to make a switch. Mr. Cook, who is the first speaker, has consented, and we will have Mr. Smith.

Ramifications of Safety Interest

By WALTER S. SMITH

Manager, Safety Division, Milwaukee Association of Commerce, Milwaukee, Wis.

I feel highly complimented in being called before your Section today. I would be very proud, indeed, if I could give you such a message that when you went back to your respective manufacturing establishment you would be able to banish accidents forever. That, of course, I cannot hope to do, but I do hope that some word of mine may be the means of inspiring you to greater efforts along safety lines so that when another year has rolled around you will be able to say that you have accomplished bigger things in accident prevention.

I believe we have reason for self-congratulation. The fact that we are present today and the purpose for which we are here are indications that we are tending toward a higher civilization.

In the days gone by, when the cavemen or the jungle jumpers found an injured man, they immediately got busy with their war clubs and put the unfortunate person out of his misery, saying perhaps: "That's one less competitor." I doubt if any of you gentlemen would do that. In the first place, you haven't any war clubs—you have golf clubs but no war clubs. War clubs are not nice little play-things anyway, but in the old days no home was complete without one. Domestic peace and felicity were maintained by whoever got to the war club first.

Today we are experimenting with civilization. I say experimenting because it is far from perfect. No civilization even approaches perfection in which many thousands every year needlessly are killed and injured.

I have been much impressed by reading the transactions of the Rubber Section of other years and note the high quality of the men who addressed your various meetings. It is an inspiration to read what they said to you. It seems to me that it would be time well spent for every safety man to have access to the printed transactions of the National Safety Congress so that he might draw on the splendid safety gospel therein shown.

Many of the addresses are well worth reading a number of times, which reminds me that Paderewski said "repetition makes reputation," so if we wish to rank high as safety men we can very well repeat on the reading of the transactions of the congresses in years gone by.

There are perhaps six thousand people in attendance at this safety congress and let it be hoped that every one is intensely interested in taking back home with him the enthusiasm that he will so much need during the coming year.

Every speaker, in making a public appearance, would like to be witty, would like to be effervescent and make a hit with his audience. I regret that I cannot be that way for the simple reason that I am depressed because I know that today, while we are assembled here to discuss safety, 69 people will be killed in automobile accidents, 63 will die by accidents in industrial plants, 41 will be consumed by fire, 22 by drowning, and 63 will lose their lives in home accidents.

It seems to me that we have not sufficiently popularized safety. We have not made a fad of it as yet. There are any number of men in the United States who watch very closely the styles worn by the Prince of Wales and are very quick to imitate him in their dress. Of course, that is a fad, but if we could make safety a lasting fad, which may seem somewhat paradoxical, perhaps we could get greater results than we have so far attained.

What we need, also, is to get more big men interested in safety. If the most noted business man in America were to say tomorrow, "You business men had better get behind accident prevention right away as a matter of good, common

sense," it would be one of the best things that could possibly happen to the safety movement.

As an illustration, if I say "No matter how we juggle the figures, two and two added will always make four," no one will pay any attention to that, because the statement seems trite and the person making the statement is perhaps not widely known. But let President Coolidge say that and the newspaper wires all over the country will burn up with a story that the President renews our faith in the infallibility of mathematics as an exact science.

I imagine that if we were to ask each one of you safety men here present, you would tell me that when you left your home city your plant was in as good a condition as it was humanly possible to make it and yet, undoubtedly, there will be accidents while you are away.

You have analyzed your accidents and you have kept statistics so that it would seem almost impossible for the same accident to happen twice, and yet, it does happen. Perhaps it is because while we have been able to safeguard machinery, we have not been able to fully control the human element.

Speaking of the human element reminds me of a report I received from the "Roads Department" of the Province of Quebec.

The department up to July 25 had cancelled 150 drivers' licenses for various infractions of the rules of the road.

One driver's case in particular interested me. His license was cancelled "for stopping his car on the railway track at the approach of a train with the object of daring and frightening the engineer."

Of course that is an extreme case, but it goes to show how far some persons will go in flirting with death.

We are trying to find all of the ramifications of safety interest. In our search we are sure to find a great deal of indifference. It's your job and my job to batter down that indifference and to get all with whom we come in contact enlisted under the banner of safety.

A report of accidents in the rubber industry for the State of Ohio, June, 1928, shows one fatality—cause given is miscellaneous.

There were 621 non-fatal accidents reported.

The causes are as follows:

Hand trucks	31
Falls of persons	38
Hot, corrosive and poisonous substances	40
Falling objects	51
Slipping upon or striking against objects	72
Hand tools	78
Machines	93
Handling objects	161

The last named is the largest number. Most of the accidents named cannot be prevented by mechanical guards. Many of them can be prevented by the only means left and that is safety education.

I wonder if many of these accidents are not due to the fact that persons are placed on jobs for which they are not physically and mentally fit.

In endeavoring to discover the ramifications of safety interest, I found what we always find when we start to do this sort of thing. When we discover that accidents are increasing in spite of an immense amount of safety work being done, we try to pin the reason unto some person or persons.

In preparing this talk, I had access to a recent report of the American Engineering Council which is published in book form by Harper & Brothers, New York. I am going to quote you a few paragraphs from this book, which is entitled "Safety and Production."

After quoting a number of cases where accidents were materially reduced and remarkable increase in production made, the report says this:

"These examples not only conclusively answer the query whether accidents are controllable, but the results are so remarkable that they definitely raise the question whether the new safety movement, when it really gathers momentum, may not quite eclipse the older movement and bring results that have scarcely been deemed possible heretofore.

"Apparently there are hidden sources of strength in the safety movement that have hardly been tapped. The common outstanding feature of all the cases cited is the thoroughgoing interest of the executive. In every one of these cases the result has not been casual and accidental; it has been the result of long continued careful effort; it has been obviously the carrying out of an executive policy. The executive had not only an interest but a vision of safety and the growing belief in the possibility of realizing it, and he went to work to attain it through the peculiarly effective ways that are known to executives. In other words, these are simply further examples of the ability of an executive to impress his point of view upon industry and the significant feature of these cases is the demonstration that this power of the executive to influence action carries over into the accident field.

"This then raises the question: Is not the key to the safety movement of the future the chief executive himself? Up to the present time the safety movement has in general been essentially a second rank movement. It has had the knowledge and approval of executives but it has not entered into the consciousness of most executives as a matter demanding their personal interest and attention.

"The point of view underlying and motivating this present undertaking is, as a matter of fact, a belief that the time has come when safety in industry must become a matter of first-rate and first-hand executive importance. Frankly, the primary purpose of this study is to interest executives in the subject. It is believed that the success of the safety movement of the future, a movement that must stem an industrial tide that is running not only swiftly but dangerously, and ever more swiftly and dangerously, can be had only when safety is recognized as a major executive objective."

There are many of the largest executives of the United States that are doing a first-class piece of work in safety. Some of them are attending this congress. There are cases on record where the chief executive has shown a very decided interest in the safety of the plants under his charge. But there are many more cases where safety is being well taken care of where the responsibility has been delegated to men who are perhaps known as minor executives.

I recall a large manufacturing plant where there used to be a constant stream of men going to the first aid room to have their injuries cared for or to be sent to the doctor when the injuries were serious. Everyone there seemed to take it as a matter of course.

Yet that plant went from the first of May last year to the first of July with only one lost time accident. They had no accidents in July and in August they had two.

And these splendid results were achieved because the chief executive got busy and determined to have no more accidents. And they were successful because they got the co-operation of all the men in the plant. Everyone began to believe in safety. There weren't any ifs or ands or buts. Everybody got on the bandwagon and the result was perfect harmony and almost no accidents.

You will remember that the Spanish-American War took place during the administration of President William McKinley. Before the war with Spain started it was necessary for the War Department to deliver some very necessary information to General Garcia in Cuba. And it was imperative that some one go to Cuba with it. No one expected that President McKinley would pass up all his other duties and, as Commander-in-Chief of the army, go to Cuba with that information.

But he was able to select a man who knew how. This hazardous task was delegated to Major Rowan who went to Cuba and returned safely with his task accomplished.

It occurs to me that this is one of the most remarkable cases on record where a task was delegated to a minor officer; and so I believe it will be, no matter what new developments we may have in the safety field, the minor executives who will continue to have the greater part of the burden to bear. But perhaps you don't agree with me—that may come out in the discussion.

One of the ramifications of safety interest took me into the University of Wisconsin. The President of the University, Glenn Frank, has written one of the finest articles on safety that I have ever read, "Safety for the Body and Adventure for the Mind." I believe that President Frank delivered this safety talk at the Fox River Valley Conference at Oshkosh last June.

You will find a printed copy of the address in the National Safety News for September. Among other remarkable statements, President Frank said this:

"If I did not think enlightened self-interest was making for such an end, I should join the men who despair of our civilization. But our machine age is going to cure itself of its own sins without either the assistance of outside reform or any internal reform of the characters of business men, simply because the steady advance in technical progress and business intelligence is making it daily plainer that most of the things about our machine age that the critics condemn are bad business."

Now, gentlemen, I thank you for your patience and your kind attention. May you go forth to your endeavors with fresh determination to surmount the difficulties that beset your tasks.

May you be filled with the spirit that wavers not, and that you may be spared many years in which to make America a safe place in which to work and to live.

WALTER S. SMITH (manager of the Safety Division of the Milwaukee Association of Commerce, Milwaukee, Wisconsin): I would like to tell you something of my work as manager of the Safety Division of the Milwaukee Association of Commerce. Part of this work is to conduct a foremen's school, a fire prevention school and a first aid school. In our foremen's safety school we registered 6,360 people. They didn't all attend at once. Sometimes our attendance at one meeting will run as many as 4,000 people. We have the school divided into eight sections: electrical section, machine shop, all-trades, etc. We registered something like 1,700 people in the fire prevention school. They don't all attend at once, but we have attendances from 800 to 1,000 persons. While I have been engaged in a large number of different kinds of work, I think the thing that I am now doing is the most interesting. It brings me in closer contact with human beings. Mr. Salisbury is chairman of what is known as the All-Trades Section. The attendance in that section is made up of a variety of industries, those who won't fit into some of the other sections. The attendance will run as high as 1,300 at one meeting. The average for last year was 915. He is also a member of what is known as the Operating Board, consisting of 22 men that represent the leading industries for the city of Milwaukee.

CHAIRMAN SALISBURY: Thank you, Mr. Smith. We will defer discussing your paper until we have gone through the rest of the program.

The next speaker on the program appears as Mr. F. J. Hoxie, but we are going to put that over to the last subject and go right into the paper of Mr. Cook. It became necessary to make a change in Mr. Cook's paper. You will note he was to discuss vulcanizers, but Mr. Cook stated that he had already discussed vulcanizers in the rubber industry some years ago and with slight modifications the copy can be brought up to date, and he didn't feel it would be worth while coming here and repeating a subject that has already been properly covered. At the end of his paper, if there is anything on your minds in connection with heaters and

vulcanizers, I am sure he would be glad to give us the benefit of his experiences and his knowledge. I am sure that the paper he will give us will contain many valuable ideas and possibly some new thoughts. I now have great pleasure in presenting to you Mr. G. W. Cook.

Methods of Accident Prevention

By G. W. COOK

Supervising Engineer, The Travelers Insurance Co., Hartford, Conn.

Since the organization of the Rubber Section of the National Safety Council about fifty speakers have appeared before you. The safety problems of the rubber industry have been treated from many angles and the proceedings of the Rubber Section now form a valuable reference work on accident prevention in the rubber industry. You will recall that most of the speakers, who have addressed you, were men actually engaged in the rubber industry. It may be, then, of interest to you to hear the ideas of one who deals with all industries.

It is dangerous to proclaim anything new in safety. We do many things as a matter of habit and many of these methods we use today, are worthy of scrutiny. After examining some of these methods critically, we have developed certain progressive ideas which are being applied to industry in general, and it is only fitting that we examine them and test their applicability to the rubber industry.

It is almost unnecessary to say that to prevent an accident we must know the cause of the accident. If you will examine the list of accident causes, by which you classify your accidents, you will find that the list is made up of classes or kinds of accidents, but not causes. For some unknown reason the practice has grown up in practically all safety work of listing, as the causes of an accident, a description of the accident. Your foreman, when reporting on an accident, puts down under the caption Cause, "Hand caught between halves of a mould," or "Hot water splashed on man." Almost every report made by a foreman, or even a safety inspector, investigating an accident, will show under cause of accident, a description of what happened, but not why it happened.

We speak of cause and effect, and in describing accidents, almost invariably, effect is given as the cause. What caused the man to be caught between the halves of a mould? What caused the hot water to splash on the man?

This all seems absurdly simple, but try to get your foreman to report causes. Try to get your safety inspector to report causes. Take the reports of accidents which come over your desk and assign causes yourself. You will immediately find yourself in difficulty. It is easy to tell what happened. It is generally easy to tell how it happened. The difficulty arises when we try to tell why it happened; what caused it to happen.

If you analyze accidents to cause, it will mean that you will have to scrap your present charts of accident causes, with items on them, such as, hand tools, bumped against, burns, etc., and to substitute such items as, instructions not enforced, unskilled employees, ineffectually guarded, or improper planning. It would be interesting to see a comparison of experience of the members of the Rubber Section on such causes as, incomplete instructions, disobedience of rules, or congestion.

We speak of basic causes of accidents, the primary and secondary cause of accidents, the principal and contributing causes. Several people analyzing an accident may each assign a different cause. It is not always essential to find what we might designate as the basic cause. Find any cause and cure it. If you educate your organization to do that clear fundamental thinking necessary to really analyze accidents to cause, you will develop an entirely different approach to your accident

You are always much concerned over the severity of your accidents. Your first efforts are to keep down compensation accidents and, next to compensation accidents, the lost time accidents. Seldom is any serious attention given to, no lost time, or at work accidents. There has been an opinion, more or less prevalent that no effort should be made to keep down minor accidents. An increase in minor accidents has been accepted as an indication of the efficiency of the safety department in getting minor injuries to the hospital. There is a well established theory that if any effort is made to cut down minor accidents, injured employees will be driven away from the hospital and an increase in infections develop. It is an idea that was probably founded purely on theory and not on fact. In plants where a drive on minor injuries has been tried, this "bugaboo" of increased infections has not materialized.

Every accident has a cause. The severity of the physical result of an accident has little, if any, relation to the cause. The physical result of an accident is purely a matter of chance. The same cause may produce a fatality, a compensation accident, a lost time accident, a minor accident, or a near accident. From this viewpoint and, if the accident problem is to be treated as a whole, every accident is of equal importance.

We might say that all accidents are minor accidents and major accidents are only minor accidents which, due to chance, or unfavorable physical result, have become major accidents and, by the same reasoning if we stop minor accidents, we cannot help stopping major accidents. The causes of major accidents and the causes of minor accidents are the same causes. If we stop minor accidents by eliminating the cause, we can anticipate the major accidents.

This all means that we must approach the problem from a different angle, to forget the severity, and treat all accidents with equal concern, and try to eliminate all accidents regardless of the physical result.

One of the oldest safety sayings we have is, that the foreman is the keystone of safety, or the key man in safety. Later we have developed the idea that the foreman should be held responsible for the safety of those under his supervision. We endeavor to accomplish this foreman's responsibility in various ways. We hold foreman's meetings. We require them to investigate the report on accidents. We charge the cost of their accidents against the cost budget of their departments. We incorporate accident prevention into the bonus system, and we discipline them through their immediate superiors for unfavorable experience.

We have found plenty of ways of placing the responsibility on the foreman, but it is a question of just how much of this responsibility he has accepted. Is his cooperation the result of discipline from his superiors, or does he willingly accept the added burden cheerfully with a real desire on his part to incorporate it into his conception of foremanship? Most foremen look upon the safety department as an organization with which he cooperates to prevent accidents. He does not yet look upon it as primarily an organization to assist him in preventing his accidents.

The time has passed when your safety department needs to sell the safety idea to the foreman. You are now holding him responsible in his department, and you now have another obligation with respect to this foreman. Most foremen were workmen yesterday, and in many ways he still thinks with the mental attitude of a workman rather than from the standpoint of management. He should understand the economic significance of accident prevention. He should be taught how to go about it to prevent accidents, to analyze accidents, and how to solve his own safety problems.

Your safety departments have a further duty to perform with respect to the foremen, whom you hold responsible for accidents, and that is to educate them, to school them, in the business of preventing accidents. They should be taught to come to you to discuss their problems with you, and not your problems with them.

If you will recall the unexpected, extremely serious, accidents which have oc-

curred in the rubber industry, you will also recall that they were mostly accidents on machinery or engineering equipment. An elevator falls—a vulcanizer door blows off—a man is caught in a calender or wind-up. Each kind of these accidents happens so seldom that they can hardly be said to have any frequency. Grouped together, however, these engineering accidents do have a frequency which, coupled with their unusual severity, have a marked effect on the plant experience.

In every plant in the rubber industry there are two safety organizations—the one we usually recognize, and the one maintained by the Engineering Department. Your maintenance engineer is the head of a safety organization whether he knows it or not. You depend upon him to keep a vast amount of engineering equipment safe. He is tolerably successful in doing this. He has inspectors, testers, etc., testing stops, gauges and inspecting elevators, chains, hoists, etc. The fact that these accidents do happen indicates that there is still room for further improvement.

Your designing engineers are supposed to design safe machines and generally do so. When a machine is installed, safeguards are provided before it is put in operation. Unfortunately many of the hazards surrounding a machine only develop as the machine is operated. In fact, some of the most serious machine accidents in the rubber industry have happened while the machine was being developed for production. There are two ways of correcting this condition. One is to make a study of the machine in operation from the standpoint of safety and provide the safeguards. The other way, the one most always used, is to have the accident first and provide the remedy afterwards. Recall, if you will, the accidents on the rimming presses, the bead wrapping machines, and some of the tire building machines,—accidents which happened on new machines before they were properly safeguarded, but after they were put into production.

I know of no industry where there has been such a turnover in equipment as there has been in the rubber tire industry in the last few years. You have made such rapid progress that your engineers have been exceedingly busy keeping up with this progress. The job of the engineers is to design and install equipment for the production department, and keep it in operation. Safety must always be incidental to the main job of these engineers, and as it works out it is the incidental job to several different engineers. We know that to get a job done well, the responsibility should be concentrated under one man. Is it unreasonable then to say that the safety of engineering equipment should be concentrated under one man, an engineer whose first job is safety?

I know that in every plant you have what you call a safety engineer. These men are seldom engineers and their duties are not those of an engineer. They investigate accidents, hold meetings, compile statistics, make inspections, post bulletins, draw charts and do many other things. They fill a real job in the accident prevention program, but it is not an engineer's job.

There is a need for the concentration of responsibility for the safety of engineering equipment in use under one head, and responsibility for studying new equipment and seeing that it is safeguarded before these accidents occur.

Whether such an engineer should be under the works engineer, assigned to the safety department, or independent of either, I am not prepared to say. This much is certain. In the average plant one very important function, that of controlling safety of engineering equipment, is in the hands of various individuals. The responsibility is scattered and the definite control uncertain.

One of the oldest forms of safety work is plant inspection. We inspect a plant for safety. By that we mean that we make a tour of the plant and observe unsafe conditions. There are some plant operations that can be taken in at a glance. There are some others which require several hours to complete the cycle which can be termed one operation. Starting up, feeding and running a batch in a calender is such an operation.

There are other operations which are intermittent and are only performed at

intervals. Milling a batch for the cement house is such an operation. A plant inspection will disclose only a portion of the first kind, and may miss entirely the second kind of an operation.

It is evident then, that if we are going to disclose all the hazards of a plant, we must make a study of each operation from the start to the finish. We must take each department in turn and trace the operations through the department, just as a time study man analyzes operations.

We designate this as job analysis. We analyze the job from the standpoint of safety. If we have the benefit of accident records properly kept, we can allocate the accidents which have occurred to the departments where they have occurred, and possibly to the operation, and study the operations in view of past experience. Also, from our knowledge of accident causes we can develop the possibilities of accidents which have not yet occurred on the specific operations.

In some plants where job analysis has been practiced, a set of detailed safe practices has been built up for each operation. It then becomes incumbent upon the foreman, to train new employees in safety on these operations, and no further excuse for ignorance of employee can be used if the foreman has done his part.

Job analysis requires careful detailed study. It requires time and a thorough analysis of operations. The results are well worth while, and far more valuable than plant safety inspections as usually conducted.

If you in the Rubber industry will practice Safety Job Analysis, you will develop a far better picture of accident producing conditions, and in time be able to provide your foreman with detailed material for instructing his help.

If you will concentrate the responsibility for engineering safety under one head, an engineer, you should expect a decrease in the severe unexpected engineering accidents which have had such a marked effect upon your accident costs. If you will school the foreman in the fundamentals of practical accident prevention, you will be doing your share towards fitting him to carry on the responsibility which you have already placed upon him. If you will ignore severity, and treat all accidents with the same degree of seriousness, make a drive on minor accidents, you will undoubtedly have a marked effect on all accidents. And, lastly, if you will analyze all accidents to cause, you will find a much more effective method of approach to this problem of accident prevention.

CHAIRMAN SALISEURY: I think it would be well to discuss Mr. Cook's paper right now while the subject matter is fresh in our minds. I would just like to make one or two remarks concerning the Rubber Industry accident experience for Mr. Cook's benefit. It fits in somewhat with his paper. Of the 17 companies reporting their accidents during the year 1927, the rubber industry stood in ninth position with respect to the frequency rate, and third with respect to severity. In your talk, Mr. Cook, you touched on the low frequency-high severity accident—that is to say, in the paper you emphasized one or two points in connection with reduction as controlled by engineering supervision. I agree with you considerably and I just wonder if we can't discuss this phase of Mr. Cook's paper for the next ten minutes with some advantage.

C. L. HUNGERFORD (Division of Safety and Hygiene, Firestone Tire & Rubber Company, Akron, Ohio): With respect to machine accidents, and not being able to do anything until we have an accident—one of the methods that we use in our plant is this: Before a new machine is turned over to the production department it has to be okayed by the safety department. Of course, if it is a pressure vessel it has to be given the hydrostatic test. We also expect it to be seen that the state laws are complied with, such as providing necessary guards for gears, and one of the things we have found out on new machines is that very often not having just enough or too much clearance between revolving rollers causes a lot of accidents and that is a matter of education with the engineering department, but we always try to get our roller sufficiently far apart so as not to form a grip-

ping action, should a hand become caught. In other words, if it is only an inch apart, we try to get it three or four inches apart, or else right up close together, and that method has prevented a lot of accidents that never came to the attention of the management until after the machine was placed in construction and going full blast. We have had no trouble there in a year and a half and I think that is one of the reasons—inspection, study of the machine before it is placed in production for regular operation.

CHAIRMAN SALISBURY: Are there any questions you would like to ask Mr. Cook?

I have one in mind, if you don't mind my monopolizing the meeting. You made reference to proper discipline. In just what manner do you think we should hold foremen accountable and responsible for accidents? And in just what manner do you think a foreman should be disciplined? Could you answer that question?

MR. COOK: You are asking one of the oldest questions in the safety game. I have seen several different methods tried and I think you have to bring into consideration two things—the way in which a plant is managed, first of all. I recall a large electrical manufacturing concern who refused definitely to penalize the foremen or to do anything to discipline the foremen. On the other hand, they were perfectly willing to put in the budget allowances for prevention methods. It seems in this plant each department has a cost budget for operating and they were perfectly willing to charge the cost of accidents in the department to the cost budget of the department. Strange as it may seem, cost was one of the things in this plant they were disciplining the foremen on, and by adding this they got as good results in disciplining through the cost budget as by any other means. I am not prepared to say, Mr. Salisbury, how foremen should be disciplined in any plant. I think that is the job of every plant to decide.

One of the most serious accidents we had in the rubber industry occurred last spring on the in-running rolls, where they were about six inches apart. That means that in-running rolls are always dangerous. Unless a man could go clear through between a pair of in-running rolls and not get hurt at all, we consider them dangerous, and if you will discover in your plant all the in-running rolls, you will find a lot of them, and if a man can get a hand or leg or anything else in the rolls, you have a dangerous condition and it should be watched. Very often, when we see a pair of windup rolls for example, we think they have plenty of room between them. That means there is no pinching hazard, no chance of a hand being squeezed, but he can get in there in a good many ways, besides getting his hand in.

MR. McHUGH (U. S. Rubber Co.): Mr. Salisbury, I would like to find something out. Quite frequently this discipline of foremen and employees comes up at meetings. I would like to ask if they have disciplined a foreman at any time and if they would do so would they have the courage to recommend his discharge if they thought the accident severe enough to warrant it.

A MEMBER (Chicago, Ill.): I know of several plants where the foremen are participating in the bonus system and about two out of three plants charge on 20 per cent of the cost, and the other charges all of it. Now, the foremen are vitally interested because every bit of accident cost that is developed under their supervision is deducted from their bonus, and I think that is quite a severe manner of discipline.

MR. McHUGH: When you are giving him a bonus you are giving him something outside of his salary. I refer to cases where a man is on a salary and where you deduct part of his original salary, or else lay him off, where he loses that or loses part of his job. You are not touching his regular salary that way; you are touching something that is being given to him. What are we going to do about discipline?

MR. COOK: I can't speak for the rubber industry, and I wouldn't want to be

in the position of violating confidences, but I can tell you frankly that I know of cases—plenty of them—where foremen have been discharged, laid off, demoted and also in some organizations have been fined for violation of the rules that have been laid down to them.

W. L. SCHNEIDER (Goodrich Rubber Company): I happen to know of a number of cases, and I may say that this happened in some other plants, where usually the management does not have a good safety man to watch it; or else he is not one himself. This is due to a lack of effort in production. You will find that is generally true. The foreman who is not a good safety man himself lacks the essentials of a good production man. He is usually out of it.

MR. WOOD (Mansfield Tire Company): I think I sense the gist of the situation. We have been up against the same proposition. It resolves itself right back to the type of management which is sold 100 per cent on the theory that you can't interfere with the foreman. "We would like to do so, but we can't."

MR. HENNECK (The Safety Cable Company, Bayonne, New Jersey): I happen to be a living example. I am a foreman, and the method in our plant is to make the foreman realize that accidents have to be prevented at any cost, especially those that can be attributed to neglect on his part. One of the methods is to publish his name in the department on a great big conspicuous board on the entrance to the plant, showing accidents and how prevented. Another method is to have a meeting of the foremen each month to impress all of them that accidents must be stopped, by deducted bonuses. He receives no bonus for that month. The third measure of prevention was to make every foreman an inspector in the plant with regard to safety. He devotes two days a month in all departments studying conditions.

MR. McHUGH: The reason I started this discussion was the fact that in my experience we come to these meetings and we are interested and talk of safety and we want to go back and put it across. But my experience has been that we have had foremen in our plant that are good production men. If you say, "We recommend that you lay this fellow off without salary for a month," your management is not sold on that idea. We have to go out and sell that idea to the boss back home if we are going to put across discipline. You have to do it right. I don't think there is a man here this morning who has done anything.

MR. HUNGERFORD: I don't want to tell this, but I will have to. An inspector slipped in the shower room and broke his clavicle, and the safety department was criticised for having a slippery shower room. It is always slippery. The colored men settle it by wearing sandals; but in checking up we found that horseplay was the cause. Another inspector splashed cold water on this fellow. He jumped and fell and broke a bone. The foreman criticised the medical department before he found it out. It took an hour to get this case to the hospital. The foreman still insisted on telling the organization what terrible treatment he was having. The management was criticised for not having sent someone in to find out what was the real cause of the accident. Another thing he stated was this idea of holding foremen responsible for horseplay in the shower room was all the bunk and furthermore if a man was fool enough not to carry out the instructions that were posted on our bulletin board he wasn't going to do much about it. The next day he was not a foreman, and still isn't. We did keep him, but he was reduced to piecework rate basis on the job from whence he started. That is the only specific case I know, but that happened four months ago. He was the full shift foreman.

MR. McHUGH: Was in charge of a department?

MR. HUNGERFORD: He was in charge of a department; he had full range. He was first, second and third shift foreman, and responsible directly.

CHAIRMAN SALISBURY: Isn't it a fact that the necessities for disciplining foremen would be very rare? Of course, there is one example, of another foreman in

our Eastern plant losing his position not only because of the bad safety record that he had, but as Mr. Schneider said, that safety record was closely allied to a bad production record and he was discharged. But those cases are rare.

MR. McHUGH: He simply wasn't a good production man.

MR. J. T. KIDNEY (Goodyear Rubber Company): How long had he been with you, Mr. Hungerford?

MR. HUNGERFORD: Fifteen years.

MR. KIDNEY: I think the gentleman has answered his own question when he said he was foreman for fifteen years. We have had that condition, and we find it among our men who grew up with us twenty-three years, and we find that men who have been holding jobs so long are the hardest to bring into safety. We actually did bring a twenty-three year man around on the 1st of July. It was done by the State Inspector. He had six men chipping, and then one received a bad eye. The State Inspector came in and looked at the machine and saw two men in the back working without goggles. The foreman said that they didn't need goggles, that they were not chipping. The inspector said, "Chipping is going on here about them and the laws require that those in danger of the flying chips have to wear goggles, too." Well, the foreman said he couldn't see that. He said, "You have to put goggles on those men." He came back and ordered us to post bulletins out there about it. We had to put a bulletin board above the chippers that they would have to wear goggles all the time. Shortly after that he had another accident and the inspector said he was going to arrest him. The boss said, "You can't do that." The inspector said, "You leave him there and we'll take him out."

MR. McHUGH: I'd never let a twenty-three year man go on that account. We don't do that.

MR. KIDNEY: I don't think any foreman ever lost his job just because he wasn't a good safety man, but it is used as a measure of disability as a foreman and I think that the whole question is answered there. I know men in our plant that are being turned out. They may be important men, but are poor safety men, and that is one of the items that went into the yard stick with which they were measured.

CHAIRMAN SALISBURY: Gentlemen, I take pleasure in introducing to you a genuine authority on static electricity, Mr. Hoxie.

A Personal Peculiarity of Workmen—Common Cause of Accident and Fire in Rubber Factories

By F. J. HOXIE

Associated Factory Mutual Fire Insurance Companies, Phenix, R. I.

In 1921, at the Boston meeting of this organization, I gave a paper entitled, "Fire Hazard of Rubber Factories, Dependent on Humidity." In that paper I mentioned a case in which a physiological peculiarity of a man employed in a rubber spreading room was the cause of many fires. Since that time other cases have occurred which clearly demonstrate the danger of employing people about combustible volatile solvents who do not give off much moisture from the surface of their bodies.

There was an article in the "Factory Mutual Record" of November, 1924, entitled "Human Spark Plugs," which described the case of a young woman who was employed in Endicott Johnson's Shoe Factory, in passing shoe soles between rollers which applied rubber cement to them. The cement took fire from static sparks five times in one winter. In one of these fires she was so severely burned that she was under medical treatment for three weeks. Dur-

ing this time another girl carried on the work, and no fires occurred. When the first girl recovered and returned to work in the morning she had been at work but fifteen minutes when another fire occurred. It was then recognized that some personal peculiarity of this girl was the cause of the fires.

In recent years, in inspecting factories in which volatile combustible solvents are used with rubber, pyroxylin, or other substances I have made careful inquiry as to whether any people are employed about these combustible solvents who have dry skin. This can generally be determined by shaking hands with such people. The skin on their hands feels dry, and due to the fact that little moisture is given off from the surface of their bodies their clothing remains dry and they retain any static charge which is communicated to them, with the result that a spark will pass from their fingers to any grounded or large conducting object which they come near, thereby igniting nearby volatile combustible solvents.

Generally such people are not themselves aware of the fact that they are different from other people, attributing the fires which may occur about them from time to time to mere chance. In the above mentioned case, as well as the one I mentioned in the previous paper fires were of frequent occurrence, so that if this fact had been recognized it would have been at once seen that it was a physiological peculiarity which caused the fires, which might at any time cause a serious accident, not only to the persons themselves but to their associates.

In the use of humidity for preventing fires from static electricity the question at once arises as to what is the most convenient way to get the humidity and how much is needed. Several rubber factories have now been using this remedy for some years and have made careful observations which will answer these questions. Among these are the Hood Rubber Co. of Watertown, Mass., and the Firestone Tire and Rubber Co. of Akron, Ohio. A gentleman from these factories will discuss this paper and give their experience.

Several years ago I recommended humidity to prevent fires and explosions in grinding metallic magnesium. At first it was thought that the humidity would blacken the magnesium powder but it was found that the small amount required to keep down the static did not have a seriously detrimental effect.

Recently a representative of the research department of a large explosive manufacturing company wrote me, asking if I could suggest a remedy for static in the handling of dry nitrated cellulose. I mentioned the cases cited above and suggested the use of humidity. This gentleman has been asked to discuss this paper and give any experience he may have on this subject.

I have found it useful in studying the effect of moisture on static fires to plot all of the fires reported according to the month of the year in which they occurred. The Factory Mutual Insurance Companies have so little experience with dry nitrated cellulose that this method of study cannot be applied, but doubtless the manufacturers of nitro cellulose, either for explosives or pyroxylin plastic could throw useful light on this question.

As a means of getting humidity in cold weather I have frequently recommended a small open pet cock on the steam heating appliances, as these heating appliances will only be used in cold weather when the air is dry and when there is the most danger from static.

Thorough grounding of all metal parts of machines and providing a well grounded metal plate to stand upon is frequently recommended for preventing static fires. This is excellent if the grounding is effective, but frequently the operatives wear new shoes in which the metal nails do not come in contact with their feet on the inside or the metal plate on the outside, therefore the maintenance of a humidity of about fifty per cent relative or not less than five

grains of moisture to the cubic foot of air in the room in which the volatile combustibles are handled generally proves most effective.

Our experience has been that more fires are caused from static sparks from the fingers of the operatives than from the machine itself.

Another department of a rubber works in which several fires and explosions have been reported is an apparatus in which flowers of sulphur are passed through metallic sieves. These sieves serve as condensers and accumulate enough electricity to cause a spark sufficient to ignite the sulphur. I have never heard of any cases in which the static capacity appeared to be an important factor in the ignition of flowers of sulphur, although I see no reason why it should not be so if the atmosphere is dry enough.

CHAIRMAN SALISBURY: We are indebted to you for the valuable information you have given us. It is listed in the program that Mr. W. T. Runals, Assistant Superintendent of Engineering, The Firestone Tire & Rubber Co., Akron, Ohio, would discuss Mr. Hoxie's paper. He can't be here, but Mr. Hungerford has consented to give us the benefit, not only of Mr. Runal's experience, but also some of his own.

MR. HUNGERFORD: This discussion wasn't written by myself, but by Mr. R. R. Jones of my company. It is somewhat of a reinforcement of what Mr. Hoxie has said.

Discussion of Mr. F. J. Hoxie's Paper

I do not believe there is any subject more vital to the Safety and Fire Protection Engineer in a rubber factory than the subject of static electricity. Static is generated as a sort of by-product in practically every operation performed, while at the same time, the conditions surrounding that operation are more conducive to fire than is usually the case in other lines of work. The most interesting tool which any safety engineer can make for himself is a gold leaf electroscope. He can find all the information necessary in any High School book on Physics and with this tool he can make many experiments and settle some questions not otherwise soluble. With such an instrument I have repeatedly shown that some persons, for some reason, are "Human Spark Plugs," as Mr. Hoxie states. A small percentage of women operators working under identical conditions will show a charge where their associates will not show a charge. I have never discovered this property among men although it may be that it exists. It is needless to state that the best interests of safety are served when these "spark plugs" are transferred to an operation where the conditions surrounding are not conducive to fire hazards.

With this electroscope also it can be shown that the evaporation of an ordinary rubber solvent will generate static electricity; that the vapor is one polarity, the containing vessel the other. In the absence of sufficient moisture in the air, the charge is liable to build up on the containers so that a grounded object such as an operator approaching them will induce a spark with the usual results. The answer is, of course, sufficiently high humidity to provide leakage past, or direct grounding, or both. It might be well for the safety engineer to take notice in the plant of another condition which caused us some trouble before the answer was found.

It is, of course, a rule that paddles, scrapers, etc., used in handling rubber cement, or similar materials shall either be non-metallic, or some non-ferrous metal such as brass, copper or aluminum. One of our operators made a very beautiful paddle consisting of an aluminum head and blade, but he made a mistake by mounting this on a wooden pole, the net result being that the head would accumulate a static charge such as a body in free space, and brought near a grounded object such as the inside of the masticator, would give off a spark in

absolutely the worst possible place. At least two fires occurred in this manner and a metal handle stopped the difficulty.

As to the use of humidity in preventing fires from this cause, I might say that so far as I am aware we have never had a fire which might be attributed to static where the humidity in that particular part of the room where the fire occurred was above 50 per cent. In our control work, we require an average humidity of 40 per cent and require the supervision to obtain these readings, using a Sling Psychrometer, and working out the results with a Parks-Cramer Humidity Slide Rule. This method of obtaining humidity is admittedly the more accurate and with the above equipment, a slight amount of discussion which we have had, there is no difficulty in securing accurate and consistent results.

As to the method of obtaining the increase of humidity, the escape of steam is usually as simple as anything and since the winter time is when the most correction is needed, the heat liberated in the room will not be detrimental. Where air washers are used in connection with ventilating systems they can obviously be used for humidity control.

It is the custom in some plants to use a moisture of carbon tetrachloride with various inflammable solvents to reduce the danger flash. It can easily be shown that such moisture, even containing as low as 20 per cent of carbon tetrachloride, are not as hazardous as poor solvent. They are not, by any means, safe under all conditions until the amount of carbon tetrachloride is sufficiently high that its toxic effects begins to be apparent. These mixtures again are often made by men who do not realize the difference in the specific gravity of the ingredients. If the mixture is not thoroughly stirred, there will be surely some surprise parties and taken altogether the little moisture in the air is less expensive, less toxic and quite often safer than the usual mixture of this kind.

Safety and fire protection engineers should also be on the look-out to separate fire causes reported to be due to static from those which undoubtedly occur from this cause. If an operator spills solvent in an electric switch or breaks an electric lamp, or an extension cord, or does a lot of other foolish things from which a sudden fire results, it is very liable to be charged up to static. By separating the causes, the Safety Engineer will prove whether or not his precautions against static are adequate and will find many cases where the matter is one for ordinary discipline and not a revision of his method of static control. The matter is a very interesting one and, at the same time, a vital one to the rubber industry. As a matter of fact, our work here was made necessary due to the fact that we are using in our gum dipping plant often as high as 15,000 gals. of benzol per 24 hours per day, in addition to the usual hazards of a rubber tire fabric.

MR. HUNGERFORD: Though it may be that that exists now, I may be responsible for that, but he is not familiar with the exact situation, because I just happened to mention a case where we had an operator, a young man of about twenty-one, and every time he reached for his shears he shot a beautiful spark until he almost became a nervous wreck. We didn't know what to do about it. Suddenly I noticed he had on some beautiful crepe soled shoes.

Another time I was standing and watching another operator of a horizontal spreading machine. He was spreading a frame flap which had a fleecy line and this was the first shift operator running the machine. The second shift operator had gone to his locker room, and returned. It was raining outside terribly, and there had been some water coming through the window on the floor. I imagine the humidity was around 80 degrees anyway. And all at once, a light flew out and shot along the length of the room! Of course, we all left immediately, but right behind me came the operator of the third shift wearing his rubbers. He had gone down and put on his rubbers, generating a beautiful charge and letting it on to the spreaders.

The electroscope is a very handy instrument. It is amusing to take around and get up near some person and watch it act. Some people it will not affect and others it will straighten out. And it is certainly peculiar to watch the people with empty looks on their faces when you carry it around, especially from October to May. Some of them can't understand what it is all about, though we try to educate them along that line.

I will have to admit, Mr. Hoxie, that we have been very unsuccessful in using the hygrometer due to the fact that the wick must be exposed to the atmosphere and in the dusty conditions which the rubber industry is not entirely free from, the wick becomes soiled and we have proven that by taking a new wick and placing your hands around it, the moisture of your hands will affect your hygrometer reading, so we bought several automatic recording devices and we have bought also the simple wet and dry bulb and tried them out and have discarded them, due to the fact that we have found them unreliable.

MR. HOXIE: Have you used the Cramer Hygrometer that depends upon the stretch of a hair?

MR. HUNGERFORD: No, I haven't.

MR. HOXIE: I use them very generally in my work in cotton mills. You see, a cotton card-room is about as dusty as any place you can get. The advantage these have is that they have a direct reading. You don't require any wick. You can read right off on percentage.

MR. HUNGERFORD: Is that a recent development?

MR. HOXIE: No, they have been used a long while and are common in cotton mills, where they want a direct reading apparatus.

MR. HUNGERFORD: We find that the sliding rule makes it simple to do that. Another thing that comes under the head of static, which I mentioned at the end of my paper, is the use of your powdered coal systems. Not only is that particularly hazardous in itself, but there has been some bad explosions due to the use of powdered coal. We have had several fires. One was very serious. However, we find that good housekeeping is the real preventative there. We have installed a very complete vacuum system and under no condition would we permit the cumulation of dust throughout the building. The final analysis in one fire was the static that was caused by the powdered coal dust and we have since been very strict about housekeeping in the coal dust plant. I am very sorry that neither Mr. Jones nor Mr. Runals was here because they have done a lot of work on the subject, and have worked very closely with Mr. Hoxie.

E. W. BECK (U. S. Rubber Company): I would like to ask Mr. Hoxie if he knows of a very simple device for testing grounds.

MR. HOXIE: Do you make your own electricity?

MR. BECK: Yes.

MR. HOXIE: You can ground in sight of your circuit and pass it on the other side but there is a little danger attached to that. A magneto is very effective indeed. That has always been used in electrical work.

MR. BECK: Do you recommend a magneto—a megometer?

MR. HOXIE: That has always been used in electrical work. Why, yes, you have the same thing there only you have gone further testing them. You have measured them. You know that you may have ground of a very high resistance, then if you get equally high voltage it will go through. I did quite a lot of work one time in measuring grounds in reference to some study I was making of electricity, and I buried around my house plates of lead a foot square and then connected the transformer with currents of various voltages and put on a millimeter and determined how much current I would get through.

You will find very frequently the grounding of transformers is a means of safety, for the reason that you can drive a pin in the ground where the soil is sandy, and it will conduct some electricity, but not very much, and the conduc-

tivity comes from the little bit of water carried on the outside of the grains of sand. You let a ground current pass through there; the heat of the current itself will advance in a little while. We, in the insurance rules, now say a good way of getting ground for a ground detector on a switch-board is to drive a pin in the ground. Well, you know that different soils conduct electricity very differently. I put in some discussion one time in a paper that was read before the Society of American Electrical Engineers, in which the author had said that you could get a very good ground by driving a pin five or six feet into the ground. I think that was around Chicago, but you know that the ground water through the middle West is charged with lime and conducts quite differently than along the Atlantic Seaboard, so you can't gamble on that at all.

One time, in Rhode Island, lightning struck a power line on the Blackstone River, and it ran for several miles and burned all kinds of farms and did lots of damage. Yet, take this very case—that circuit was grounded at every pole through a piece of post three-quarters of an inch of pipe driven right along the edge of the river. But you know that was because water that is comparatively pure is a poor conductor, whereas water containing a small amount of salt, lime, or anything else like salt will conduct very well. But, as far as static is concerned, most any kind of water will carry that. And the chief thing in the static in rubber works is that moisture on the surface of your body counts for a lot. You know that if, as some people do, you get up in the morning and don't air your beds out, when you go to sleep that night, you find the bed is very cold. That is due to the fact that those bed clothes were moist from the moisture which had come from your body and you can't sleep warm if you don't dry that moisture out of them and your clothing. Your underclothing, and other clothing also contains moisture, and that all contains salt which conducts electricity very greatly. It is very effective indeed. But there are some people that don't have it and those people are dangerous to have around any volatile solvent.

To get back to that human spark-plug that the Endicott-Johnson people wrote about, I will cite you another instance. In a factory where I was employed, they carried this test on in a room with a number of steam taps. They leaked a little. They were going to move it to another building where there was no leaking steam. I told them to go slow. My guess was that those eighteen steam taps were doing a lot of good there and if they put that into a normal building where there was no leaking steam they would get into trouble; so they put in methods of blowing steam into it and they have had no trouble as yet. The only test I have found necessary is simply to shake hands with the people, but I have found no doubt that a more exact test could be used by putting them in a small room with a recording hygrometer. You will find that people who are apparently quite normal will surprise you by their registration.

ADJOURNMENT

October 3, 1928

R. C. SALISBURY, Chairman

**Manager, Health and Safety, The Fisk Rubber Company, Federal Division
Cudahy, Wis.**

The third session was called to order at ten o'clock by the chairman, R. C. Salisbury.

CHAIRMAN SALISBURY: We are nearing the end of the Rubber Section meetings this year and we have a very splendid program arranged for this morning. You will notice that we are to hear reports of the various committees, but I believe it would be better to call upon our speaker, Mr. L. J. D. Healy, of the Fisk Rubber Company, who is going to give us his continued talk on "Health Hazards in the Rubber Industry—Organic Accelerators and Anti-Oxidants." It is not necessary to introduce him, but rather to present him.

Health Hazards in the Rubber Industry—Organic Accelerators and Anti-Oxidants

By L. J. D. HEALY

**Technical Superintendent, Federal Division, The Fisk Rubber Company
Cudahy, Wis.**

This paper is a continuation of a similar paper on the health hazards of compounding materials used in the rubber industry and presented by the writer before the Rubber Section at the last annual safety conference.

In the latter paper the various compounding materials used in the rubber industry were classified into four groups:

- 1—Accelerators and dry organic compounds.
- 2—Dry inorganic compounds.
- 3—Gums, resinous materials and waxes.
- 4—Liquids and gases.

The method of classification and description of these compounds was taken up in detail and complete description of a considerable number of the organic compounds listed under Group No. 1 was completed. The data presented at that time has since been used as a basis for compiling a Safe Practices Pamphlet, the work having been continued by the Health Hazards Committee upon recommendation of the Rubber Section, and the pamphlet issued by the National Safety Council.

This classification may not be the best possible one, although with many years of experience with them it seemed like a logical classification. Yesterday I played hookey from this section and attended the Chemical Section where they were having a discussion on "Health Hazards in the Chemical Industry." The rubber industry is essentially a chemical industry and I thought possibly I could pick up something of interest in that section. In a discussion of manufacturing, I was very much interested to hear Dr. Gehrmann of the DuPont Company, Wilmington, say that our knowledge of most of these organic compounds, especially the newer ones, is really deplorable. I think that Dr. Shirley here will agree with that statement, as he and I have both worked on this problem during the past year, and it is a fact that there is practically no reference in either American or European literature to the greater majority of these compounds. There are only a few of them, such as aniline oil, benzol and a few of those which have caused serious disturbance in the rubber industry that have been covered. This is only a small minority. It is a big problem to classify these substances in an intelligent manner and know just what to expect from their toxic and irritant properties. This

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Health Hazards in the Rubber Industry—Organic Accelerators and Anti-Oxidants

By L. J. D. HEALY

Technical Superintendent, Federal Division, The Fisk Rubber Company
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idea is not original with myself, but the credit for the suggestion of compiling this information belongs to our Chairman, Mr. Burt Salisbury.

Mr. Salisbury realized the need of more definite information in regard to these compounds and unfortunately for myself, he dragged me into this. I found it was a pretty deep subject and I just had to keep on swimming and haven't seen land yet. By the time I get one list complete and written up, along will come two or three more new organic substances on the market and these have to be studied. To keep this work up to date means that the Health Hazard Committee of the Rubber Section will have to continue working on it from year to year.

The work thus far has dealt only with the organic accelerator group. Of the four groups or types of compounds, the organic accelerator group consists of a comparatively new series of substances used for rubber manufacture. As a group, they are the least understood and most dangerous to handle from the health hazard standpoint.

With the presentation of this paper, the writer completes the classification and description of the accelerator group. Several new accelerators have been developed during the past year and put into commercial production, and these have been added to the list as prepared in the previous paper.

New chemicals for use in rubber manufacture are being continually developed with the result that an increasing number and variety of organic substances are being offered on the market, often to the confusion of the rubber manufacturer and due to conflicting claims of the distributors. In this present age of competition, the accelerator manufacturer is only too anxious to get a promising accelerator on the market, often before adequate data has been obtained either as to its value for rubber work or as to the health hazards involved in the handling of the material. On the other hand, the rubber manufacturer, being only too anxious to improve his product, is often tempted to accept the exaggerated statements of accelerator salesmen, and jumps into production with an unknown and untried substance resulting in untold factory trouble, as well as possible injury to the health or comfort of the employees using these materials. Numerous cases of the latter have occurred during the past few years with the advent of organic accelerators and softeners.

A recent issue of an *English Rubber Journal* contains a report of the chief inspector of factories and workshops of Great Britain for the year 1927, which shows an increase of dermatitis amongst rubber workers of 96 per cent in 1927 as over the year 1926. Nineteen of these were caused by the use of accelerators, whereas these agents were held responsible in only seven cases in 1926.

While the writer has no definite record of this kind for American factories, he believes that dermatitis and illness caused by accelerators is decreasing in the United States rather than increasing due to the more intelligent use of accelerators.

Referring back to the meeting which I attended yesterday, Dr. Gehrmann also brought out the fact that very often trouble arises from the use of these compounds, of which very little knowledge is obtainable. It is very difficult to get at the bottom of some of these troubles at all. For instance, he cited one case where a department superintendent was requested to report as to whether or not a certain organic compound was causing any trouble and he reported no, none whatever. He then asked him what percentage turnover he had, and the superintendent replied, that he had a very large turnover there; he had 40 per cent turnover. That looked rather peculiar, so some of the men who had been in that department the longest were examined and it was found that a great majority of them were suffering from certain disorders due to the use of this material. This shows that the men who quit, had more sense than the employer in that they realized their health wasn't good on that job and they quit and went to some other work. I think you will find the same thing true where many of these compounds are used. The

manufacturer takes very little interest in how toxic some of these compounds are and the men just leave and go somewhere else.

When we say some of these compounds are safe to handle and that there is practically no health hazard involved, it must not be understood that they are entirely non-toxic because some of them are relatively toxic in one sense of the word; that is, it is a degree of relativity. Experiments have shown that most of these compounds are toxic to an extent when taken internally through the digestive tract. While many of these are toxic in large quantities taken internally, it must be remembered that so also are many of the products which we consider entirely innocuous, and if taken in large doses, would be toxic.

In setting a safety factor, we must take into consideration the time and the manner of injection. This is a question of continuous or discontinuous exposure to such compounds. The time and amount are really the important factors. Thus it can be readily seen that the method of handling in many of these cases is a deciding factor as to whether or not the material is or is not a health hazard. I think most of the medical men here present will agree that many of our every day substances and drugs would be likewise classed, if taken in large overdoses, as toxic, but in the ordinary handling of the same could not be classed as such.

Other factors to be considered in the handling of such substances are, first: Is the substance a liquid or a powder? If it is a liquid, is it volatile; and if a powder, does it fly or create a dust? Second, whether liquid or a powder, does it decompose into toxic gases during process?

For illustration, aniline, a liquid, is exceedingly toxic in small amounts; it is a volatile liquid which makes it doubly harmful. As it goes into the different compounds in the factory it becomes subject to heat, and the volatility is greatly increased. It does not decompose, but the volatility is such at the calenders that it comes off in considerable volume and becomes a very dangerous material to use. So you can readily see that the method of handling these compounds is exceedingly important. In handling anything such as aniline, it goes without saying that it likewise must not come in contact with the flesh during handling. Some means of handling must be worked out which will prevent contact and in subsequent operations wherever volatility occurs, there must be strong suction hoods to remove these vapors and prevent the men from inhaling them. It happens to be a compound which is not only absorbed through the skin, but can be taken internally through the respiratory organs, as well.

As against the strictly toxic compounds which are toxic upon being taken internally and which can get into the system in the form of dust and so on, or through carelessness in handling by men getting material on their hands and later without washing partake of food, we have another class of compounds which are very prone to cause dermatitis. Some of them are powders. In handling the latter, each manufacturer seems to have a problem of his own. One of these compounds handled in one plant will cause no trouble whatever, whereas used in another plant, will give all kinds of trouble. I think I can mention one which you will all recognize, Hexa methylene tetramine, or "Hexa." I have seen this material used by the ton in one climate and amongst certain groups of workmen, causing absolutely no trouble. I have also seen it used where it has given no end of trouble. There are several reasons for these peculiar conditions. First, we have susceptibility of the individual, some persons being much more susceptible than others. As with poison-ivy, some people can pull it up by the roots and are immune, and others cannot come near it without being poisoned. Personally, I can handle Hexa without a sign of a rash, while I have seen other people who will develop a rash through just handling stock in which there was about three-fourths of one per cent present.

Then, too, we have climatic conditions, which contribute to these troubles. Climates which are very humid and warm, probably give us more trouble in han-

dling these accelerators than those which are cool and dry. Again we have conditions under which the laborers are working when handling these materials. So you can readily see that unless some of these compounds are better understood, there is danger of the rubber industry running into quite an epidemic of occupational diseases.

Most of these dermatitis cases are not serious and usually respond quite readily to treatment, provided the employee is taken away from that particular department and placed in another department. However, we must not lose sight of the fact that some of these skin eruptions are liable to other secondary infections. Blood poisoning might develop and we would have a very serious case on our hands, and while not necessarily due to the dermatitis, the initial cause was the dermatitis. Some of these eruptions are very itchy and a man, if not careful, is going to scratch himself and infection is very likely to follow. So it goes without saying that we should make every effort possible to reduce the hazard of using these materials, not only for the health of the working man, but also for his comfort.

This classification will practically complete the organic group. I will not attempt to read a description of these substances, but I will just go over the lineup as to their relative toxicity.

With reference to the paper presented by the writer at the National Conference in 1927, it has been suggested that the rubber compounds be arranged according to their degree of toxicity rather than alphabetically. The writer still believes that for reference work it is desirable to group all compounds alphabetically, but in order that the more toxic compounds can be readily recognized, he suggests that an indexed grouping arranged according to the degree of toxicity, preface the description of the compounds.

The writer further suggests that the index be arranged in four groups:

Group A will contain all the highly toxic compounds.

Group B those involving only slight hazards.

Group C those compounds involving no hazards provided they are handled according to recommended procedure.

Group D those which involve no hazard and which can be handled more or less promiscuously.

According to this grouping the organic compounds would be indexed as follows:

Group A—Highly Toxic or Irritant

Aniline Oil
Hexamethylene-tetramine
Ortho-toluidine
Para nitroso-di-methylaniline
Para phenylene-di-amine
Para toluidine

Group B—Slightly Toxic or Irritant

Alpha naphthylamine
Beta naphthylamine
Formaniline
Lead oxidation products of di-methyl-di-thio-carbonic acid
Methylene aniline
Methylene di-tolyl diamine
Methylene para toliudine
Tri methyl trimethylene-triamine.

*Group C—No Hazards With Proper Handling
Somewhat hazardous with promiscuous handling.*

Aldehyde ammonia
Di ortho tolyl thiourea
Di-phenyl thiourea
Heptaldehyde aniline
Methylene dianilide
Methylene diphenyl diamine
Quinodine
Thiocarbonilide

Group D—No Hazards

Dimethyl ammonium dimethyl-di-thio carbamate
Di-ortho-tolylguanidine
Diphenylguanidine
Ethylidene aniline
Mercapto benzo thiazole
Phenyl-tolylguanidine
Piperidonium pentamethylene-dithiocarbamate
Tetra methyl thiuram disulphide
Tetra methyl thiuram monosulphide
Triphenyl guanidine
Xanthates
Zinc oxidized salt of dimethyl-di-thio-carbamic acid

In these Safe Practices Pamphlets prepared by the Health Hazards Committee of the Rubber Section, and issued by the National Safety Council, we have endeavored to show the composition of these accelerators, their probable toxicity or irritant effect, and wherever possible suggestions of handling which will remove all hazards. We believe that if these suggestions are followed, but little, if any, hazard will be experienced in handling these compounds. In a few instances, the use of very toxic accelerators has been discouraged since with the large variety we have to choose from at the present time there can usually be found a suitable substitute.

It has been very gratifying to note that a number of the large reputable chemical companies are now making a study of the toxicity of their accelerators and organic compounds before offering them to the trade, and in many cases guarantying them to be non-poisonous and non-irritant. This practice is to be commended. The more knowledge we have concerning the materials we are using, the more intelligently can we handle the same.

The classification and description of accelerators appended hereto will therefore complete the list of most of the organic accelerators in common use today. As new accelerators come into general use, the Health Hazards Committee can add these to the list from time to time and thus keep the latter up to date. The committee will be glad to receive any information concerning unusual conditions or symptoms of trouble arising through the use of accelerators. It is hoped that the various manufacturers will send in to the committee any information which they think will be of interest to others in avoiding troubles. We are especially interested to learn of any trouble developing from the use of rubber compounding ingredients.

I will now take up a new group of organic compounds, which has invaded the rubber manufacturing field since the writer's first paper was prepared. This group of compounds consists of the so-called anti-oxidants for preserving the life of rubber.

Since the discovery of vulcanization by Goodyear in 1839, practically no advance had been made in the vulcanization of rubber until the discovery of organic accelerators about a decade and a half ago. Previous to the use of accelerators,

the normal life of most vulcanized rubber goods was comparatively short. With the extended use of accelerators during the past ten years, it has been noted that certain of these accelerators not only greatly cut down the time of vulcanization but they also greatly improved the physical properties of the rubber goods and in addition made them more resistant to deterioration.

The principal factors contributing toward the deterioration of vulcanized rubber are: light, heat and oxygen. Rubber may be protected against the action of light by storage in darkness or by compounding in such a way as to prevent excessive absorption of the actinic light rays. Resistance to heat may also be obtained to a considerable extent by proper compounding. Atmospheric oxygen still remains to be the most destructive factor.

Certain types of accelerators have appeared to offset this oxidation to a considerable extent and has led to an intensive study of those particular organic groups which best resist oxidation. The search has resulted in this new body of organic compounds which have been named "anti-oxidants," and which promise to offer the next great advance in the vulcanization of rubber goods. They have been given considerable publicity and have come into quite general use during the past year. A canvass of the various rubber companies indicates that most of the latter are using or at least experimenting with one or more of these compounds.

These anti-oxidants are organic compounds similar in many respects to the organic accelerator group. There are approximately about a half dozen of these compounds in quite general use. They are sold mostly under various trade names. Some of these compounds are derived from toxic bases and others are of such composition that those using them should be on the lookout for dermatitis. In general they are substances which can be safely handled with reasonable precautions. A study is being made of their toxic and irritant properties and as soon as this is completed, these substances will be classed as a sub-group under the accelerators and dry inorganic compounds. Sufficient data has not yet been accumulated in order to complete the anti-oxidant group in time for this meeting. However, for the benefit of those using these substances, the following list comprises those in most general use, together with their basic composition and probable toxic or irritant properties:

Age-rite powder

A gray powder melting at approximately 100° C. and consisting of phenyl-beta-naphthylamine. Probably slightly toxic and should be handled according to instructions noted under the naphthylamine group of accelerators. No hazard with proper handling.

Age-rite resin

A red resinous substance, brittle when cold and liquid at milling temperatures. Contains adol-alpha naphthylamine. General precautions as noted for the age-rite powder should apply.

Antox

A tan colored powder containing para-amino phenol. A combined accelerator and anti-oxidant. Used only to a limited extent. No trouble reported from its use. Possibility of slight dermatitis.

Neozone

A purplish gray waxy compound containing phenyl-alpha naphthylamine with meta toluine diamine and some acid wax. Quite safe to use with ordinary precautions. Probably slightly toxic. No danger of dust.

Oxynone

A light brown powder, oxidizing in moist air. It is an amine derivative, which should be handled with some care to prevent staining of the flesh or possible dermatitis. Should not be inhaled.

Resistor

An aldehyde condensation product in the form of a pinkish buff powder. No data as to toxicity but its general composition would indicate no hazard involved in its use.

Stabilite

A yellowish compound readily turning purple upon exposure. Consists of di phenyl ethylene diamine. Probably somewhat toxic but involving no hazard with careful use.

V. G. B.

A brown resinous powder consisting of acetaldehyde alpha naphthylamine. Only slightly toxic. Has been used in large quantities. No trouble other than slight dermatitis reported. Should not be inhaled.

A description of these compounds will later be issued to be appended to the accelerator and organic group.

The Health Hazards Committee gladly welcomes any criticisms or suggestions concerning this work.

✓ **Lead Oxidation Product of Dimethyl-dithio-carbamic-acid**

Origin and Constitution:

The lead oxidation product of dimethyl-dithio-carbamic acid is prepared by oxidizing the lead salt of dimethyl-dithio-carbamic acid, $[(CH_3)_2N-CS-S]_2Pb$. It is one of the very powerful ultra accelerators and for this reason is seldom put on the market in the pure state, but usually in a diluted form on a clay base. In the latter form it consists of a very fine gray to yellowish-white powder and with only a slight odor. It has a specific gravity of 2.50.

Uses:

This material is used commercially as a rubber accelerator. It is used principally in dark-colored goods in conjunction with litharge, finding a quite extensive use in mechanicals, footwear and dry heat stocks. It reacts at low vulcanizing temperatures the range being from 250° F. to 280° F.

Litharge is required to activate the accelerator. It has a tendency to scorch on the mill, and temperatures must be carefully controlled.

Health Hazards:

Being a dry powder, this accelerator is usually weighed out in the compound room in the usual manner and added directly to the rubber on the mixing mills. It is a lead salt but is relatively insoluble and comparatively little danger is involved in its use. However, it is invariably used in conjunction with litharge and the same precautions should be observed when handling this accelerator as noted under the use of lead compounds.

The compound weighers and mill operatives should avoid handling with bare hands and be careful not to inhale the dust. Such small amounts of the active ingredient are used that the danger from poisoning is slight. The real danger is from the litharge, which is invariably used in conjunction with this accelerator. No cases of dermatitis have been reported.

Methylene-ditolyl-diamine*Origin and Constitution:*

Methylene-ditolyl-diamine is the reaction product of formaldehyde and two molecular portions of para toluidine. It has the formula $(CH_2.C_6H_4.NH)_2CH_2$ and is similar in properties to methylene para toluidine, the latter being formed when formaldehyde reacts with one molecular portion of para toluidine.

Uses:

Methylene-ditolyl-diamine is a mild accelerator for vulcanizing rubber. Due to its low accelerating power it is now practically obsolete as an accelerator.

Health Hazards:

The health hazards of this material are about the same as for methylene para toluidine. It is non-poisonous except as traces of formaldehyde or para toluidine are present as impurities. No ill results of its use have been reported.

Methylene-para-toluidine*Origin and Constitution:*

Methylene-para-toluidine, also known as anhydro formaldehyde para toluidine, is a grayish or yellowish white powder with faint aromatic odor. It has no definite melting point but softens between 80° and 100° C. It is not a definite chemical compound but a mixture of two isomers having the formula CH_2 . C_6H_4 . $\text{N}=\text{CH}_2$. It is prepared by the action of formaldehyde upon para toluidine in equi-molecular proportions.

Uses:

This material is used quite extensively in many lines of rubber manufacturing including mechanical rubber goods, tires and tubes. It is used both as an accelerator and a rubber softener. It is also an excellent plastisizer and anti-scorching material and for this reason is often used in conjunction with more powerful accelerators to counteract the scorching tendency of the latter. It is used up to 2 per cent on the weight of the rubber present. Zinc oxide is usually used with it as an activator.

Health Hazards:

Methylene-para-toluidine is handled in much the same way as other dry powders, being weighed out in the compound room and the powder either added directly to the rubber or mixed with the other powders. The powder does not fly excessively and no special precautions need be taken in weighing out. It is non-poisonous if pure and causes no skin rash. However, the commercial product may contain traces of aldehyde or toluidines and for this reason it is advisable for the weighers to refrain from handling the material with the bare hands.

During the mixing and calendering operations some volatilization takes place and pungent aldehyde fumes cause irritation to eyes and respiratory organs. Mills and calenders should accordingly be hooded, with suction to remove these vapors.

This material has had an extensive use in the rubber industry and when above precautions have been observed, no ill effects have been reported.

Para-nitroso-dimethyl-aniline*Origin and Constitution:*

Para nitroso dimethyl aniline is a green crystalline substance with a melting point of 88° C. and having the formula $(\text{CH}_3)_2$. N. C_6H_4 . NO. The commercial dried product contains about 2 per cent moisture and 95 per cent para nitroso dimethyl aniline on the dry basis. The latter is soluble in both rubber and water and melts at about 80° to 85° C. The dried product absorbs moisture very rapidly from the air and undergoes decomposition when exposed to air. For this reason the material is also marketed as a paste containing a definite amount of water, usually 40 per cent.

Uses:

Para nitroso dimethyl aniline is used as an intermediate product in organic synthesis and as a rubber accelerator. It is a fairly powerful accelerator and has been used quite extensively in the hard rubber and pneumatic tire industries.

It readily disperses in rubber exercising a pronounced softening action with little

danger of scorching. It may be used in the proportion of from $\frac{1}{2}$ to 1 per cent of the rubber. It may also be added to the rubber by soaking the latter in a water solution, previously to adding the compounds. It cannot be used for white or light colored goods since it has a discoloring action.

Health Hazards:

This material may be weighed out as a powder or paste, or dissolved in water. There is a certain amount of danger from handling this material by any of these methods. The material is poisonous and has a decided tendency to cause disagreeable skin eruptions. Care should be exercised in handling, and the material should not come in contact with the skin.

During mixing and calendering it gives off a disagreeable odor but does not fume seriously. The mill and calender operatives should avoid handling the hot stock with the bare hands as far as possible since it is conducive to dermatitis. Since it is almost impossible to handle stock of this nature through the plant without danger, its use has been discontinued by some manufacturers. It is advisable to use less poisonous accelerators wherever it is possible to do so.

Reference: Jr. Ind. and Eng. Chem. 1918, P. 865; Hamilton—Ind. Poisons in the U. S.—1925, P. 502-524.

Phenyl-tolyl-guanidine

Origin and Constitution:

Phenyl-tolyl-guanidine is a white crystalline powder having the formula $C_6H_5.NH.CH_2C_6H_4.NH.C:NH$. It is slightly soluble in rubber.

Uses:

Phenyl-tolyl-guanidine is used commercially as a rubber accelerator, but to a lesser extent than many of the other accelerators. It is a relatively active accelerator, comparable in most respects to diphenyl guanidine.

Health Hazards:

Being a dry powder this material can be handled conveniently in the compound and mill rooms. It can be weighed out in the usual manner and added directly on the mills. It does not fly excessively nor does it fume during mixing. It is a safe accelerator to use. No cases of poisoning or of dermatitis from its use have been reported.

Quinoidine

Origin and Constitution:

Quinoidine is a dark brown resinous substance having no definite melting point. It softens between 80° and 100° C. It consists of the uncrystallizable portion of the extract of cinchona bark. It is obtained from the latter solution after all the crystallizable alkaloids have been removed. The commercial material is put on the market in a very impure form, often being contaminated with appreciable quantities of foreign matter.

Uses:

Quinoidine is used in medicinal preparations and as an accelerator for rubber. It is no longer popular as a rubber accelerator since it has the disadvantages of imparting a disagreeable odor to the rubber and has a tendency to scorch during milling. It is only a mild accelerator requiring from 1 to 2 per cent upon the weight of the rubber. Zinc oxide is necessary to activate the accelerator.

Health Hazards:

It is a comparatively safe accelerator to use. It does, however, give off a strong penetrating and disagreeable odor during the milling and calendering operations. Its use in the rubber industry is now almost obsolete.

Tetramethyl-thiuram-disulphide*Origin and Constitution:*

Tetramethyl-thiuram-disulphide is a grayish crystalline substance having a melting point of 150° C. and a specific gravity of 1.29. It belongs to a class of organic accelerators known as the thiuram disulphides. They are prepared by oxidizing the corresponding dithiocarbamates. The tetra methyl salt is the one best known in the rubber trade and is prepared by oxidizing the reaction product of dimethyl amine and carbon disulphide. The commercial product is prepared as a fine powder. It is insoluble in water but soluble in benzene or carbon disulphide.

Uses:

This material is used quite extensively as a rubber accelerator in all types of rubber goods. It is an extremely powerful accelerator and one of the best known low temperature ultra accelerators. It is used in proportion of from 1/8 to 1 per cent on the weight of the rubber. It is usually used in conjunction with zinc oxide as an activator.

Health Hazards:

This accelerator is a dry non-hygroscopic powder and non-poisonous. It can therefore be weighed out in the compound room safely and added directly to the rubber on a mill or put up in the form of a master batch. There is no fuming on mills or calenders. No ill results of its use have been reported.

Tetra-methyl-thiuram-monosulphide*Origin and Constitution:*

Tetra methyl thiuram monosulphide is a yellow crystalline powder having a melting point of 103° C. Its chemical constitution is represented by the formula $(CH_3)_4NCS.S.CS.N(CH_3)_2$. It is similar in many properties to the thiuram disulphide but does not react at as low temperatures as the latter. For this reason it can be handled to better advantage than the disulphide for many types of rubber compounds.

Uses:

Its principal use is an accelerator for the vulcanization of rubber. It is an extremely powerful accelerator and is used quite extensively for many classes of rubber goods. It is usually used in comparatively small quantities, of from 1/10 to 1/2 of 1 per cent on the weight of rubber.

Health Hazards:

Being a dry non-hygroscopic powder it is easily handled. It is non-poisonous, non-fuming and no hazard has been encountered in its use for rubber work.

Triethyl-trimethylene-triamine*Origin and Constitution:*

Triethyl-trimethylene-triamine (T.T.T.) is a brown viscous liquid having a boiling point of approximately 207° C. and a specific gravity of 0.89. It is quite soluble in rubber. It has the formula $[(C_2H_5.N:CH_2)_3]_x$.

Uses:

T.T.T is prepared for use as an accelerator in the vulcanization of rubber. It is a very active accelerator, especially in the presence of zinc oxide. While not used to as great an extent as many other accelerators, it does find considerable application in certain lines of dry heat vulcanization and is adaptable for sheet goods and for boot and shoe work.

Health Hazards:

T.T.T is classed as a safe material for accelerator purposes. It should be carefully handled however. A number of cases of dermatitis caused by its use have

been reported. Certain persons appear more susceptible than others. Persons who have previously suffered from "Hexa Rash" will often develop dermatitis from handling T.T.T stocks. If reasonable precautions are observed to prevent direct contact with the hands and clothing, no serious difficulty should be experienced in its use.

Triphenylguanidine

Origin and Constitution:

Triphenylguanidine is a white crystalline substance having a melting point of 145° C. and specific gravity of 1.10. It is prepared by the action of aniline on thiocarbanilide and has the formula $(C_6H_5NH)_2C:NC_6H_5$. It is insoluble in water but slightly soluble in rubber. It is a very stable material being unaffected by exposure to light or air.

Uses:

Triphenylguanidine is used quite extensively as a rubber accelerator. It is a mild accelerator, but is adaptable for white and light colored goods and in compounds requiring a long range of cure. It can be used for nearly all classes of rubber goods and due to the fact that it has no tendency to cause scorching it has been very popular with the rubber trade. Its use as an accelerator is falling off in favor of newer and more powerful accelerators.

Health Hazards:

Triphenylguanidine, if pure, is non-poisonous and odorless. It does not fly badly and can be handled easily in both compound room and mill room without danger. The material is non-volatile and causes no danger from fuming at the calender.

Several impurities may be present in the commercial product, the most dangerous one being free aniline. A careful check should be made to detect any undue excess of aniline. It is a very safe accelerator and no health hazards are involved with ordinary care.

Xanthates

Origin and Constitution:

The Xanthates are extremely powerful accelerators being amongst the most powerful of the ultra accelerator type. There are several commercially available Xanthate accelerators, namely, zinc butyl xanthate, zinc ethyl xanthate and zinc isopropyl xanthate. They are white powders, finely ground and quite stable. They do not readily take on moisture from the air. The zinc salts are prepared by the reaction of zinc sulphate upon the corresponding sodium xanthate and their general

formula is $Zn(S:C \overset{S}{})_2$.
OR

Uses:

The zinc xanthates are used as rubber accelerators but their use is decidedly limited due to the fact that they react at very low temperatures and cause scorching, especially if used in conjunction with zinc oxide. They are used for the most part in quick curing cements and specialties which are cured either very rapidly or at low temperatures. A xanthate cement will cure in less than one minute. Wherever used special precautions are required to prevent premature setting up of the rubber stock.

Health Hazards:

The zinc xanthates are dry powders which can be easily handled in the weighing and milling departments. Comparatively little data has been accumulated relative to their toxic properties, but their chemical grouping would indicate that they are relatively harmless for rubber work, especially where used in such small quantities.

Zinc Oxidized Salt of Dimethyl-di-thio-carbamic-acid**Origin and Constitution:**

The oxidized zinc salt of dimethyl di-thio carbamic acid is one of the very powerful ultra accelerators used for low temperature vulcanization. It may be obtained either in the pure undiluted state or in a diluted form in which the oxidized zinc salt is mixed with an inert clay base. It is a fine gray to yellowish white powder having a slight not unpleasant organic odor. It has a specific gravity of approximately 2.00. It is decomposable upon heating.

Uses:

The material was developed for use as a rubber accelerator. It is very active at low vulcanizing temperature and is very difficult to handle on mixing mills without scorching of the rubber. Due to this difficulty it has not found extensive use in the rubber industry. Its use is confined largely to specialties and vulcanizing cements.

Health Hazards:

This accelerator is non-poisonous and causes no disagreeable or harmful fumes during mixing. No ill effects from its use have been reported.

CHAIRMAN SALISBURY: Perhaps there are some questions that occurred to us as Mr. Healy read the more simplified part of the paper that you would like to enlighten yourself upon. Anything in connection with the usual dermatitis or skin eruptions that comes to your mind, Mr. Healy and Dr. Shirley are here.

C. S. CHING, (U. S. Rubber Company): I would like to ask Mr. Healy, in the use of aniline, take this kind of a situation: If you had a plant that was throwing off aniline fumes into the air, I don't know in what way, or at what distance from that plant. Could you get any bad effects from it? Have you any idea?

MR. HEALY: The aniline fumes couldn't come off in any great volume. The amount of aniline used in the rubber industry, based on the percentage to rubber milled is very small, probably less than 4 per cent.

MR. CHING: I mean where they use aniline dye.

MR. HEALY: That is a case of concentration. If that was blown through a stack at a considerable height, it would be lost unless in tremendous volume.

MR. CHING: If you could get a discoloration in the course of an hour, if that sheet of paper would turn absolutely yellow, would that be dangerous?

MR. HEALY: That would be dangerous.

MR. McHUGH: We had a case of dermatitis. A man working in a compound room had it, what would you say to keeping him in the plant where he would be susceptible to it?

MR. HEALY: He could be placed in departments where he couldn't come in contact with those compounds. There are several departments where you wouldn't want to put him, where he was handling the raw stock, for instance. Even after the stock is calendered and goes either to the tub or tire room or mechanical department, there still might be danger with certain types of accelerators if he handled the raw stock. It is not alone in the mill or calender where you have the hot stock that they contract dermatitis. If they are susceptible they get it from the cold stock also.

MR. WILLIAMS (R. & H. Chemical Co.): I'd like to ask this meeting if they have ever formulated any test they would like to have the manufacturers make before offering to the public. As a manufacturer, we do a great deal to determine toxicity and its causes. We have spent a great deal of money and time on the Hexa rash. We have made blood tests and sweat tests on acidity. We have a man who has ground Hexa for ten years and has no more rash on him than anybody in this room. He is covered with dust from morning to night. But we want

suggestions as to how to get at this thing because we don't want to send out a material that is going to come back and give us a bad reputation. I believe if this committee could establish some kind of cooperation between users and manufacturers it would help a great deal. If our materials get out and there is a difficulty, why we want to know it immediately so that we can investigate it. We usually test a material a year before it is put out to the public. We have men assigned to it daily and if nothing turns up we naturally assume that it is comparatively safe, but in a rubber mill you have a combination of sulphur fumes coming off and that, with this material whatever it may be, may give dermatitis or some other ill effect that we don't know and I would like to see some cooperation established by which we could predetermine the ill effect which may be produced.

CHAIRMAN SALISBURY: I will be glad to refer that to the Health Hazards Committee, both your problem and the proposal that you make and possibly during this coming year they will get in communication with you.

MR. HEALY: I think that it is a fine attitude to take, to determine the toxicity of these compounds. I think, however, that will have to be handled through the research department of one of our universities, not only one, but probably several. Mr. Schneider, of the Goodrich Company, has had some very fine work done at the Western Reserve. So probably that will have to be handled through the research department of one of our universities.

MR. MEADE (U. S. Rubber Company, Providence, R. I.): I would like to ask a question regarding aniline fumes that are thrown off to the atmosphere, whether the weather has any effect upon the amount or weight, or what I could call concentration on objects that are exposed? I have known instances where, when the wind is blowing in the right direction and the weather might be called a misty rain, a newspaper hung out of a window became thoroughly saturated and every drop that fell on the newspaper, inside of half a minute turned perfectly yellow. Is there any way in which the amount thrown off can be gathered and located as to quantity?

MR. HEALY: Referring to the first part of that question as to weather conditions, that is another case of concentration of the aniline in the atmosphere. It goes without saying, of course, that the diffusion of the aniline in the air is much more rapid and is scattered more rapidly at certain times than others. Now, on damp days the atmosphere is heavy, there is very little wind stirring and the aniline does not diffuse or get away rapidly and being heavy and water soluble, probably disperses very close to where it is discharged into the air, and concentration can become very great. I believe your chemical laboratory can probably make that test for you to determine the concentration. It would mean absorption apparatus, especially rigged up, and you would have to absorb the aniline and then test for concentration per meter or cubic yard.

P. M. WOODEN (Mansfield Tire Company, Mansfield, Ohio): As a matter of information, I would like to ask the members present if they have had any experience with boils? I have had an epidemic of boils lately and they think it comes from the rubber stock. In the last three weeks we have had twenty-five or thirty men with boils, as many as twelve or fifteen boils.

DR. SHIRLEY (Hood Tire & Rubber Company): I think this time of the year they are likely to have boils, but from what you have said, I should think it was a contamination from one worker to another. I have seen that happen very often in my experience.

MR. WOODEN: But I have had it all over the plant.

DR. SHIRLEY: I often think we should blame the compounds but I can't link it up. I think you will find that with the change of season you will have them. In the spring and in the fall they are more prevalent.

MR. WOODEN: I don't have that always. It didn't happen last year, Doctor.

DR. SHIRLEY: Maybe one individual started it. I think you get them more in the spring than in the fall, but at the change of the season, as I say, you may get it. You will see that in your plant dispensary. It follows pretty true year after year, you get your two waves, the spring wave being heavier than the fall wave.

MR. DIETZ (Pennsylvania Rubber Company): Would you advise educating the worker in handling these ingredients as to the health hazards?

MR. HEALY: I believe that it is not altogether necessary to instruct the worker as to the nature of the compound he is working with, but you should give him the tools to work with. If there is danger in handling, you should see that he is given gloves and goggles and so forth for the proper handling of the materials. Likewise, if you have trouble in mixing, you should have your mills hooded. You must give him the tools to work with and provide the rooms with the necessary circulation of air to prevent excessive fumes or dust. A man doesn't care what he works with so long as he knows that no harm results from the use of that material.

CHAIRMAN SALISBURY: We have been unusually fortunate at this convention in having two particularly outstanding speakers, one the other day, Mr. Knutson of the Industrial Commission of Wisconsin, whom you will remember as big, and also the speaker of today, Mr. C. S. Ching, who is also big physically, and equally big mentally. Mr. Ching is permitted to come on to our program and we may well congratulate ourselves.

C. S. CHING (U. S. Rubber Company, New York): Mr. Chairman and gentlemen, I want to thank you for your very complimentary remarks. I am here simply as a pinch-hitter for Mr. Thacher, our vice-president. I will present his paper. I assure you I will not handle the chemical terms as fluently as Mr. Healy did.

Safety as Management's Responsibility

By S. P. THACHER

United States Rubber Company, Detroit, Mich.

Management and Industrial Enterprise work with and through the four M's—Men, Materials, Machines and Money. Nobody will deny that in the battle for industrial supremacy men are the deciding factors. Management can get money; can buy the most efficient machines and the best of all materials, but it has to train men—workers and executives. The degree of efficiency to which management is able to carry this training largely determines the results.

In this training modern management goes further than teaching speed and quality or production. We have recognized the need for teaching safe practice in our productive methods and processes. We have gone even further than this and are training our employees to practice Safety First off the job as well as during working hours. In other words, interest in the employee has gone beyond the purely economic stage.

Experience in the past decade has conclusively proven that the work of accident prevention is not a "one-man job;" that satisfactory results can be secured only through the highest measure of cooperation between employer and employee. Management must be vitally interested in the work if it expects to educate men to share the responsibility. The workers must be given a part to perform in it if their interest is to be aroused and maintained, and it is only through organization that this is possible, whether the plant be large or small.

Management cannot expect workers to be interested in safety work if it does not give consideration to the guarding of dangerous machines and conditions and follow it up by *action*. While it is true that the greater percentage of injuries can only be eliminated through the care of men following safe practices, at the same

time, the fact that physical safeguarding is being taken care of serves as a good basis for argument that the men must do their part.

Human carelessness cannot be quickly corrected, but physical safeguarding in a plant, in many instances, can be completed in a short time and have an important bearing on reduction of injuries.

It depends finally on the measure of cooperation from the workers and this cooperation cannot be expected unless the workmen have the proof and belief that management is sincere and willing to do its share in the joint effort which will inure to their common benefit. The tangible evidence given by safeguarding, promoting safety education and spending money to remove or lessen hazards is the best possible guarantee of its good faith.

The employer who does not see that accident prevention is a duty cannot fail, if the facts are properly presented, to appreciate that it is his responsibility and duty and an economic and humanitarian necessity.

I do not believe that anyone questions the fact that all this is management's responsibility—and by management is meant the entire executive staff from the president down to those on the firing line—the foremen and assistant foremen.

A glance at the organization chart of any modern manufacturing concern will surely disclose a safety supervisor and usually he is shown as reporting direct to the factory manager.

Safety must be given a dignified position in the organization. Management must get back of it and stay back of it so unmistakably that every foreman and workman will know what the officers propose to do to make the plant safe and what they expect the foremen and workmen to do. Without this backing from the management a safety supervisor can do little in reaching the workmen and in awakening the real safety spirit.

It is a pleasure to pay a well earned tribute to these men. Their work is not easy and oftentimes they do not feel that they are accomplishing very much. But day in and day out, they have been carrying on until today if an audit could be made of their combined efforts it would show many millions of dollars of economic and human waste saved in industry.

Accident prevention is of major importance to a plant, whether it be in a time of high or low production. In rush production it is easy to overlook accident prevention or welfare of the workers. In our efforts to meet schedules and orders a few, or, perhaps, many of our workers in industry are sometimes killed or maimed, which may appear to be excusable. Every time there is a serious accident there is that interruption to industry. It means much to modern industry. What it means in dollars and cents I cannot say, but the mere consideration of it establishes definitely that fact in the mind of any manager who cannot otherwise be interested in safety work.

The worker is oftentimes censored for his carelessness and for crippling the working force, especially if he is a valuable worker. Management can overcome this in a large measure by not forgetting the fact that increased production necessitates increased supervision and guidance. This increased supervision or guidance will pay for itself without question, for it is that sort of supervision that makes for greater interest among the workers and develops accident prevention as well as better methods of production.

Education, discipline and supervision are paramount in accident prevention. My personal experience leads me to believe that there are two types of safety education—first, that type of safety education where we depend too much on safety propaganda or mere talk; second, that type of education where educational effort is directed to the development of skill rather than caution. To achieve the desired results, I believe we should direct our efforts and energy to make our workers thorough and skillful. It is that type of mental training, discipline and inspiration

which makes a man carefully grasp his tools and think safety at all times. Exactly the same process is involved as that which takes a slovenly workman and raises him to the class of a craftsman—the most productive industrial machine and industrial human unit that we have in the whole world—and work of that kind, discipline, training and inspiration, expended in safety work, must automatically have as a corollary a training in increased care and pride in work and greater productive capacity on the part of the workman. This, of course, is undeniably true of the new worker.

In the past, and even today, too many major accidents and lives have been lost in industry as the result of new employees being improperly instructed or misplaced for the jobs they were expected to perform. Management has learned to exercise care in selecting men physically and mentally fitted for the jobs they are hired to fill, and has come to realize that in making a good first impression on the new man a distinct advantage has been gained in his willingness to learn and his general attitude toward production and safety. Courteous treatment, careful explanation of work, follow-up and the right kind of supervision are important. This right kind of instruction and supervision not only makes workers quicker producing units but also safe workers in any plant.

I am inclined to believe that our troubles do not come from failure to accept these principles so much as from failure to use judgment in their application.

Another angle concerning the question of responsibility is the manner in which safety is handled or introduced into a plant by management. Safety can be made a part of business production, operation, or what not. It can be treated as a frill or a fashion. Whatever way it is introduced or handled, it will be received by the workers accordingly. There is only one way that management should insist that it be handled and that is that every man in the organization, from the president down, make safety a part of business production.

To the pioneers of this great safety movement and to men present who are engaged in this important work, I pay my respects, because I think it is one of the greatest movements ever instituted in that its effects are so far-reaching. It is perfectly all right and good business to talk about dollars and cents; that is primarily one of the purposes of accident prevention, but if we expect the results that you men are so arduously working for management must not forsake the humanitarian side of this problem by considering dollars before men. Just as soon as the workers sense that the matter of preventing accidents is being carefully planned and becoming an integral part of their work to save money they will refuse to cooperate.

In my opinion the correct viewpoint that management should have on safety is summed up very beautifully on the trophy our company presents each year to that one of its plants showing the greatest improvement in its accident experience:

“And the end is that the workman shall live to enjoy the fruits of his labor; that his mother shall have the comfort of his arm in her age; that his wife shall not be untimely a widow; that his children shall have a father, and that cripples and helpless wrecks who were once strong men shall not longer be a by-product of industry.”

MR. CHING: I am now going to take a minute of your time to tell you gentlemen engaged in safety work to have a measuring stick for your work. Unfortunately the position I occupy in the company prevents me from applying the measuring stick in the work I do. I may be sent to Washington or Cleveland, and I talk the matter over with Ed McHugh or in Detroit with Jimmie Quirk, or in Hartford with Ed Lawler, so I am moving around in a circle. There is no way of measuring or handling employer-employee relations where you can apply a measuring stick and get down to a dollars-and-cents figure. But in safety work there is an absolutely accurate way of applying the measuring stick, and one of

the reasons why Mr. Beck in our company has been able to do what he has done to stimulate the interest in the higher officials of our company is because he has had his figures and statistics in such shape that nobody could contradict them.

You must prepare your statistics and figures in the same way. If you do not do that, you are certainly not going to stimulate and arouse the interest of your company officials as you ought to. I think Mr. Thacher is absolutely right and we all agree, of course, that we must think of that other side of safety, the humanitarian side, of the suffering that is caused as a result of industrial accidents, but the difficulty is that we are so remote from the scene of the accident that we don't see the blood or bruise of the injured limb, and it becomes merely a record. If you want to impress your officials with it, if you want to leave an impression upon them, you have to make it in either black or red figures. Sometimes red figures have as great an effect on a man who is removed from an accident as a drop of blood. It means that somebody has to take notice. So much for that phase of it.

The relations between all the departments of a company are so intricate, so complicated, that it is extremely difficult for each one in the organization to know what is in the back of the other's head and what he is trying to accomplish. That goes for members of your organization, your supervising force, as well as for the worker, and the job of the safety man in endeavoring to get everybody in the plant thinking in terms of safety, is a tremendously big job, because you haven't the time. You can't get the people together and impress them with your point of view or get them to see all phases of it. If you have possibly a contract or a special occasion job, and a certain way is set up to do a quick job on it and the customer has been promised this thing next Thursday morning at nine o'clock, the thing that is running in the minds of your production organization usually is: "We have to get this out. He has been promised this and it has got to be shipped at nine o'clock." A safety man comes along and then says, "See here, why this is dangerous. You mustn't do that and that and that . . ." And immediately the production man may get to thinking: why that is going to block the wheels of progress. If we could just get this pest out of the way we would have a perfectly lovely time here and do things.

The big job is to get that fellow to see that you can't do the job right except with safety; that one small accident will delay that job more than doing it right in the first place. I don't know how many of you have had experience with some kind of employees' committee. I assume that you all have had some kind of safety committees operating in your plant. Safety committees are good things. They are not worth a tinker's damn if you are just going through motions; if you are going to say, "Some one made a speech at the National Safety Council, and we ought to have a safety committee." So the safety man goes home and tells the manager about it and that it is the latest fad, and they go out and get Bill and John and Tom and they have a safety committee. The first two or three meetings they don't make any suggestions, they just go along and make speeches and gradually it dies out. Then some fellow who has never had an accident in his life will say, it is a fashionable thing to spend money on safety, but it is really not important.

Now, I want to say that safety is but one phase of production. Safety is but one phase of employer-employee relations. Believe me, until you get to talking to your employees about everything affecting that relation, when you have a system of committees that will talk to your management back and forth, so that they know every phase of production and just what you are driving at, so that the management and employees are cooperating all over the plant to make it a safe place to work with low labor and high wage—if you are getting that, your safety is going far.

There is another thing, a thing that you have got to hammer home and realize, and that is this: You can't have proper labor relations in any plant that is not efficient. If you have an efficient plant, waste of any kind in your plant, if it is not operating efficiently in regard to the number of men in the plant, the number of men on the job, the proper safeguarding of materials and all of those things, you never can have proper employee relations in that plant. And my hunch is you never can have a safe plant if it is inefficient. I don't care how many speeches the manager makes at the Chamber of Commerce meeting, you can't have a safe plant until you clean house and have the proper number of men on the job, until their earning capacity is unhindered, and until you are getting no waste in the plant. That is the only way you can have a safe plant because it fits in with every other phase of proper production.

We are hearing a lot about the foreman being the keyman of the job. I have heard it so many times I am sick of it. Even the Y. M. C. A. is talking about it now and the foreman is quite a fellow, but the fact that you call him a foreman doesn't change him very much; he is still about the same as he was before. You can't get very far in preaching to him either. I believe that the foreman in your plant may not be the same kind of a fellow as the one in our plant, but he must be a good all-around production man first of all. I know that comparing men occupying similar positions with our plant and others we find the foreman classed as a superintendent or an overseer, or a general foreman or assistant foreman, or what-not; so when you talk about foremen you are talking about a lot of different grades of supervising forces. We have to give our foremen absolutely reliable statistics that are comparable to accidents in their departments; then we will accomplish a great deal.

I assume we are all making our comparisons in the same way and the interchange of information is what helps. We say, "Here is the Fisk Rubber Company and the U. S. Rubber Company, and our comparisons with Fisk are so and so." We hand that to the vice-president and he will say that you are either good or rotten, depending on whether you are talking about one or the other. That should get to the foreman in his particular plant and his department. Don't hesitate to spend a little money on typewriter ribbons. Get our statistics and figures. Keep them before the eyes of your management. I can't emphasize that too strongly. I worked with a young fellow once who later became an official of a big company. He told me three things to remember: (1) Always make all the friends you can; (2) Be sure to keep your boss posted, whether you are right or wrong, especially if you are wrong; (3) Don't be afraid to do a little judicious advertising.

CHAIRMAN SALISBURY: I am sure, gentlemen, speaking in your behalf, that we are greatly indebted to Mr Ching for his inspiring address and we are grateful to Ernest Beck for helping us secure Mr. Ching.

Report of the Nominating Committee

Before proceeding with the balance of the program, I wish to submit for your approval the recommendations of the Nominating Committee. They have named the following officers to carry out the business of the Section during the coming year.

For Chairman—Mr. M. A. Quirk (better known as Jimmie Quirk), U. S. Rubber Co.

Vice-Chairman—E. A. Hoehner, E. R. Lawler, U. S. Rubber Co.

Treasurer—P. Van Cleef, of Van Cleef Bros., Chicago.

Secretary—S. Mansfield, Goodyear Rubber Co.

Posters—J. T. Kidney, Goodyear Rubber Co.

Slides—R. H. Cochran, Kelly-Springfield Co.

Programs—C. E. Ott, Seiberling Co.
News Letter—J. Lynch, Fisk Tire & Rubber Co.
 Membership—P. M. Wooden, Mansfield Tire Co.
 Statistical—H. W. Low, Miller Rubber Co.
 Health—L. J. D. Healy, Fisk Tire & Rubber Co.
 Engineering—C. L. Hungerford, Firestone.

Advisory Committee:

H. T. Martin
 E. W. Beck, U. S. Rubber Co.
 W. L. Schneider
 R. C. Salisbury

The recommendations were regularly moved and seconded.

CHAIRMAN SALISBURY: Mr. Quirk, will you just give us about two or three minutes?

MR. QUIRK: Gentlemen of the Rubber Section, two minutes are a long time for me. All I can say is that it will be indeed a pleasure to serve the Rubber Section and you men next year, and the only thing that I am going to ask for is that one big word, cooperation. The coming year we have a lot of work and I realize that the chairman has a big job ahead of him, and will absolutely need your support and in a very short time you will receive some message from me asking for your help, so, in closing, I just want to say that I want to serve you to the best of my ability and I will conscientiously carry out the duties of Chairman of the Rubber Section.

MR. MARTIN: Mr. Ching gave me the idea of the yard-stick for measuring statistics. That called to my attention a class of statistics that I think is very much overdone sometimes. We have a statistical committee and I would like to give this thought to them for consideration. We are talking a great deal about lost time accidents. That means, to my mind, accidents due to loss of time. We consider a lost time accident, one where the loss of time extends beyond the day or shift after the man is injured. I know a great many concerns that have gone to unreasonable limits in caring for lost time accidents. I think it is of no great importance whether you have loss of time or not. Any accident that comes to your hospital is a loss of time and should be cared for whether it takes seven or ten days. We are making a lot of liars out of ourselves, if you will permit the frankness. We go to ends that are some times questionable to prevent lost time accidents. I am entering a plea for honest statistics, minor injuries, this differentiation between classes of accidents that causes men to work in a guard house that never happened before, on a job that is created for no other purpose than that of beautifying statistics. Let's come clean.

CHAIRMAN SALISBURY: The balance of the time is to be devoted to a discussion of Safety Kinks as used in the Rubber Industry, and as compiled by our friend and co-worker, Mr. C. L. Hungerford, who is going to put this on for us in his usual good form. I am sure that it is going to be beneficial and after showing the pictures, we want to use a little time for a general round table. One or two questions have been sent up on cards and we want them answered.

Safety Kinks

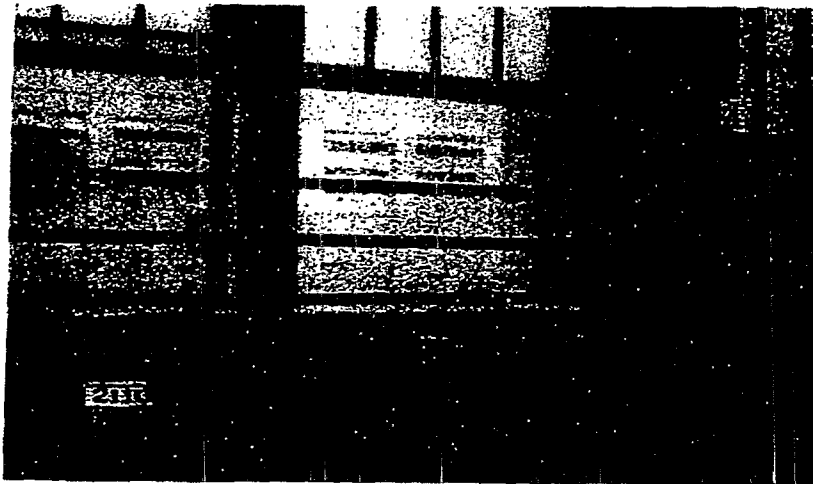
By C. L. HUNGERFORD

Division of Safety and Hygiene, Firestone Tire & Rubber Company
 Akron, O.

Just as Mr. Quirk has already stated, all of this work is due to the cooperation of members. We are paid primarily to do our job in our company but we do give a lot of time to the National Safety Council Rubber Section because

we know that by giving we secure a lot of valuable ideas that will help us in our work. Now, on the Safety Kink Slides that will be shown is material that was given to me by various companies and you can use these any time you like by merely writing to the headquarters office of the National Safety Council. The cooperating member's name appears on the slides and I thank them. We have not only endeavored to show mechanical guards, but will show a few things that are kinks or methods of putting safety across to the man who is on the job.

The first picture, furnished by the Fisk Rubber Company, is a truck for carrying a large calender roll. It is a cradle truck, cut away to conform to the contour of the roll, which prevents it from falling off. We are using the same type at our plant. Before we put it on a flat truck with wedges. You can visualize what happened when the wedges were not placed properly.



Slide 2110—Danger of falling eliminated by window bars. (Fisk Rubber Co.)

H. W. Low (Miller Rubber Company): May I ask the author how they take care of the different sizes of rolls? Do they have different trucks for various sizes?

MR. HUNGERFORD: The sizes don't vary greatly.

MR. LOW: In this connection, I may add, we had a similar type of truck four years ago. All plants don't work the same, but we made the storage at that particular place. We take the calender roll from the calender and sling it on an overhead track. We have the same cut-out stand that will fit the contour of the roll. It eliminates entirely the trucking and the handling of the calender roll. We have a section of the corner of the room set off and the men just place them in the overhead track. We consider it more efficient.

MR. HUNGERFORD: The next is a picture (slide 2110) of where the windows are low and there are possibilities of the employee or material falling out. The bars here prevent that possibility. There has been a lot of close calls of employees leaning out of windows with low sills. Just the other day a girl was leaning out of the window to look at the clock in the tower. If anything had scared her or if anyone had pushed her, it would have been possible for her to have fallen five

stories. It is the simple things that often go unnoticed that sometimes create fatal accidents. They use this in the Fisk Rubber Company.

MR. LYNCH: It is always very valuable too for keeping material such as rolls of stock that are used in the Rubber Industry from falling out or from falling on a truck which is passing by.

MR. HUNGERFORD: Another thing, we have in our plant a conveyor which passes our windows, and the bars are for the same purpose.

MR. BECK: Mr. Chairman, in that particular connection, in certain warehouses where they barred up windows, they often stack supplies. It is very poor practice from the point of view of fire prevention. Do not store goods against windows or walls where you have an outside exposure. In event of fire it handicaps you.



Slide 2115—Mould press. (Fisk Rubber Co.)

MR. HUNGERFORD: Here is pictured another simple kink, and yet very effective. How many of your millmen are continually cutting their hands while sharpening knives on stones? This stone holder is fastened to the housing of the mill. It remains there permanently.

MR. SCHNEIDER: I wonder how many companies have their knives dressed at one central point rather than by each individual, eliminating a certain amount of danger or localizing the danger?

MR. HUNGERFORD: I don't think that is always practical for millmen. We are doing it, however, in some divisions and it seems to be working successfully. A man takes his old knife back and gets a new one; it saves a great deal of time.

Here is shown a conveyor with a span mill guard around the gears. The hooks are protected with just ordinary rubber hose which prevents anyone from being injured seriously if they should happen to walk into the conveyor. This rope around here is a safety rope which stops the conveyor in case of emergency. We had safety ropes installed on our conveyors and they are not only a wonderful thing to prevent physical injury to men and women, but every once in a while

something may go wrong with the equipment. By being able to stop it quickly, it prevents further damage.

This is a truck for transferring large rolls of calender stock, the idea being that it carries two rolls, one on each side. That prevents a bale from over-rolling.

Mr. Low: Is that a portable foot?

Mr. HUNGERFORD: It is removable.

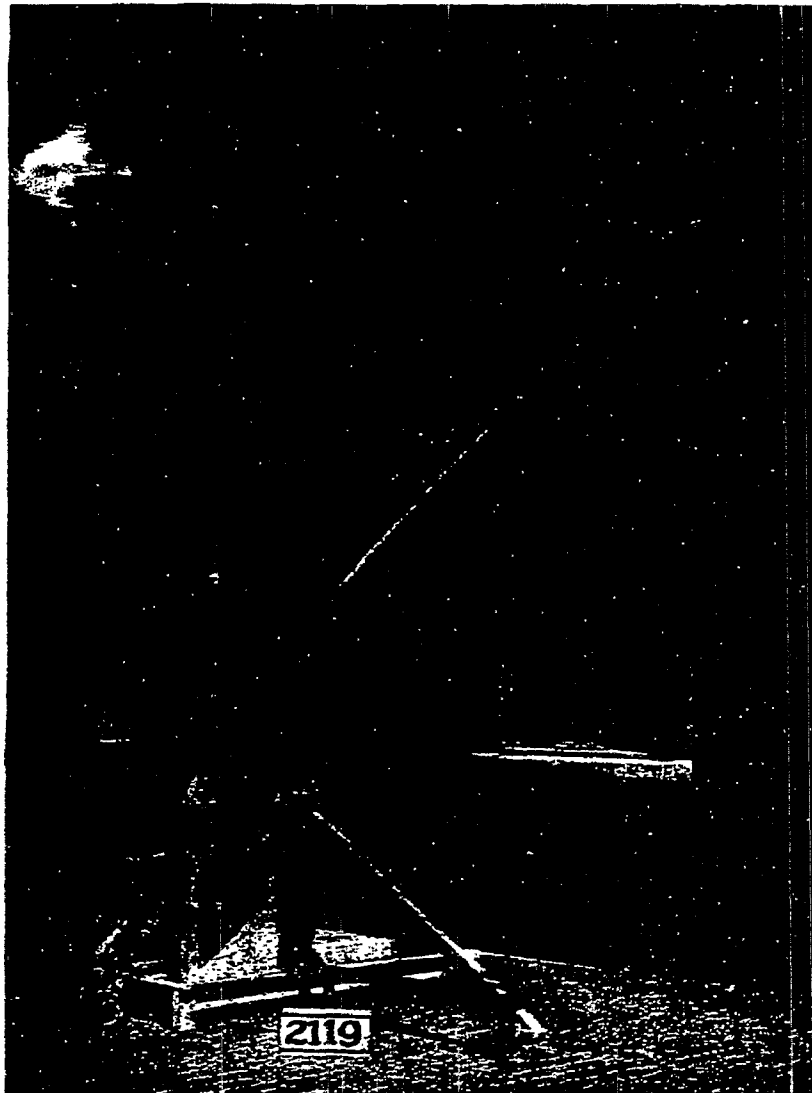


Slide 2118—Safety Bar on warm-up mill. (Firestone Tire & Rubber Co.)

Mr. Low: Suppose it is not used, what happens?

Mr. HUNGERFORD: Well, sometimes they get along all right without them, but we have had examples where they fall over. If we find they are not using them, we dress them down for it.

Mr. HUNGERFORD: There is another thing here, a hanger to prevent the bars from slipping out. It is especially designed and is a little hard to see. We wanted to carry the same bar all the way through from the wind-up on the calender to the wind-up on the pocket building table. We found that the bars were continually dropping out so we just welded a piece in the end of each hanger and it keeps the hook from shifting and allows plenty of chance for the bar to drop in but not to drop out.



Slide 2119—A ladder that will not slip; O. K. for high ceiling. (Firestone Tire and Rubber Co.)

MR. MCHUGH: It is simply a skirt on the bottom of your hanger, is it not?

MR. HUNGERFORD: Yes. Mr. Lynch will explain the mold press, please?

MR. LYNCH: (Slide 2115). I imagine everybody has had trouble with presses

the same as we have had. This we have worked up. It is the best thing we have put in recently for safety. Rather than have a storage of rings alongside of your conveyor table, you leave one ring on the bottom half of your mould. The tire is placed in there and the top ring which is traveling along immediately between the bottom half and the top half of the mould, drops down, goes under this press and is automatically pressed. You don't have to stop the conveyor



Slide 2122—Lugs prevent car plate from slipping. (Firestone Tire & Rubber Co.)

at all. It has proven a very favorable thing from every standpoint. Needless to say, it is a wonderful thing for safety.

MR. BECK: Have you ever had anyone caught between the rolls and the top case of the mould on that type?

MR. LYNCH: No, we haven't. There is a man who doesn't show on the picture, who sits directly behind that mould and operates it by hand; as that mould passes through, he releases the hydraulic valve and raises and then lowers it. It isn't in that position all of the time. That is just in the closed position.

MR. BECK: Does that give you an absolutely perfect center?

MR. LYNCH: Yes, it does.

MR. BECK: You don't have to use your spring presses?

MR. LYNCH: No, except on the big tires.

MR. BECK: Does that eliminate your clasp and ring press operation? Does it eliminate it entirely?

MR. LYNCH: Yes, and incidentally, in five years we lost 324 days in ring press accidents and in compensation about \$1,000.

MR. HUNGERFORD: This next picture illustrates an elevator safety switch. When the operator leaves he throws it off and makes it impossible for anyone to start the elevator. This was suggested by an elevator operator who got off to help a trucker on and in some way the truck handle started the elevator. The operator grabbed a stick, reached under the gate and shut off the power. Of course, that prevented any further damage. Now these safety switches are on all elevators and the rule is that no operator can leave without pulling the switches. It is quite an interesting feature. They were going to publish this man's picture and name in the Non-Skid and commend him highly for the wonderful headwork he used in stopping the elevator. On second thought it was suggested that he certainly didn't use head work in getting off the conveyor and leaving the power on, so he was reprimanded instead of commended.

MR. SCHNEIDER: Isn't there a tendency for them all to want to assist people in getting on and off.

MR. HUNGERFORD: We have elevators where that is the rule.

The next slide shows a simple thing on a ladder and yet a very effective device. How often do we have a man on a ladder where the safety shoes slip or are not effective? We have had a ladder where the man at the bottom of the ladder was not 100 per cent safe either. It is very easy with the hooks at the end of the ladder, as shown, to hook it on to anything.

Here (in slide 2118) we have a safety bar on a warming mill. This bar is put across the front and the difference between that bar and the roll is twenty inches. It prevents the millman from getting too close to the mill and it gives him something to lean against. The millmen like it very much. I want to call your attention to the fact that the mill is not as low as it looks. It is fifty-four inches from the floor.

MR. MARTIN: How high is your bar?

MR. HUNGERFORD: About 24 inches.

MR. HUNGERFORD: I might tell how and why we installed that.

We had a safety inspector from the State come through our plant one day— We had beautiful safety trip-tables and about three inches under each safety trip table we had a rigid bar which was to prevent the rubber from snapping loose from the mill. That worked fine. This was called to our attention by the State Safety Inspector. The objection was that the safety would be tripped by the rubber sling being loose. Incidentally, this bar prevented that. It slips over very tight and there is no trouble. Of course, you only get that on your rubber stock.

MR. BECK: How close do you say the bar is to the rolls?

MR. LYNCH: The distance is twenty inches on the average.

MR. BECK: Are you using the center bar on your trip?

MR. LYNCH: Yes, it is about eighty inches above the floor on all our mills. You can't reach it. It is too high. We haven't a man in the place that can reach that bar. These are all hooked up with your safety. It has to be reset.

MR. HUNGERFORD: Here (slide 2119) is a ladder that will not slip, and that is excellent for high ceilings. We had a man who fell off a ladder, the ladder slipped, and he fractured his skull and died. Our Vice President asked for a ladder that could be adjusted, something that would not slip and cause such accidents. We thought we couldn't get anything that we could put through the doorways and so our Safety Department and Engineering Department got together

and got a company to manufacture this for us. It has only a two-foot wide base. The adjustable outriggers support it. The platform, toe board and standard railings, giving a man a place to work with perfect security. It will support a weight of 300 pounds, that is, an ordinary man, with proper tools and motor can stand on it. It is being used a lot by our mechanical division.

MR. LOW: Do you have a climbing ladder?

MR. HUNGERFORD: No, it is part of the structure and is telescoped.

MR. LOW: What actuating medium have you there?

MR. HUNGERFORD: It is a hand crank with an automatic friction brake which prevents the platform from coming down too fast.

MR. LOW: What is the approximate cost of that?

MR. HUNGERFORD: \$750.00.

MR. LOW: Do you have it manufactured?

MR. HUNGERFORD: That was the only one. That is what makes it so expensive. The vice president wanted it and O. K'd it. These are also used by big department stores. We found that in New York City every big department store has this type. They have an awful lot of ceiling work and have had a lot of trouble with accidents on account of ladders falling, so it just shows you what effort in one instance will influence another. We don't care whether you make rubber tires or sell silk cloth.

MR. KIDNEY: At the exhibition on the roof of the Pennsylvania there is a scaffolding being exhibited and you might be interested in it.

MR. HUNGERFORD: I noticed that. It is a good line, but the huge platform that is necessary for transporting that makes it impossible for us to use it.

MR. QUIRK: A week ago in Detroit there were planks across a ladder on the seventh floor of a building and the scaffold was two months old. They are now testing to see whether it is the acid used in the window cleaning that caused the scaffold to break. The front frame broke on the seventh floor. They thought a ladder two or three months old would be O. K. Two men strapped to the different ends of the ladder fell down. We should find out what is being used in cleaning windows. I wonder if they are watching that or not. It is being investigated in Detroit.

MR. DEITZ: How long have you had that ladder?

MR. HUNGERFORD: A year ago last June a man was killed and we got the ladder about four months later.

MR. MCHUGH: Would you need an engineer to operate it?

MR. HUNGERFORD: No, it is very simple; one man can handle it. It practically folds up. These adjusting wheels below here can take care of any uneven surface and the standard toe-board and railing lands on the base. I have seen one man on the job take care of it. It is very easy to pull. It is all operated from the ground.

MR. MCHUGH: What is the height of the ladder when it is extended?

MR. HUNGERFORD: Eighteen feet to the top of the platform. It is not designed for four or five men. It is designed to support the weight of 350 pounds. Of course, it is all structural steel.

MR. MCHUGH: How long does it take to set it up?

MR. HUNGERFORD: Five minutes is a long time. The rigging trips and sets the foot down on the ground just like a regular transfer. I know we are glad to have it. I am sure the manufacturer would be glad to supply them. It is economical, a money saver, because one or two men will go out on a job that took four men.

MR. MCHUGH: Can you take a motor on it?

MR. HUNGERFORD: Yes. Originally we could take a motor up and couldn't get it down. Now, we can take it up and bring it down very easily. We will be glad

to give you whatever dope you may want on this at any time by simply asking for it.

MR. DIETZ: How do you take care of the varying returns? These are worrying me.

MR. HUNGERFORD: The cleats are close enough together that we haven't had any trouble with that at all.

The next is from the Miller Rubber Company. At this corner persons would come around with a large roll of bead wire and—bing—somebody would get a foot smashed or something else. They cut out the partition and put in a screen which enables clear vision and eliminates the blind corner. Now, there are a lot of places in any organization where that can be done, either by cutting out the partition and putting in screen ornaments, or whatever you desire. They haven't had any trouble since this has been installed.

MR. LOW: That enables the stockroom man and pedestrians to see into the stockroom. They are not so used to the fact that there is danger there and don't always look, but the stockroom men and people coming for the stock look out for it every time. Our pipe storage is also in that room. Once in a while a fellow would come out carrying a piece of pipe over his shoulder. He now is given a chance to see anybody coming along.

The next (slide 2125) is a window prop. The rods are slotted on the end and we found that after awhile the slot would bend. Then the men would stand a milk bottle or something to hold the section of the window open. We have had a lot of trouble, no injuries, but several close calls, by a piece of pipe or milk bottle dropping out of the windows. We went around and took all these window rods and spot welded them across the end of the slot so they can't get away. Welding makes it one piece now like the links of a chain.

MR. HUNGERFORD: This is an extended lip on the truck to prevent your mould from slipping off or out when being transferred from one point to another. I think it is a very good idea.

MR. LOW: It is as heavy as boiler plate. It is not welded on, but it is fastened on with bolts.

MR. HUNGERFORD: We often wonder what kind of bulletin boards other companies are using. Here is one being used by Fisk. Part of their success is getting their statistics before the eyes of the men, bearing on what Mr. Ching said about letting them know what is going on.

The next slide shows an accident report that every foreman makes out. This is a combination of the report used by U. S., Goodyear, Goodrich and Fisk. It shows the history of the injury, how long with the company, etc., but the important thing is to state the cause of the accident and what is being done or could be done to prevent it. The only thing an accident report is good for is to find out what you can do to prevent it. We pay a lot of attention to what has been done and is being done, to prevent it. This lets the department heads know just where accidents occur, and what is being done about them. It also shows the immediate supervisor. We often find out that the supervisor is having more in one department than the supervisor in another.

I have never been to a Safety Congress but what the question has come up regarding the lunch room of the mill. We have installed as shown in this slide this portable cafeteria in our millroom and we serve a hot meal to the men at a reasonable cost. These lunch wagons were made by our mechanical division. We serve meat, soup, coffee and dessert from ten to twelve, and from four to six. It isn't used on the third shift because the men usually eat before they come on, and they don't have any lunch period through the day. This is very popular with the men, giving men who do heavy work a hot and heavy meal.

This next—Accident Score Board—is used by the B. F. Goodrich Company

in presenting to their men just what they are doing. It seems to be self-explanatory. If a score isn't marked up daily I get a telephone call on it.

Mr. Low: Does the Safety Department do its posting or the departments themselves?

Mr. HUNGERFORD: The departments themselves post it because we want every foreman to know his experience.

Mr. HUNGERFORD: Another Safety Kink. "Open these doors and see the best safety device known." "I Am It." Would you mind telling us something about that, Mr. Salisbury?

CHAIRMAN SALISBURY: That is a simple and inexpensive method of making the employee realize that he is an integral part of safety. The truck is portable and can be taken from one department to another. The employee opening the doors sees his reflection in the concealed mirror.

Mr. HUNGERFORD: If you have got any good out of these Safety Kinks we are glad, but I want to bring out this. If you have received any good from it, please bear in mind to help whoever is in charge of safety kinks for next year. Send in your ideas, photos, etc., because the receipt means an awful lot in the way of helping it along. The success of the program depends on the cooperation of every member—new or old.

CHAIRMAN SALISBURY: I want to get into the record of this meeting the following question that was sent up on one of the cards: "What is the opinion of the value of installation of mills higher than 46 inches from floor line to top of rolls? Is there any objection to 54 inches?" That was sent in by W. L. Schneider, of B. F. Goodrich Co. He also adds, "If not, has it any additional safety value?" I want to get that into the record and unless someone can answer it now, we will just keep it there for future records.

Mr. SCHNEIDER: The point I had in mind there was: We are talking about newer methods of safety. Some people have used low or squatting mills for years and we have an engineering standard now that recommends 46 inches. I wanted to get the opinion of some of our body here as to what constitutes a good installation of height from a safety standpoint under a new method.

W. F. DOWN (U. S. Rubber Company, Cambridge): I wonder if anybody present at this group could suggest to me where I could have made a glass roll, solid four inches in diameter, approximately 46 inches in length. Have you ever had anything like that made?

Mr. DIETZ: Try McGee Glass Company, Jeanette, Pa. They will make it up for you.

CHAIRMAN SALISBURY: I am going to ask the new Chairman to close this meeting.

Mr. QUIRK: It is customary for a chairman to announce the additional part of the slate for next year, the men who are going to serve on the different committees. The following men have been selected to serve. Will they just arise when called:

Mr. Lawler, Vice Chairman, U. S. Rubber Company.

Mr. Mansfield, Goodyear Rubber Company, Secretary.

Mr. Wooden, of Mansfield Tire Company, Membership.

The others have already been announced, so I won't repeat them.

I just want to say that with your efforts and mine, we will accomplish something. There are many new faces each year. As I look around me now, there are a great many faces that I do not know and I think before we leave we had better get better acquainted. I would like to shake hands with you all. If there is anything you would like to present this coming year, I shall be happy to hear it.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Steam Railroad Section

New Section Officers

- Chairman*—J. E. LONG, The Delaware and Hudson Company, Albany, N. Y.
Vice-Chairman—C. F. LARSON, The Missouri Pacific Railroad Company, St. Louis, Mo.
Secretary—A. W. SMALLEN, Chicago, Milwaukee, St. Paul and Pacific Railroad Company, Chicago, Ill.
Program Committee Chairman—C. E. HILL, New York Central Lines, New York City.
Membership Committee Chairman—C. T. BAILEY, Oregon Short Line Railroad, Salt Lake City, Utah.
Accident Causes and Remedies Committee Chairman—T. H. CARROW, The Pennsylvania Railroad, Philadelphia, Pa.
Poster Committee Chairman—L. G. BENTLEY, The Chesapeake & Ohio Railway Company, Richmond, Va.
Publicity Committee Chairman—D. H. BEATTY, Southern Railway System, Washington, D. C.
Prevention of Highway Crossing Accidents Committee Chairman—C. L. LAFOUNTAINE, Great Northern Railway Company, St. Paul, Minn.
Public Relations Committee Chairman—(United States & Canada)—J. L. WALSH, Missouri, Kansas, Texas Lines, Dallas, Texas; W. A. BOOTH, Canadian National Railways, Montreal, Quebec, Canada.
Present and Future Activities of the Section Committee Chairman—A. V. ROHWEDER, Duluth, Missabe & Northern Railway Co., Duluth, Minn.
Engineering Committee Chairman—A. N. REECE, The Kansas City Southern Railway Company, Kansas City, Mo.

Retiring Officers

Chairman, E. R. COTT, The Hocking Valley Railway Company, Columbus, Ohio; *Vice-Chairman*, J. E. LONG, The Delaware and Hudson Company, Albany, N. Y.; *Secretary*, C. F. LARSON, The Missouri Pacific Railroad Company, St. Louis, Mo.; *Past Chairman*, J. D. WHITE, Illinois Central System, Chicago, Ill.; *Accident Causes and Remedies Committee Chairman*, T. H. CARROW, The Pennsylvania Railroad Company, Philadelphia, Pa.; *Poster Committee Chairman*, L. G. BENTLEY, Chesapeake and Ohio Railroad Company, Richmond, Va.; *Publicity Committee Chairman*, A. B. HOFF, Erie Railroad Company, New York City; *Prevention Highway Crossing Accidents Committee Chairman*, C. T. BAILEY, Oregon Short Line Railroad Company, Salt Lake City, Utah; *Public Relations Committee Chairman*

(United States and Canada), J. L. WALSH, Dallas, Texas, and W. A. BOOTH, Canadian National Railway, Quebec, Canada; *Program Committee Chairman*, D. G. PHILLIPS, Wabash Railway Company, St. Louis, Mo.; *Special Committee Chairman on Present and Future Activities of the Section*, T. P. BRENNAN, The Long Island Railroad Company, New York City; *Membership Committee Chairman*, A. V. ROHWEDER, Duluth, Missabe and Northern Railway, Duluth, Minn.; *Engineering Committee Chairman*, W. L. ROLLER, The Hocking Valley Railway Company, Columbus, Ohio.

October 2, 1928

E. R. COTT, Chairman

Supervisor of Safety, The Hocking Valley Railway Company
Columbus, O.

The first session of the Steam Railroad Section at the Seventeenth Annual Safety Congress was called to order at nine-fifteen o'clock by the chairman, E. R. COTT, Supervisor of Safety, The Hocking Valley Railway Co., Columbus, Ohio.

CHAIRMAN COTT: The Seventeenth Annual Safety Congress of the Steam Railroad Section of the National Safety Council will now come to order. I will thank you all to rise while Mr. W. L. Roller gives the Invocation.

W. L. ROLLER (Chairman, Engineering Committee, Hocking Valley Railroad Co., Columbus, O.): We feel grateful to Thee, our Heavenly Father, for this privilege of meeting together again to consider the many questions which have to do with the welfare of our fellow men.

We thank Thee, Heavenly Father, that thou hast put it into our hearts to get into this great movement that means so much for our fellow men. Be with us through the entire session of this Congress for our sake and Jesus Christ's sake. Amen.

We start the program out while we have Mr. Roller on the floor, to call on Mr. Roller for the report of the Engineering Committee.

Report of Engineering Committee

By W. L. ROLLER
Chairman

The chairman of the Engineering Committee, Steam Railroad Section, wishes to report that on account of other activities he has been unable to carry forward the work of preparation of Safe Practice Pamphlets as outlined early in the year. A number of such pamphlets have been reviewed and suggestions forwarded thereon. Chairman wishes, in lieu of definite accomplishment, to recommend for the ensuing year the following:—

First—That in all cases where technical knowledge of material and equipment, the use of which affects the safety of the railway worker, the matter be referred to the Engineering Committee for study,

Second—That the "Repair, Redressing and Sharpening of Maintenance of Way Tools" be made subject for Safe Practice Pamphlet. Our experience shows that a considerable proportion of accidents and personal injuries, especially in the Maintenance of Way Department, arise from faulty or neglected repairs to small tools which might be avoided by proper repairs and proper inspection.

Third—That the "Care and Operation of Gasoline Motor Cars" be made subject of Safe Practice Pamphlet. With the tremendous increase in number of such motor cars on the railways each year, it is vastly important that some reliable data be made available looking toward greater care in the maintenance and operation of this equipment. This is especially important in that this equipment is usually entrusted in their operation to men more or less lacking in the knowledge of fundamentals of their construction and proper operation.

Fourth—Would also recommend that the committee be assigned the subject of "Safe Methods of Handling Steel Rails." This pamphlet should embrace not only the matter of mechanical methods and devices but should also approach the matter of laying rails by hand and also report on recommended practice in loading rails at the mill to insure greater safety in unloading on the site of the work. This phase of the maintenance workers job is fraught with more hazard than almost any other class of work he is called upon to do.

CHAIRMAN COTT: We wish to thank Mr. Roller for his work during the year and he has laid out a program at least which we recommend to our successor. I wonder if next our chairman of the Program Committee, Mr. D. G. Phillips, will come forward and make his report.

D. G. PHILLIPS (Wabash Railway, St. Louis, Mo.): The Program Committee; about the only report they can possibly make is to call your attention to the written program you have in your hands. There is just one part of that program to which I call your special attention. While it is not more important than any other part, yet this year we have stressed that part and that is the Round Table Discussion tomorrow afternoon. Now, as you look at that program you will find a number of subjects, five I believe, suggested; but that does not mean that those are the only subjects that are expected to be discussed at that time. It simply means those subjects were selected to sort of start the thing off, to give us a running start. So, think up any subjects you possibly can that you want discussed, get up on the floor and get the rest started and we will do the rest.

I want to express my thanks to Mr. Walsh and Mr. Larson of the Missouri Pacific and incidentally to Mr. Cott, who did most of the work of getting this program together. We hope and feel sure you will be interested and profit by the things you hear and you yourselves say and do during the rendering of this program.

CHAIRMAN COTT: Thank you.

Mr. Hoff of the Erie, chairman of the Publicity Committee, will be called on next for his report.

Report of the Publicity Committee

By A. B. HOFF
Chairman

In presenting my report as chairman of the Publicity Committee, I regret to state that circumstances over which I had no control have rendered my activities far short of what I had hoped for.

What has been accomplished is this:—

1. A committee was formed.
2. A bulletin outlining a policy on publicity, was sent to the safety representative of each member road.
3. Articles suitable for publicity were solicited from railroads. Some usable material was sent in and used.

4. Relations were established with the editors of two brotherhood magazines in Cleveland, and two shop crafts magazines in Washington. These gentlemen agreed to cooperate and were furnished by me with safety articles by members of their craft or brotherhood. Some of these were published.
5. Press articles from time to time.

It is perhaps pertinent, in this report, to inquire just what functions a Committee on Publicity can cover. It is clearly impossible to establish a Publicity Bureau. This requires a continual supervision, an adequate staff, office room and financial assistance.

The question therefore resolves itself into possibly two functions:

1—A channel of publicity for such National Safety Council committees as desire, or find advisable, to use the committee for any special publicity purpose of their own.

2—As much casual publicity as is possible to put over featuring more particularly the work of the National Safety Council, Steam Railroad Section.

In commenting on these two functions, which may be considered distinct in character from publicity put out by the American Railway Association, or any individual road, it must be observed that the Publicity Committee is merely one more agency in the vast number of railroad publicity organizations which are now at work.

Every road has one, every railroad association or publication has one. They are chiefly interested in such a form of publicity as will serve their ends and the ends of safety.

It is with these thoughts in mind, therefore, that I have the honor and privilege of presenting this report. In conclusion, I wish to thank all those present and absent who have so cordially and cheerfully cooperated with our committee.

CHAIRMAN COTT: Thank you, Mr. Hoff. Mr. Bailey, I will ask you to report for the Highway Crossings Committee.

Report of the Highway Crossings Committee

By C. T. BAILEY

Chairman

It has seemed hardly necessary for the chairman of the committee assigned to the subject of Committee work to make a report in view of the very excellent accomplishments of a similar committee in the American Railway Association Section. However, the National Safety Council has a distinct place in the program of the Accident Prevention on Street Crossings. I believe it is the real organization for contact with the public. They have done a lot in assisting this great movement. They have assisted a great many ways in the distribution of posters and publicity. That is a big thing as we do it in propaganda, educating automobile drivers as to the hazards of grade crossings.

We did not prepare a formal report but we have assembled some statistical data that will be of interest. It will be recalled by action of the Executive Committee and the Committee of Direction, the work of both committees would be coordinated and we have striven with that point in view. The American Railway Association, as you recall, is putting out the posters and booklets. I am advised by the secretary of that section, in carrying on this general propaganda, that there were 596,000 posters distributed throughout the country and 542,000 booklets. Of this portion, the National Safety Council distributed through their local councils and other agencies not available to the committee of the American Railway Section, 10,000 posters.

There were 1,600 periodicals and messages broadcast over 100 radio stations last year. Editorials and articles written in the *National Safety News* covering the Grade Crossing situation were re-printed in many magazines and publications throughout the country.

Getting down to the Grade Crossing Accident Prevention propaganda you no doubt all were furnished with statistics covering these corresponding accidents in 1927, which shows a very great decrease in view of the increase of automobiles in the country. In 1926 there were over 23 million automobiles registered and there were 2,371 killed and 6,613 injured, a decrease over 1926 of 121 persons killed and 373 injured with the increased use of motor vehicles. For the first six months of 1928 there is shown a slight increase in this type of accident.

For the first six months of 1927 the Interstate Commerce Commission indicates there were 2,561 accidents resulting in 1,062 fatal injuries and in 1928 there were 2,634 accidents occurring with 1,097 fatal injuries and 2,934 other injuries, an increase of 73 accidents, 35 persons killed and 33 persons injured.

Of course we realize that exposure to this type of accident is governed largely by the use of motor vehicles. As the use of motor vehicles increases we are confronted with that type of accident. I want to urge upon all members of this Section to cooperate fully with the propaganda being distributed through the country. We can not give it too much publicity. You would be surprised at the opportunities that are afforded to talk on this very important subject at clubs and other places and the newspapers are anxious to get material for news items—nothing that is old stuff—but something new all the time.

I think if the representatives of the American Railroads will do their best to get into contact with the newspapers' representatives in their community and distribute this propaganda, the accomplishments will be great. The Committee has nothing much further to report other than to urge your continued support of this matter and cooperate with the American Railway Association which we are going to do. We are going to continue to carry on as we have in the past.

CHAIRMAN COTT: Before calling on Mr. Rohweder for the report of the Membership Committee I want to call attention to the fact that I received a letter a few days ago informing us that the Boston and Maine Railroad has recently become a member through the help of Mr. Charles E. Hill, vice-president of the National Safety Council. I wrote Mr. Hill thanking him for his interest, which all of you know is great, in this Section, in securing this new member.

Mr. Rohweder, will you please make a report for the Membership Committee?

Report of the Membership Committee

By A. V. ROHWEDER

Chairman

The report of the Membership Committee is a report very much similar to the report of the sales campaign. A year ago we had 98 members and today we have 102 members. Among the new members you might be interested to know are such railroads as the Boston and Maine, Great Northern, Northern Pacific and the Chicago, Milwaukee, St. Paul and Pacific; adding materially to the mileage of the Section and very materially to the section in bringing some of the men who have been very active in this section in years gone by and for some reason or other had dropped out.

The work of the Membership Committee is a work which should not be left to the chairman of the committee alone. Every one of you in your respective territories throughout this country should assist the Membership Committee. We find in talking to a number of executives who have refused to join the National

Safety Council that they know little or nothing about the work the National Safety Council is carrying on.

The fee paid by any railroad in the National Safety Council is brought back to them a million times over in direct and indirect service, in the work that is done in the industrial organizations along the line of their railroad, and in the schools, in the homes and on the streets and highways, that these roads pass through. I mention that just as a thought and a suggestion that there may be a railroad in your territory or someone on that railroad you can get to and suggest to them the advisability of their supporting the National Safety program to a membership in the National Safety Council and add to the 102 members we now have in the Steam Railroad Section.

CHAIRMAN COTT: I want to thank you, Mr. Rohweder, for your activities which have been most helpful.

Mr. Walsh, will you please report for the Public Relations Committee?

Report of the Public Relations Committee

By J. L. WALSH, Chairman

The Steam Railroad Section, National Safety Council, has as great a need for the approval, sympathy and close cooperation of the public in its accident prevention work as any of the various sections and probably has since its organization, put as much time, effort and money in interesting the general public in the necessity of an organized safety campaign as any other single agency.

The interest of the Steam Railroad Section in this, might by some perhaps be called a selfish interest, but this is not true as safety in the home and safety on the streets and playgrounds has always been stressed in the numerous contacts made by railroad men in their talks to the public in schools and in club meetings of various kinds.

That you may visualize how many people are annually addressed in this effort to interest the general public in accident prevention work, I might mention that, on inquiry, 25 railroads advised me that during the year 1927 representatives of their safety departments personally addressed 2,028,974 school children and 267,700 other persons on the subject of safety. If all the Class 1 railroads were canvassed, this number could no doubt be multiplied by two or three.

In January, 1928, as chairman of the Public Relations Committee, I wrote to the National Secretaries of the Parent-Teachers Associations, International Association of Rotary Clubs, International Association of Lions Clubs, The Kiwanis International, and to the chairmen of fourteen of the various A. R. A. Sections, offering to provide a capable speaker for a short talk on safety at their annual meetings. I find that in most instances the program committees of these sections are in the same position as is the program committee of this Section, that is, not bothered so much about a shortage of speakers as they are about finding time for those that want to talk.

Every reply expressed approval of the safety campaign the railroads are conducting, and gratification with the result obtained; also expressed the importance of cooperation by the various agencies. The campaign resulted in placing speakers as follows:

For the Freight Stations A. R. A. meeting in Niagara Falls in June, addressed by Mr. J. E. Long of the D. & H. Ry.

For the Freight Claim Division A. R. A. meeting at Detroit in June, addressed by Mr. Frank Wenter of the C. & N. W. Ry.

For the Protective Section A. R. A. meeting in St. Louis in June, addressed by Mr. D. G. Phillips of the Wabash Ry.

The Parent-Teachers Association advised me that their program already provided for a round table discussion on safety conducted by the Educational Division of the National Safety Council and the Medical and Surgical Section A. R. A. advised that arrangements had already been made for a representative of the Safety Section A. R. A. to address them on the subject of safety.

The attitude of the public toward the railroads in accident prevention is important and no opportunity should be overlooked or neglected to post them on what the railroads have done and are doing to prevent accidents and injuries of all kinds. Their aid and cooperation should be solicited, especially that of the National, State, County and Municipal office holders, the schools, churches and newspapers, the Fraternal, Civic and Industrial organizations and associations.

CHAIRMAN COTT: Mr. Walsh has been ill for some time and we are glad he is here.

Without detracting for one minute from the work of various chairmen I want to say that Mr. Walsh took his work seriously, worked earnestly throughout the year, was a good man to tie to throughout my administration and he has done in your interest a considerable amount of work that will be reflected later on in lowered accidents throughout the country.

Mr. J. E. Long, Mr. Bailey and Mr. Walsh are appointed a Committee on Resolutions. Mr. Long, Chairman.

I call your particular attention to the death of Mr. Brennan and I will expect them to produce a resolution later on in this section acknowledging our loss. I presume most of you know of Mr. Brennan's passing. I was fortunate enough to be able to attend the funeral as a representative of this Section.

J. E. LONG (Delaware & Hudson Railway, Albany, N. Y.): Mr. Chairman, might I ask you to include Mr. Bentley on that Resolutions Committee?

CHAIRMAN COTT: I am very sorry, Mr. Long, I will have to refuse your request. Mr. Bentley has been chairman of the Resolutions Committee for the last twenty-nine years and made me promise I would not put him on a Resolutions Committee this year.

Chairman's Address

By E. R. COTT

Supervisor of Safety, The Hocking Valley Railroad, Columbus, O.

Gentlemen, it now comes to that time when the chairman is supposed to make his address. Had I thought of it a little earlier I would perhaps have had the program changed, to show, not an "address" but a "talk" by your chairman. An address presupposes that the subject will be exhausted, usually accompanied by an exhaustion of the audience, but one who talks may say that only which he knows and then stop. This is a time, as I see it, not to make an address but talk things over among ourselves and talk them over frankly.

I have always been more or less a direct actionist and sometimes we have been advised to soft-pedal this and that; but when, if ever, can we talk things over among ourselves except here? So, for a while you and I will talk things over that are in my mind and perhaps in yours and leave you to be the judge as to the worth of the subjects that come to my mind at this time.

Without thought of trespassing on the reports of these various committee chairmen, I want to make some mention of their work and accomplishments. Mr. Phillips, in preparing this program had in mind both the safety officer and the railway employee attending a safety convention for the first time. The program, I believe, is a balanced one. It will provide food for thought for the

safety officer, education and inspiration for the railway employee, and in preparing such a program we must keep in mind these two audiences which we have here. Sometimes some of us are bored, we think we are at least, because we hear some things over and over again; but we must always recollect there are with us men to whom the subject is new.

Mr. Walsh and Mr. Booth, Mr. Booth in Canada and Mr. Walsh in America, have opened up several new avenues of contact which, if followed up by succeeding chairmen, will produce a relationship with various organizations that will be helpful both to this Section and to them and to the Safety movement in large.

Mr. Hoff of the Erie has had that thankless task that any chairman of the Publicity Committee has. The most difficult thing in the world to obtain is publicity, at least at long range. We must and should find some publicity channels that have not yet been opened to us. Here is a work for which we bequeath to our successor in the hope that he can find and secure some avenues which were not opened to us. I do call attention to the fact that the National Safety Council headquarters, with their staff of 85 or more employees, and public relations channels, have not been fed. We have not fed them the amount of real news that all of us have at our finger's ends, which might be spread out over the network.

Mr. Bentley, Past Master of Bulletins, has done a splendid work as chairman of the Poster Committee of this Section. Unfortunately the work that he has produced has not been purchased in quantities that work justified. Only recently a new cooperative plan between the American Railway Association and the National Safety Council was worked out. It has not been given trial long enough yet to prove its practicability. The members of this section are entitled to bulletin service. This Section must furnish bulletin service. It is part of the membership service and a plan must be worked out and it is a difficult one since the American Railway Association has gone into the bulletin service and produces such splendid bulletins. This also I bequest to my successor and he and time will tell whether our present plan will work out.

Mr. Bailey, of our Highway Grade Crossing Committee, was a member of the same committee of the American Railway Association. That committee by right is taking a lead in this work and our thought in having Mr. Bailey, in addition to his ability, was that knowing what was going on in the other section he might be in a position to cooperate and help through this section of the Council, the work being done by the American Railway Association.

Mr. Thomas Holmes Carrow, late of Europe (you will learn more about that later), will give you a report today which is instructive and timely; namely, a report upon the trespassing situation in America. The American seems to think he has a God-given right to go when and where he pleases; exercising that divine right, he occupies our right of way at any point which he wishes to, resulting as you know if you are watching the statistics, in a tremendous loss of life about which the nation itself is indifferent. Your special officers who are making an attempt to reduce this evil are getting very little support from public authorities. Let your officer arrest ten men in the average State in the Union, take them before the Judge and he gives them fifteen minutes to get out of town and they go down to the station and take the next train out. In my section of the country we have complaints from the trespassers saying the train is late delaying them from getting from one point to another.

We had a wreck on our railroad and a delegation of hoboes came to our trainmaster and wanted to know how soon the wreck would be cleared up. If your trains do not stop at the point which they want to leave they are very clever about knowing how to open an angle cock and they can get off if they have to knock down the conductor in the caboose doing it. The trespassing situation is getting away from us, Gentlemen. It is time we looked into it, time we acquainted

the public with the true situation so earnest steps and efforts can be made to handle it. I recommend after you receive Mr. Carrow's report, you take it home, see that it is broadcast and use it in an endeavor to handle this situation on your own individual railways.

Mr. Roller, a first engineer for a number of years to the chairman of the Engineering Committee, has told you a lot of the things an Engineering Committee should do and which he has not done. We forgive him, however, because of the fact that at least we have a program laid down to us by an engineer which we may follow. His recommendations, I believe, are worth while and succeeding chairmen should make a study of that report, establish a contact with the safe practice men of the National Safety Council and work toward the end suggested.

Mr. Rohweder, chairman of the Nominating Committee, had I believe, Mr. Larson or Mr. Walsh and Mr. Phillips as his assistants. Their report will be given to you tomorrow. It is based upon a long acquaintanceship in the section, precedence and a thorough study of our own situation. They are absolutely unbiased in their opinion and had only in mind the welfare of the Section when they selected the officers whom they will present to you tomorrow. So much for this part of the Chairman's talk.

You are all, no doubt, familiar with the fact that recently the National Safety Council at the request of the Steam Railroad Section, introduced a system of medal awards and in January, 1928, seven metal plaques were presented to the seven individual railroads making the lowest accident rate over a period of years. When we did this we eliminated from the contest those who were awarded medals for 1927. You have a fair and open field for all of the other railways in the country. There are no favorites. Work and endeavor alone will put one to the top and we hope that all of you have an interest in this contest and have an ambition to see your road receive one of these plaques. This work is confined entirely to employee accidents. There is no weighted basis used such as in the Harriman award and the Interstate Commerce Commission figures are the only figures used in computing your rating. There was, at first perhaps, some little suspicion and misunderstanding as to what was intended. Nothing more or less was intended than a stimulus, recognition of work done, and I am sure that the railroads will welcome this additional public recognition of their efforts. Paraphrase: We live, Gentlemen, in a world of progress. I think it was Elbert Hubbard who said: "If you stand still you go backwards."

That is true. You recall the Roman Empire; master road builders built their far flung highways away from Rome and after getting so far, set their figure of a God, at the end of the roadway. The name of this God comes down to us now in the word "Termina." As long as Rome expanded, as long as Rome grew, as long as she reached out for other empires there was strength. There was power. But, after a while, she became satisfied, she set up this God "Termina" and instead of being interested in what was over the hill, what was on the other side, began to stop and look around and then look backward, back from whence it came and gradually retreated and decay and rot set in.

And so it is in Life. In any movement as long as we are looking ahead, as long as we have a desire and ambition to see what is on the other side of the hill, we progress but whenever we become satisfied to stand and look around, then we are going backwards.

I had a grandfather, not an unusual thing for one to have, but a rather exceptional grandfather, one of whom I am greatly proud. He was one of these men as he grew older was interested in the things that were around him. I believe it was Shakespeare said, "Man is a creature that looks before and afterwards," and Carlisle in commenting on it said, "It is a wonder he didn't look around a bit."

My grandfather kept mentally young. He was interested in what was going on and things ahead, and it was my custom as a lad to go to his home every Saturday

evening. I remember they had a light meal of tea and toast. I always hated tea and I didn't care particularly for toast but I sat through the meal because I would have the privilege for an hour or so after of listening to my grandfather talk.

There were two magazines always found in his room. The *World's Work* and the *Scientific American*. It was his custom to bring out one or the other of these magazines and select some topic he had read and discuss it with me. I recall going to his home one Saturday evening and finding grandfather excited about something, and after the meal was over he took me into the library and he told me in rather strong words he was cancelling his subscription to the *Scientific American*. He was done with it. He was through with it, no longer interested in it. He said for years he had had confidence in the *Scientific American*. If they were expounding or reciting about a theory they so stated if the matter had not been proven the reader was told, but now for some reason they had gone off into the realms of fiction with a story in the last issue of the magazine—not only was it fiction but they deliberately lied and introduced photographs to prove a thing which any man with reason knew was impossible. He then exhibited to me a photograph of the Wright Brothers flying their first aircraft at Kitty Hawk, N. C. Grandfather had reached the limit of his road.

From then on, as I see it now, he began to lose interest in what was around him and go back over the road he had traveled.

Now that, gentlemen, can be true of the safety movement, but it must never be true. Those of you who have in the past led the way, those of you of today who are showing the way, those of you tomorrow who will be responsible for that movement, must always have a vision that looks beyond; and God help this movement whenever we stand still and look around and become satisfied with the things being done.

The safety movement has made a definite progress, step by step, if you will trace its movement; but it is only recently I believe that we have realized that safety is, after all, not a thing of itself but rather a by-product of other things. Safety is a by-product of correct engineering, efficient and economical operation, and those things of themselves are but by-products of correct mental attitude.

A number of years ago in the interest of fire-prevention, the railroads of the country ordered good housekeeping. Bulletins were spread about; rules were made, orders issued with more or less indifferent success and then it was that someone discovered that good housekeeping in itself was nothing more or less than the outward indication of the character of men in charge; that good housekeeping in a shop or a building was nothing more or less than a bulletin that told to the passing world the character of men in charge of that building. If I wanted to know what kind of an agent you had at one of your stations I would only have to go there, ask no questions but look inside. If he was a bluffer the waiting room would be clean and the rest wouldn't be fit to be seen. If the place was disorderly, poorly cared for, dirt in the corners, records thrown about, I would know he was a poor agent. I would know his reports were not on time or accurate, that the superintendent or dispatcher did not like his work because the conditions surrounding that particular station indicated the kind of man that was there. To order him to clean up was of no avail, but to clean that man up mentally and morally would sooner or later be reflected in the character of housekeeping that prevailed in that particular station.

I have seen it time and time again proven, that the traveling auditor would say, "What happened to John Smith in his accounts?" When the chief dispatcher tells me John Smith is a better operator than he used to be—when the traffic manager is better satisfied, it is not because he cleaned out, but because we cleaned him up mentally and the house and his work showed the result. That is absolutely true of the safety movement. You cannot talk safety first and secure safety; you cannot issue orders that will make him and his men safe; but when you change

the mental attitude, you will have changed the surroundings, because habits change and then economy, order, cleanliness and safety follow.

The safety record of any shop is but the sum total of the mental and mechanical qualifications of that particular shop. Poor railways do not have good safety records. Low production is reflected always in high accident rates. Inefficiency is no kin to safety, and uneconomical operation is followed always by high accident costs. The railways that are making safety records and good records today are efficiently operated railroads, and safety is merely a reflection of the efficiency that we find in the operation of those railways.

The safety man of today and the future must be a student of personnel work. He must intimately acquaint himself with operating details because today to get farther down the list than we have he must get into the matters that only are reflected later on in safety records, because he must have his fingers on the pulse of the entire movement of a railway. The safety officer is not asking for greater authority. He is asking for larger opportunity, opportunity to serve; and recently the safety officer on the American railways is securing his place in the sun, the place which he deserves. I don't think there is a finer body of men existing on our American railways; that elsewhere you can find a group among which are so great a number that will subordinate personal ambition to the love of their work. Greed, selfishness, personal ambition and self desires, hatred, suspicion—these cannot be in the heart of a safety man who expects to get the results we want and the road wants. So I am proud of the safety men I know, who go on day after day asking little for themselves only to be of greater service to their fellowmen.

Wonderful things have been accomplished since Thomas Holmes Carrow took the floor at Salt Lake and talked about the 35 per cent goal. Lewis R. Palmer has prepared some statistics for us that will be given to us today or probably tomorrow, which will show you what has been accomplished since that time and these statistics I speak of are brought clear up to date through the six months of 1928. Those of you who are not thoroughly familiar with the statistical end of this work will be amazed and surprised at what has been accomplished. We must be frank and acknowledge that part of this reduction is due to the fact that we are no longer being charged with accidents due to the facts that hurts can no longer be dignified by the term "injury" and thus charge us with carelessness. The indifference of reporting officers, physicians and supervising officers is now a thing of the past and the result is that there have been chalked off of our record, a mark of carelessness that was after all a matter of nothing more or less than indifference. We are getting down to the point now where to reduce accidents hurts but there is a group out here in front of me who are big enough to carry the job on and it will be done.

I want to sound to you a note of warning which I believe it is my right and privilege to do: that we keep our balance; that we do not make of safety work a thing sublime now, ridiculous later; and that we ourselves do not degenerate into claim preventers but always be accident preventers, which is our job. That note of the warning I sound.

I want to say a word in speaking of records about whispers. Perhaps it might be better for me not to have mentioned what I speak of now but when one gets his head up and over the top it is a good target. Prominence subjects one to exposure and there have always been tales going around from time to time about the methods of reporting on certain railways. Not one but a number. Only recently the Interstate Commerce Commission made an examination of a number of railroads and inspection of their method of reporting and gave them a clean bill of health, all of which I think you will be glad to know.

The Interstate Commerce Commission has a rule that we must report accidents under certain circumstances and there is a stiff fine for failing to do so;

and if any one knows of a specific instance, it is their right and privilege to so report the facts, but, gentlemen, we are all working together friendly and happily. Let us leave the whispers out, let's work together; let's strive to reach the goal. Let's not take into our heart any envy, only the envy of ambition to reach the goal.

I want to welcome the Boston & Maine, a new member and our old friends who have come back into the National Safety Council. I think it is now time that we no longer put the question to ourselves: What do we get out of membership in the Council? but rather to put it on the basis of what our membership does.

First, it makes possible this Congress and this Congress will carry a message of safety to the far corners of this nation and perhaps the world. Our memberships make possible missionaries that go into the field to make Safety Converts.

Our membership makes it possible to carry to the public and industry our problems and their relations to it. In the interest of greater Safety both for them and ourselves it makes possible helpful contacts and associations that reflect in lower accident rates throughout the nation, and it carries and makes possible the carrying of a Safety message to schools and homes where live and where are women and children, whom all men love. If you will think of the movement in that way, I believe you will never ask, "What do we get out of our membership?" but "What does our membership urge us to do in the interest of Safety?"

Now, when I look at you men, you safety men, I don't see you but I see beyond you and through you. I see homes, sheltering roofs, trees and gardens and flowers, and there, happy in his task, a father. There also, secure in the love of a mother, are little children, safe in the home. Above I see the vision, a cloud by day and a pillar of fire by night, the guardianship of safety.

Mr. Palmer, will you escort the Doctor to the Chair? We are having a slight change in our program in item three on Wednesday morning. It will now be given in order that the Doctor who intends to leave for Europe tomorrow may present his paper.

Gentlemen, I take pleasure in introducing to you Dr. Arthur Geiringer, M.D., Associate Medical Director, Equitable Life Assurance Society, New York City.

Preservation of Health

By ARTHUR GEIRINGER, M. D.

Associate Medical Director, Equitable Assurance Society, New York City

It is certainly the experience of life that irrespective of riches or poverty, fame or obscurity, happiness or sorrow, yes, even in health and in disease, the great hope and the great conscious and subconscious desire of mankind is to continue to live. No one but the individual with perverted reason can deny that the basic urge in man is "I want to live and I want to live long." Of course he wishes to live happily and comfortably but above all and despite all, with rare exception, man's cry and prayer is to *live* and to prolong this life.

If this desire to live is the fundamental and basic wish and determination of man, what more noble or worth while effort can one conceive of than any agency which will, by means of any degree of intention, advice or practice, help him accomplish his aims; and it is exactly that which numerous forms of Health Preservation Units throughout the world are doing with rapidly growing and progressively increasing effort and success.

This great health conservation movement started with the advent of modern medicine but it was not until after the Great War that the work was seriously and practically organized and actually applied. This renewed activity, or health renaissance, was stimulated by the numerous instances of disease and suffering

which resulted from the many intentional and unintentional brutalities of the war but more definitely the need of energetic health preservation was emphasized by the astounding evidence of physical unfitness which was shown by the records of recruiting camps throughout the world. It seems extreme and yet is absolutely true that almost half of the young men, the apparent flower of the nations, showed upon preliminary examination a state of health and a condition of body clearly below the normal standard and also clearly *far below* the *possible* standard of near perfection. Now if this was the picture of health of the young man what must be the physical condition of the middle and old age groups. Relatively much worse!

Casualties to Employees on Duty in Train, Train-service and Non-train Accidents
All Class I Railroads

Year	Killed	Injured	Total Casualties	Total Cas. Rt.	Man-hours Worked (000)	Estimated Total Cas. At 1923 Rt.	Total Cas. Saved	Per Cent Decrease vs 1923 Rt.
1923	1 866	148 146	150 012	50.06	4 856 964			
1924	1 403	120 912	122 315	27.34	4 473 186	134 132	15 617	11.46
1925	1 460	114 639	116 099	26.10	4 448 377	172 597	56 499	15.41
1926	1 528	107 216	108 744	23.87	4 557 537	140 757	31 991	22.70
1927	1 427	85 883	85 310	19.56	4 406 627	156 077	50 767	37.51
1928*	1 202*	65 802*	67 004*	16.25*	4 124 248*	127 357*	60 353*	47.41*

Total Casualties Saved - 215 426

Per Cent Reduction in Total Casualty Rate, Years 1924, '25, '26, '27 and '28
Compared with Total Casualty Rate 1923 (50.06)

Year	% Red.
1924	11.46
1925	15.41
1926	22.70
1927	37.51
1928*	47.41

*Based on first six months' experience.

We say emphatically and without qualification that the general physical condition of mankind is pitiful. Pitiful because it is definitely and positively avoidable.

The more profoundly we study the human body the greater is our respect for it. The more intensively we go into the details of this subject, the more definitely convinced are we that the mass of facts developed by science represent only the alpha of the secrets which are yet to be exposed. Yet, despite our profound ignorance of so many features of human structure and function, it is undeniably true that the relatively slight degree of knowledge which we have is of great significance and value. Indeed it is of such great value that if the human race would apply this knowledge and use it, even to a moderate degree, easily one-half of all physical ills would be definitely relieved and furthermore, if this definite knowledge were applied from a preventive standpoint, few of the numerous ills of mankind would ever see the light of day.

If this short talk conveys to you and impresses upon you these two following thoughts I shall be more than gratified. First, the great majority of mankind enjoy only a fair degree of health. Good health is just around the corner and humanity

may have it whenever it takes the trouble to reach for it; and secondly, the proper approach to good health and a longer life is the prevention of disease primarily, not its cure or treatment.

Time will not permit me to prove to you by statistical data the truth of my apparently severely drawn picture of the low standard of the average human physical condition. That the picture is true however, and not at all exaggerated can be very easily proven by reference to the great mass of medical data developed, as I mentioned above, during the war and further accumulated since the war, by all kinds of health units and by the thousands upon thousands of physical examinations in the records of Life Insurance companies, which records, incidentally, present a perfect cross section of health of the individuals of the leading nations over a period of fully a hundred years.

Admitting then, as a result of such study, that the average physical status of men and women is such that improvement is definitely indicated, may we ask by what means can we accomplish such a result? I believe that educational methods in the form of lectures, newspaper articles, magazine articles, bulletins, pictorial presentations, teaching in schools, and the family doctor are very important and effective means of contact and achievement, but it is my opinion that in the last analysis these methods will not be fully satisfactory unless they all emphasize that the basic, the essential procedure, is specifically the Periodic Physical Examination of all individuals and particularly and positively those of the ages of 40 years and older.

We are of course, interested in the sick man or woman. The whole effort of curative medicine exists for him, but on the other hand, the whole idea and purpose of periodic physical examination and the whole idea of health preservation and life prolongation in this newer sense were not evolved for the purpose of helping the individual who is obviously ill, who knows that he is ill, and who knows that he should receive medical advice and treatment. Quite the contrary. The idea was developed for the benefit of the large number of people who *appear healthy, feel healthy, and believe that they are healthy* but in whom there may exist an abnormal condition which has neither manifested symptoms nor made itself felt in any manner, a condition which is a potential source of trouble. The defect may be described as a weak link in the chain of an individual's physical well-being.

It might here be argued that if a person appears well and feels well it is better to leave well enough alone; that it is better not to seek trouble; and that to suggest illness is to create a thought or state of mind toward ill feeling. Quite true at first glance or upon superficial and shallow thought, *but not true at all* upon even slight reflection or elementary analysis.

There is no more justification for such reasoning than there is to say that the man who exercises foresight in saving part of his income for a "rainy day" is wrong; or that a railroad engineer is in error who from time to time inspects the important bolts, brakes, and other vital adjustments of his engine to avoid breakdowns and resulting accidents. No one could possibly criticize such practices or a host of other similar procedures of foresight which are common to all of us in our daily life. To take a contrary stand is illogical and will lead to a sad and cruel awakening. Failure to face facts is a policy which is usually definite, positive, and unrelenting in its penalties.

Despite the fact that the science of medicine is not complete or infallible it is well enough equipped at the present time to detect and to check up on the early signs of mankind's common ills. It is possible by means of a simple examination to discover the "weak link" which we mention above. This can be done with astonishing accuracy and certainty. Why ignore such an important possibility? How little material success, fortune, position, and accomplishments mean during the sad days, months or years of ill health? How often have we all heard "I would give

anything or sacrifice anything to be healthy and physically happy again!" How distressing are the thoughts and experiences of the "might have beens!"

Will the periodic physical examination change this picture? Positively! Without going into the technicalities of the question, we can cite a great number of instances where men *thought* they were healthy but in whom physical examination revealed vital defects or impairments, abnormalities which extensive experience teaches would have meant a shorter life and certainly a very unhappy one. Of these, we can tell of numerous cases where these impairments were entirely cured or eradicated with little effort through intelligent medical supervision. We have in mind several particular instances illustrative of this experience.

A policyholder of a large insurance company which is extending health conservation service to its policyholders sent a specimen of urine to the company stating that he was in perfect health and that therefore he did not desire full physical examination. "Still I have received so many of your circulars that just for interest I thought it might be well to have you do a urinalysis for me." A small percentage of sugar was found and the man was advised "that this single finding does not mean that you have diabetes but it should certainly act as a suggestion that you consult your physician, show him this report, and request the necessary further study to eliminate or confirm the possibility involved." To this there was no early response. About four months later, however, the policyholder wrote as follows: "Your finding disturbed me greatly and I was sorry that I sent the specimen to you. I was healthy and happy until I received your report. Still there was no way out so I went to Chicago, the nearest medical center. There further specimens were examined under various conditions and a quantitative blood sugar test was made. The results proved that I was indeed an early but true diabetic. I am now under periodic observation and treatment and I am convinced that I shall live many years longer than I would have lived if I had started treatment perhaps a few years later, when this disease would have made itself manifest by serious and hopeless symptoms. I am therefore more than grateful to you."

There are, without a vestige of doubt, thousands upon thousands of such cases going around entirely oblivious of a diabetic condition which a simple examination would determine but who unfortunately will not know their condition until it is too late. The same is true of Bright's disease, high blood pressure, heart impairments, early pulmonary tuberculosis, and many other ultimately fatal pathological changes. Few of these in the early stages cause striking symptoms and because of this insidious onset which may actually exist for years the sufferer has no other means of detecting and correcting his condition than by a careful periodic examination. On the other hand, if he does learn of these impairments while they are still incipient it is remarkable how readily most of them will respond to proper treatment.

Periodic examination is growing rapidly in popularity and yet not rapidly enough. No man after forty has a right to deny himself or his family this important aid to live a longer life. We prophesy that in the not far distant future Periodic Physical Examination will be the rule and not the exception among intelligent people.

And now, in addition to that aspect of this question which is the desire of man to live and to live long healthfully and happily, there is the economic and the industrial angle. We have established on the basis of surveys by various specialized investigators that this nation spends annually for drugs, doctors' services and hospital maintenance a sum very close to a billion dollars. Think, my friends, of the endless number of other uses to which, let us say, half of this fortune could be put if it were saved as it can, without question, be saved, if we all did no more than merely to follow the most simple and easily available rules and practices of health preservation!

This sum is staggering but small in comparison to the fact developed by that great statistician and investigator, Dr. Dublin. He states after a thorough study

of a great mass of material and after a clear explanation of how his figures were reached, "That sickness cost directly in lost wages, in reduced production, as well as in the necessary care, a total of two and one-quarter billion dollars a year" and then he adds, "Having due regard for the value of life at each age period I estimate that the total capital value of the lives *which can be saved* annually through the application of modern preventive medicine and public health measures is over six billion dollars."

With these facts before us we must hesitate, even for a moment, in our labors to change and to improve this picture. With all the health units thus far organized, and there are many, we have as yet barely scratched the surface. And yet great work has been done, but the greater need and the larger field is before us.

The possibility of health preservation is not a fad, it is not a fanciful hope or an altruistic dream. It is a definite, precise and proven reality, the general acceptance and practice of which will not only diminish tremendous economic waste but it will increase human happiness and the length of human life.

In conclusion, may I ask you to pardon the injection of my purely personal opinion when I state that I have had the privilege of contact with a very great number of individuals of all classes through my life insurance work. I have in addition, the opportunity of daily bedside experience and I have been intensely interested and fascinated by this subject of preventive medicine. As a result of this experience I am convinced I am as certain as I could be of any truth, that if men and women will take the trouble to live according to the rules of hygiene, sanitation and preventive medicine already firmly established, the Biblical fallacy of three score and ten years of life as the satisfactory span for the chosen few could easily be relegated to past experience and that a new standard would easily be established which would grant those three score and ten years to the great majority and to a large proportion of the remainder a life of 80 years or even longer.

CHAIRMAN COTT: Mr. Walsh, will you please voice our appreciation of the Doctor's paper?

J. L. WALSH (Supt. of Safety, Missouri, Kansas and Texas R. R. Co., Dallas, Texas): I am sure we have all been glad to hear and greatly benefited by Dr. Geiringer's talk. It is a subject that has had too little discussion in our meetings. The safety work on the railroad was organized for the purpose of conserving life. You hear from the Doctor this morning what the economic loss is to our country from preventive diseases. I think it is up to the safety men of the country to take hold again and give to the members of your committees and employees of your railroads, the benefits which you got from Dr. Geiringer's talk this morning.

Most of our railroads have a hospital department wherein employees can get this physical examination without cost and I think it is clearly the duty of every safety man in the country to call attention of the employees of the railroad to the great importance of physical examinations. We may kill on our railroads 1,500 or 2,000 employees in the course of a year and at the same time during that year we lose 10,000 or 15,000 employees by a preventable disease. I am asking you if that is not a bad situation, when it is possible for us to get in on the situation and try to get our men to take this physical examination that means so much to us?

I think we have neglected this far too much. It is within our power and it is plainly our duty to get these facts before all the men on our railroad. As Dr. Geiringer said, it is pretty hard to get an old time railroad man to go to a Doctor when he is eating three meals a day and sleeping eight hours a day and feels in perfect health; yet from your own experience you know how rapidly those men between 55 and 60 years of age drop off, from diseases that could have been prevented. Their lives could have been prolonged by just a little time on their

part, either to the company doctor or any physician, to get this physical examination and find out what their condition is.

I am asking you men to give that matter serious consideration and let us endeavor to prolong the lives of our men by urging them to take this physical examination at least twice a year when they are above forty years of age. It is a matter that takes but little of time and a little effort on your part to get these men to do it. You all know how a railroad man hesitates to do those things and it will take persistent effort on the part of the safety men to bring about this result and I hope we will be able to do a great deal more in the future than we have in the past.

CHARLES E. HILL (Pennsylvania R. R., New York City): I think it might be interesting to the audience to know something about the character of the talk tomorrow.

CHAIRMAN COTT: We are without a report from the Committee on Present and Future Activities of the Section. Mr. Brennan, who passed away two weeks ago last Friday, only had his report drafted planning to complete that report later. Certain work has been done, certain files are available which are in the hands of Mr. Charles B. Hill, General Safety Agent of the New York Central lines, and the chairman who succeeds me, and he will probably find those files of use in planning the future work of this Section.

I am going to ask at this time if Mr. Bentley will please come forward and present the report of the Poster Committee.

Report of Poster Committee

By L. G. BENTLEY
Chairman

596,000 posters and 542,000 booklets were distributed by A. R. A. for 1928 campaign.

National Safety Council issued publicity material on Careful Crossing Campaign to more than 1,600 periodicals, and broadcasted messages over 100 radio stations.

10,000 copies of safety poster issued by A. R. A. were distributed to local councils throughout the country.

One article and one editorial were written on this subject in the May issue of *National Safety News*, and were reprinted in the *Lehi Valley Motor Club Bulletin* and many other publications of similar character.

I. C. C. records indicate the following for the first six months of 1927, as compared with same period for 1928:

	Accidents	Persons Killed	Persons Injured
1927 _____	2,561	1,062	2,901
1928 _____	2,634	1,097	2,934
	73 increase	35 increase	33 increase

During the year 1926, with over 22 million registered automobiles in operation, there were 2,492 persons killed and 6,991 injured in highway crossing accidents.

In 1927 with over 23 million automobiles registered, there were 2,371 persons killed and 6,613 injured in similar accidents. A decrease for 1927 over 1926 of 121 persons killed and 373 persons injured in highway crossing accidents.

The present chairman of the Poster Committee assumed the Chairmanship last April upon the urge of the Chairman of this Section because as I recollect the situation at that time there was no one willing to take up the burden and carry it on; and such indifferent success as has been attained in presenting bulletins

for the Steam Railroad Section of the National Safety Council has been hampered by the fact that the chairman of the Committee has been extremely busy. Not only in the preparation of bulletins for the Safety Section of the American Railway Association but the important work upon his own road.

I want to deal just briefly, and I think the subject merits some comment at this time, with the present situation as regards the production and distribution of posters in the Steam Railroad Section of the National Safety Council, and in order to give emphasis to what I want to say it is necessary I should refer to some comparable figures.

The committee on posters has endeavored to produce the same class of poster exactly as are being produced in the Safety Section of the American Railway Association. The only difference being that because of an agreement entered into between the Committee of Direction and the Executive Committee of the Steam Railroad Section,—one Section was to produce bulletins for railroad employees, dealing with methods of employee work and the other was to produce bulletins dealing with the public. That is the only difference in the class of bulletin. It is necessary to state at this time, that due to the fine spirit of cooperation that has existed and is now existing between the Safety Section of the American Railway Association and the National Safety Council executives, a plan has been worked out whereby the posters in both sections are sold at the same price, depending upon the distribution. Not only that, but sample copies of the posters of this section are sent to the Secretary of the American Railway Association and distributed to the members of the Section in order that they may see what they are asked to buy.

Gentlemen, I am firmly convinced that to expect Railway operating officers, even busy Railway Safety men, to look through a catalog of one colored posters and select therefrom and place a dignified order for their posters, simply because you are presented with about a one and one-half by two inch miniature, is expecting the impossible and I am strongly convinced by my experience that we should furnish to our prospective customers, a sample copy of what we are asking men to buy.

That has been worked out so that this distribution as you know is now being made. I want to say in connection with this distribution that before the present arrangement was worked out and the present chairman assumed the work, there were during the past year, produced 10 posters, the average sale of those posters being 2,500 copies. We have produced since that time, five posters and the sales have increased 100 per cent. The sales being 5,000 copies approximately instead of 2,500 copies and I attribute that to the fact that the customer sees that which he is being asked to purchase.

I would like to have some suggestions. I am sure the incoming chairman of the Poster Committee would like to have some reaction from the members as to whether or not they approve receiving all large posters. Previously we were allowed to distribute one large poster and three small ones, periodically. I have forgotten just how often but under the new arrangement we are only getting out one poster a month through the Steam Railroad Section of the National Safety Council. I would like to know, and you can give me some idea of your wishes now, by the uplifted hand. Those who are in favor of the small poster, nine by twelve inches, just that, exclusively, please raise your hands. Those who are in favor of the large poster, seventeen by twenty-three, please raise your hands. Thank you very much. I get my reaction by your uplifted hands. The Seventeen by Twenty-two is most popular and will be produced in the future.

During the past few months, Mr. Hale and Mr. Warfel have criticized the posters gotten out, not only in this Section but in the Safety Section of the American Railway Association. Their criticisms were constructive. They were the kind of criticism that a man who is striving to please the multitude needs. I want more of them. I want them in the Safety Section of the American Railway

Association. I want something that can be developed and please the people using these posters because, Heaven knows, my ideas in this respect are just about exhausted. I wish when you get the circular from Mr. Cobb about the public posters that you would place your orders promptly and as liberally as you feel like doing. Ordinarily a poster appealing to the public should produce a bigger sale than to the employees because you are appealing to the public on a subject that should influence millions of people. I do not know that I have anything further to say in regard to these posters we have gotten out.

I don't know what plan will be advised by the incoming Executive Committee but, my friends, I do want to take this opportunity of saying just one word about the Poster Committee of the Safety Section of the American Railway Association of which I am also chairman and speak of one poster particularly.

Last year we produced a Christmas poster and circular. Of that poster we sold 40,000 copies, and of the circular a quarter of a million copies. We are going to do the same thing again, I have given to the Secretary a copy of the poster that will be produced this year.

It represents a snow storm, a Christmas tree, the brakeman engaged in rushing between oncoming cars to adjust a knuckle and just at the point where he is about to be caught, the thought comes into his mind of his wife and children preparing for the Christmas tree at home; and we ask him at that time, and we would like to ask the question of every railroad man in the country, when he has an opportunity to promote safety and does not do it: "Will you make them happy or sad?" Gentlemen, that is the thought I leave with you.

CHAIRMAN COTT: We expect to adjourn at twelve so Mr. Bentley's paper will be carried over to tomorrow. We have time for two matters to come up. The report of Mr. Carrow which will be a treat, I am sure, because it will not only be a report but a travelogue.

I am going to ask at this time if Mr. Lewis R. Palmer will come forward and not take over ten minutes in presenting some facts and figures.

It would be very foolish for me to introduce "Green Book Palmer." You all know him.

The "Green Book" Report

By LEW R. PALMER

Equitable Life Assurance Society, New York City

I did not know just when this was going to be on the program and I did not exactly catch the time limit. The green book referred to went out in May and carried in it an outline of the safety contest developed by the National Safety Council, the railway employees National Safety Contest. The response that came in to headquarters in Chicago was most gratifying. The railway presidents, to whom those green books were sent, were most enthusiastic in their acknowledgment. I am sorry it will be impossible to give you extracts from those letters. It shows, however, that we have a right to be proud of the support that is given to our work by our railway executives.

The next distribution as most of you safety men know, was a photostat of the results of your work for the first quarter, 1928. I sent those out myself and the response that came back from the Presidents was most gratifying. From one railway system I received and have filed in one file, seventeen letters from the highest executive, the president. Also on down through the operating vice-president, district vice-president to the general superintendent.

I recall one letter that came in from the operating vice-president of one of the smaller groups. (By the way that railroad was in last place. I think it had a

batting average of 43.) The letter came in acknowledging it and said "you will be glad to note that we shoot a .15 now." That sounds pretty good for a bunch of farmers who never had a cue in their hands until recently. They have gone out to get to the top and are pretty well up the ladder.

One of the most gratifying accomplishments in railroad safety (and we are not mentioning any names) is, one of the largest railway organization in 1926 stood in 23rd place with .42. They did not like that so well and I think the next year they moved up to seventh place with .17. The first quarter of 1928 they cut that down to about .12 and one of the regions of that road now is shooting a .7. That shows what, regardless of where you were or what you are doing, where you can go and what you can do and of course being a large road I want to give those figures just to stimulate you, especially some of these groups and I am looking at one now. They had better get busy or some of these dark horses will run circles around them in the third and fourth quarters, which is the important thing.

In May, the president of the National Safety Council presented bronze plaques to the seven group winners. The Gorham people very kindly developed a plaster cast of this trophy; seven of them, duplicates, go to the winners of the seven groups. All that have seen it and had a chance to look at it close up agree it is worth while fighting for and that is what it takes to win in this day and age of Railway Safety.

The design is particularly interesting. The Spirit of Safety stands with a shield on her arm, the White Cross of the National Safety Council; and next to her, the executive and standing modestly behind is the Safety Representative. Then come the flag-man with the lantern and flag, the conductor with his watch, and the engineer with the oil can and goggles above his visor. (Of course he is in conference and it is all right for him to have them on his visor.) The shop man with the machinist's hammer and chisel. We discovered in the model it was a mushroom head on the chisel and we had to take it off. Then come the switchman and the track walker. In the corner beyond is the engineer with his rod and in the background is either a dispatcher or draftsman, whichever you want to play up to. The block signal is there also, then the rear markers on the side and the railway truck. It says, "Railway Employees National Safety Contest, 1927. Group Winner with the lowest total casualty rate," and the name of the road below—"awarded by the National Safety Council."

It has been most gratifying that what we set out to do is apparently going to become a fact, that is, that the contest for the reduction in total casualties is carrying with it a reduction in fatalities. That has been the thing that we have not been satisfied with. Although we have made a marked reduction in injuries, that fatal curve has not come down correspondingly. Any safety man that has had painful years of experience in safety work knows it is a darned hard curve to get down. It is a fluctuating curve, it does not always stay down but fortunately it does not very often go above what it was at the start.

The general trend is that if you keep hammering at it through your safety work, through your contest in injuries, you will get it down. Roads that have been working on the contest for years, the work they have done and accomplished in the saving of life proves that.

Sunday I went through the records in the accident bulletins as far back as 1923, which is the base line on which we compare the subsequent years' records. Nineteen twenty-three, you remember, was the year of the flood. Totaling those figures, men killed, injured, total injuries, total fatal injuries we find a reduction of 30.88 per cent, for five consecutive years, and the chickens for 1928 have been hatched and we knock wood on that basis. Estimating double what you had for six months of 1928, you will have 1,202 fatalities as against 1,866 for 1923. If you keep going as you went the first six months there will be saved on your railroads 664 lives in one year, 1928 as against 1923.

Now, I don't know of anything that should stimulate your increased effort more. I think it justifies you in going back and working even harder to make that thing a fact. Accumulative saving of total casualty amounts in five years to 215,426. Plotting the reduction, the casualty rate has been brought down in 1924 as against 1923, 11.46 per cent; 1925 as against 1924, 15.41 per cent; 1926 as against 1925, 22.70 per cent; 1927 as against 1926, 37.31 per cent, and 1928 as against 1927 47.41 per cent.

You are away ahead of your 35 per cent schedule at the end of 1930. That is about all that time permits. I only wish you could hear those splendid letters that come in from these railway executives. There will be distributed to the safety representatives listed in the membership of the National Safety Council, photostats of the work sheets kindly given to me by the Interstate Commerce Commission, showing for each region the second quarter figures, table 99.

CHAIRMAN COTT: Mr. Palmer, we thank you.

The next item on our program will be divided into two parts. You can tell when part two starts because of the fact that between part one and two Mr. Carrow will take a drink of water and take you over the water also. Mr. Carrow, will you please come forward and present part one?

Needless Waste of Human Life

By T. H. CARROW

Superintendent of Safety, Pennsylvania Railroad, Philadelphia

During the last thirty-eight years, 156,000 people have been killed and 169,000 have been injured in the United States of America, due to being struck or run over by trains while trespassing or walking on railroad tracks and bridges and unlawfully riding on freight and passenger trains. These figures make the staggering total of *352,000 needless deaths and injuries, or an average of 8,500 per year.*

Thirty-five thousand (35,000) of this great army of killed and injured were children under 14 years of age; 46,000 were between 14 and 21 years; 35,000 were hoboes and tramps and the remaining 209,000 were useful members of society, including clerks, industrial workers and professional people, the majority of whom lived in the communities in which they met death or injury.

Some people think that train wrecks cause most of the casualties on railroads, but this is far from being the case. As a matter of fact, fatalities to trespassers, that is, persons who have no business on the railroads, amount to eight times the number of all classes of persons killed in train accidents. It is even more impressive to notice that notwithstanding the inherent hazards of railroad operation, *one-third of all the fatal injuries that occur on the railroads are chargeable to trespassing on the tracks.*

This needless waste of human life is a sad reflection upon the intelligence of the American people and it will be stopped when the public spirited citizens in every town, city and community of the entire country become awakened to the full significance of this unnecessary killing and maiming of human beings.

Indeed, great improvement has already been made. Beginning in 1903 and up to 1915 the number of trespassers killed and injured on the railroads of the United States was about 10,000 per year, but the yearly average is now about 5,000 a year, notwithstanding a large increase in population and a corresponding increase in railroad business.

This magnificent result in saving human life and preventing untold pain and suffering is directly due to Safety Education in the home, the schools, the mines, the steel and iron industries and other manufacturing enterprises and to the general influence of the Safety First Movement which has been carried on throughout

STATE	Casualties to Trespassers in Train & Train-Service Accidents											
	TOTAL TRES- PASSERS		EM- PLOYEES		OTHER TRESPASSERS							
					UNDER 14 YEARS OF AGE		14 to 21 YEARS OF AGE		ADULTS			
	Killed	In- jured	Killed	In- jured	Killed	In- jured	Killed	In- jured	HOBBOES OR TRAMPS		OTHERS	
	Killed	In- jured	Killed	In- jured	Killed	In- jured	Killed	In- jured	Killed	In- jured	Killed	In- jured
Alabama.....	81	99	4	1	2	4	16	29	18	28	41	37
Arizona.....	13	16	2	1	1	1	5	5	6	6	3	3
Arkansas.....	76	67	1	1	5	6	14	23	17	10	39	27
California.....	68	86	4	4	5	4	6	10	33	45	20	23
Colorado.....	16	25	1	1	1	5	1	3	8	11	6	6
Connecticut.....	10	10	1	2	1	1	1	1	1	2	6	6
Delaware.....	3	4	1	1	1	1	1	1	2	1	1	2
Florida.....	29	31	3	1	3	1	1	4	4	4	22	22
Georgia.....	46	38	2	4	4	5	7	5	6	4	27	20
Idaho.....	12	4	1	1	1	1	3	1	3	1	6	2
Illinois.....	218	236	11	6	21	24	17	43	45	57	124	106
Indiana.....	77	63	1	2	6	4	2	13	13	14	55	30
Iowa.....	47	66	2	1	4	5	8	13	8	12	25	36
Kansas.....	26	57	2	3	1	3	4	17	6	17	13	17
Kentucky.....	121	166	9	19	7	13	11	38	29	32	65	64
Louisiana.....	47	59	6	2	4	3	5	10	9	16	23	28
Maine.....	6	9	1	1	1	1	1	1	1	2	3	6
Maryland.....	44	26	2	2	3	2	3	5	7	1	29	17
Massachusetts.....	54	17	4	1	9	7	2	1	1	1	39	9
Michigan.....	60	71	1	1	7	18	4	8	10	10	38	35
Minnesota.....	49	46	1	2	5	8	3	2	10	8	30	26
Mississippi.....	38	67	2	1	2	2	1	22	12	16	23	27
Missouri.....	108	109	2	5	4	9	7	24	29	26	66	45
Montana.....	17	29	2	2	1	1	3	8	10	12	2	6
Nebraska.....	17	20	1	1	2	2	4	5	5	4	6	9
Nevada.....	11	14	2	4	1	1	2	3	3	5	3	2
New Hampshire.....	8	6	1	1	1	2	1	1	2	1	4	3
New Jersey.....	95	77	2	3	10	16	6	11	3	1	74	46
New Mexico.....	6	11	1	1	1	1	3	5	2	5	1	1
New York.....	171	109	13	4	12	15	10	14	18	24	118	52
North Carolina.....	49	54	3	3	4	7	9	14	7	6	26	24
North Dakota.....	7	11	2	2	1	1	2	1	3	5	2	2
Ohio.....	176	167	9	6	14	18	13	27	23	30	117	86
Oklahoma.....	45	72	1	2	1	1	6	23	13	26	24	21
Oregon.....	11	10	1	1	1	1	2	2	6	4	4	4
Pennsylvania.....	272	251	12	13	34	45	16	24	18	18	192	151
Rhode Island.....	9	2	1	1	1	1	1	1	1	1	8	2
South Carolina.....	18	25	1	1	1	3	2	8	1	2	15	11
South Dakota.....	6	7	1	1	1	1	1	1	3	3	2	3
Tennessee.....	71	69	2	3	4	3	11	24	15	10	39	29
Texas.....	101	133	4	11	5	6	25	34	37	49	30	33
Utah.....	10	7	1	1	2	1	1	2	3	2	4	1
Vermont.....	7	5	1	1	1	1	1	1	1	1	7	4
Virginia.....	63	50	3	3	2	4	13	13	5	5	40	25
Washington.....	18	43	1	1	1	1	2	4	9	18	7	20
West Virginia.....	86	90	6	14	9	17	5	18	8	4	58	37
Wisconsin.....	48	60	1	1	5	6	3	9	21	16	19	29
Wyoming.....	9	15	1	1	1	1	1	5	6	8	2	1
District of Columbia.....	1	6	1	1	1	1	1	1	1	1	1	4
TOTAL.....	2,580	2,715	123	130	201	274	259	530	492	582	1,505	1,199

the United States for more than fifteen years and particularly to the untiring efforts put forth by the railroads through their Police Departments to keep all persons off the tracks who have no business to be there. In this connection, the National Safety Council has given its unstinted cooperation to all the agencies mentioned.

To further prevent death and injury from trespassing, teachers, preachers, business men and women and all public spirited citizens are urged to use their influence in having these simple precautions followed:

1. Do not walk on railroad tracks or bridges.
2. Do not allow children to play around railroad tracks or stations.
3. Do not crawl under or between cars.
4. Before crossing tracks at crossings, Stop, Look and Listen to see if a train is coming, and after a train has passed make sure no other trains are approaching in either direction.
5. Do not crawl under crossing gates when they are down. Stop until train passes.
6. Do not allow children to play around turntables, cranes, cars or other railroad property.
7. Use the streets and highways instead of the railroad tracks in going to and from work.

As an indication of the possibilities of state, county and town authorities helping to lower the number of deaths and injuries from trespassing by the enactment and enforcement of appropriate laws, the accompanying table of figures are quoted from the records of the Interstate Commerce Commission for the year 1927.

ADJOURNMENT

October 3, 1928**E. R. COTT, Chairman****Supervisor of Safety, The Hocking Valley Railway Company
Columbus, O.**

The second session was called to order at nine fifteen o'clock by the chairman, E. R. Cott.

CHAIRMAN COTT: We are going to start our program this morning with an address by a chap who represents some 12,000 employees, an auxiliary of our railroad service. For a number of years the Pullman Company has had rather large delegations at our Sectional meetings. We have been favored by their quartette. These fellows from all over the country who have had the privilege of coming, sat here intensive listeners and I have had occasion to see some of the reports they have sent back to district headquarters following the meetings and I know they have been taking in every word of what was said.

The Pullman Company is doing about as good a job, if not better, than anybody else in the individual safety instruction of their employees and the Pullman Porter is in a measure the guardian of your passengers who occupy Pullman cars. I never in my life have found one in recent years, that did not tell me to "Watch your step"; who was not looking after my luggage, if I myself was careless about it; who was not on the job in the interest of safety all the time. So we have an opportunity this morning to listen to one of these boys and I am going to ask Mr. J. Wiley, Porter of the New Jersey District, to address the association this morning.

The Porter's Place in Safety

By J. WILEY

The Pullman Company, New Jersey District

The Pullman porter occupies a place in the Safety Movement of much greater importance than may be apparent to the casual observer. His attitude toward safety is somewhat different because he realizes only too keenly that an injury sustained by any one under his care means that a lot of his time would be taken up writing statements; and furthermore, that he may be censured for some act of commission or omission that he in some measure might be responsible for.

Safety has a triple meaning to the porter, because others are involved as well as himself: namely, his patrons and his employer. While the instinct of self-preservation is just as strong in him as in others, and while there may be hazards incidental to his occupation, these are not altogether his chief concern because "Safety First" has a different significance to him than to the average individual. To him it means safety for others—first and last—and an appropriate motto for the porter would be "Others Safety First," or "The Safety First of Others."

If, by his care and watchfulness, passengers are immune from accidents, then by the same token the porter is free from trouble. As he becomes more experienced in his work and observes and studies the various types and temperaments of his passengers, he becomes more receptive to ideas brought out at Safety Meetings, and out of his own experience he readily absorbs the doctrine and becomes a warm advocate of it.

Any accident, either serious or trivial, means trouble for him, and only by everlasting vigilance on his part can the majority of them be prevented. Very often the so-called "trivial" accidents are magnified into serious ones by unscrupulous

people, and the porter is never sure to what extent he may have to share the blame in spite of all his efforts and precautions.

The tenets and principles of safety are thoroughly drilled into each and every porter on the first day he becomes affiliated with the Pullman Company. Each applicant undergoes a thorough physical examination in order to make sure that he is in possession of all his faculties, and he is impressed with the fact that accident prevention is one of his most important duties. This is one of the reasons why porters, after a few months' experience, acquire traits which tend to make them one hundred per cent safety men. Furthermore, each one of his manifold duties, when properly performed and carried out in accordance with instructions, is primarily a matter of "Safety First."

It is his duty to make sure that all windows and door-catches are in proper working condition, that vestibule and trap doors and tailgates are in good working order. He must be absolutely certain that all equipment, such as stepping boxes, step ladders, mops, brooms, electric connectors, ice buckets, and the innumerable accessories used on his car are kept in the places designated, so that they will be out of the way of passengers getting on and off and passing through his car. In other words, the motto of the real porter is "A Place for Everything, and Everything in Its Place."

Sometimes, in spite of all his efforts, passengers will leave baggage in the aisle, thereby forming a tripping hazard. However, a tremendous improvement has taken place in this respect due to better supervision on the part of Pullman men, with the cooperation of the traveling public.

In addition to the initial instructions given the porter in the matters pertaining to Safety, he also attends the semi-monthly safety meetings at which he has the privilege of expressing himself freely on all matters concerning the safety of his passengers.

To the majority of people the definition of Safety is accident prevention. To the porter, however, it has the added significance of safeguarding the passengers' health, as it is the duty of the porter to see that the car is properly supplied with the necessary deodorizers and disinfectants which are used in any space that has been occupied by a sick passenger. He is governed by rules adopted from the most modern sanitary and health authorities. He must understand the proper ventilation and regulation of temperature in his car and must adhere strictly to the rigid instructions relative to the handling and disposing of soiled berth linen, towels, etc., to prevent the possibility of spreading disease germs.

Realizing as he does, that it is the little things that count, he is ready to drop everything to stop a passenger from opening or closing a car window, because he visualizes mashed fingers. The sight of baggage projecting from an overhead rack gives him a jolt because he knows that the lurching of the train might cause it to fall on the passenger. He must keep a sharp lookout for the children whose thoughtless mothers permit them to run around and stand on the seats where the movement of the train might throw them to the floor. The alert porter is always ready to assist passengers off and on the train with the verbal caution, "Watch Your Step," for in spite of the fact that this caution appears on the steps and vestibules of all Pullman cars, the traveling public is prone to ignore them.

Pullman Porters came into contact with thirty-six million passengers last year. The average porter believes that there is a divine spark in every man, so naturally he concludes that the majority of men are honest. The other type is best recognized by the following story, which although somewhat exaggerated, is more or less typical of some of the claims handled by public service corporations. The story runs like this:

A man and his wife were in a railroad accident. The husband was not injured, but the railroad settled with the wife for \$200 for injuries sustained. The husband

requested her to give him half of the money, but the wife stated that in view of the fact that she was the one that had been injured, she was entitled to the entire amount. The husband agreed, but reminded her that he was the one who had the presence of mind to give her a kick in the face at the time the collision took place.

CHAIRMAN COTT: I want to thank you, Mr. Wiley, for your contribution to this occasion. Mr. Gilbert tells me your paper will be published and placed in the hands of every Pullman Porter in the Pullman organization and I am sure it will be helpful to them.

We have a topic for item two of our morning program that should be of interest to every railway safety officer. Now, I think it is the wish of practically every Safety officer to have an opportunity to support the local Council and they do support it. There are a great many ways we can cooperate and spend money and like the travelling salesman's overcoat—it does not show up in the expense account.

There is no man better qualified to talk on the subject of cooperation between Steam Railroads and Local Safety Councils—can give us some new ideas whereby the Council itself may be of further aid to us and we ourselves further aid to it. I take great pleasure in introducing to you Mr. Girard C. Varnum, Secretary Manager, St. Louis Safety Council, St. Louis.

Cooperation Between Steam Railroads and Local Safety Councils

By **GIRARD C. VARNUM**

Secretary-Manager, St. Louis Safety Council, St. Louis, Mo.

The other day I was walking down the street in St. Louis and met a friend who told me of an experience he had with a friend of his. As he walked up the street his friend grabbed him by the hand and said, "Congratulations, John." "Thanks, but what for?" "I understand you made \$40,000 in the iron mines in Minnesota last week." "That is approximately correct. It wasn't Minnesota, it was Missouri. It wasn't iron, it was lead. It wasn't \$40,000, it was \$4,000. I didn't make it, I lost it."

Approximately correct. So is my introduction.

I want to say on behalf of the Local Safety Councils, we appreciate very much the opportunity of having a very brief place on this program and being permitted to talk to this most important Section of the National Safety Council. At the outset, besides acknowledging this courtesy that has been extended to me, I can't refrain from reminding you that we realize that in this group, represented in this Steam Railroad Section, we have perhaps the greatest group of safety advocates there are in this nation.

We realize this Steam Railroad Section has been for many years composed of men on the firing line, in the railroads of our country. We know that there is not a greater group of men and women in this entire United States concerned in this safety problem. The millions upon millions of dollars that have been expended by railroad officials for accident prevention in the cause of saving human life undoubtedly shows where the hearts of the railroad man are in this great safety question.

In the few minutes I am going to speak to you this morning I am going to try to touch on four or five fundamental things in connection with this matter of Cooperation between Local Safety Councils and Steam Railroads. At the outset

it seems to me, for the benefit of some who may not be as thoroughly familiar as others with the Local Safety Council activities, it might be well to state as briefly as possible what a Safety Council, a local Safety Council, is and why it is.

I hope you will pardon my referring to St. Louis occasionally, because that is where my experience lies, and that is where my contact with railroad men and others is.

Back in 1918, ten years ago, the St. Louis Safety Council was formed. Prior to that time a lot of agencies in St. Louis concerned with transportation, concerned with the management of industries, concerned with other means of moving traffic over the streets of St. Louis, had been attempting to carry on an accident prevention program. We had the public utilities, the street car companies, the taxi-cab interests and others—I might go on indefinitely naming the various types of organizations, many of whom had interested themselves in safety work. But I will confine myself mainly to the discussion of the street car company because that is the thing as like to the Steam Railroad as any of the others.

The street car company was trying to carry on an accident prevention program along the public streets and among its own employees; and it found, especially among the public, on every hand, its work was handicapped because the public said that it was just another scheme of the company to save money to reduce claims. Their efforts were handicapped because they said it was a selfish proposition on the part of the street car company. Finally, a group of business men got together and said, "Let us form a clearing house to handle this question of safety as concerned with the city of St. Louis. Let us pool our interests on this thing and let us form an organization and call it The St. Louis Safety Council," and they did.

Immediately they began to work out through this local Safety Council a plan of Industrial Safety work and a plan of Public, Home and School Safety work; and the great value that this local Council has had and that every local Council will have if properly organized, is that it was non-political, non-commercial, non-profit making and non-sectarian. A local Council is just like the safety movement itself. It is a leveller of humanity. In it you will find every class of people represented. You will find the Catholic, the Protestant, the Jew, the Democrat and the Republican. The safety movement knows no race, creed or color.

That is the great fact at the outset in this Safety Council work, because when a group of men who make up the Executive Committee, representing the various interests, meet around a table and consider a problem, whether it pertains to the street railway company as related to the public, or some other branch, the ideas of all are considered. It is never a proposition solely selfish in its nature. It must be something to benefit the public, this measure being considered, and it must have the approval of all these people who make up the various interests in the Safety Council before the Safety Council as a whole will endorse it. That is the real value of a local Safety Council.

Now, on our work in St. Louis we have gone first into industry. And it seems to me a Steam Railroad—of course it is a transportation industry—but it may be likened very much to many of our manufacturing industries in St. Louis. We went to the heads of these industries and said, "Some of you have organized accident prevention work and some of you haven't"—but confine it to those who have. Here is the situation we found, and it is bound to develop on every railroad in this country. I know all of you have the greatest respect in the world for Isaiah Hale and I am going to use his name. For Hale is a fine speaker on the subject of safety, as fine as there is in the United States. There isn't any question about it.

He is a wonderful speaker and he goes up and down the properties of the Santa Fe Railroad and talks safety to those men. Regardless of how much they

like him, the time is going to come when perhaps his talks are not going to appeal as much to those men as they did in the beginning. That doesn't pertain as much to a railroad as a manufacturing plant where all the employees are inside of a fence and the boss talks day after day, and they know him well; and after a certain while, it goes over their heads, in one ear and out the other.

Now, then, the local Safety Council comes into the picture, in this way. When they are having meetings at different times throughout the year, semi-monthly, monthly or whatever, the Council can work in cooperation with that railroad just as it does with industry, furnishing new blood in the way of speakers, furnishing safety films of the National Safety Council. There are others, too, the injection of new ideas to these people concerned in railroad work in our particular local communities. I think it is a very important service that the National Safety Council can render to the employees of any local railroad. For instance, we have taken the Judges of our City Court Bench to the various organizations and they have very gladly given their help that way.

When those men appear, representing, as they do, the Government of a city and a people engaged in this safety work, when they come before these group meetings of employees, regardless of who they are, whether in a manufacturing plant or employees of a Motor Bus Company or railroad, it makes no difference, here is the thought sold to these employees: This is a wonderful movement in which we are all engaged in saving life! And as a man sits in the audience and sees one of the judges of our courts standing before him, taking his time to make this safety problem impressive, telling of the people that are coming up before him and the reasons he is dealing out a certain type of punishment, he is impressed. Perhaps at the next meeting we have the Director of Streets and Sewers who tells of the work of the National Council on streets and highways. All of those things are appealing to those men in the ranks; it shows them the enormous scope of the safety movement, and impresses them. They are one small cog in the wheel; everybody must put their shoulders to it. And as a result we believe that service is very valuable to our local people regardless of whether they are railroad or manufacturing industries.

I only mention that one thing, as an instance of cooperation between the Council and the members in an industrial way, because I realize the largest percentage of the difficulty in safety work in the railroads is among their own employees, and that is a cooperation we want to build up in St. Louis further than we have. The cooperation directly between our employees and the organizations.

Who makes the work of a Safety Council possible? We have various types of membership. Industrial membership, Public Safety membership and under Public Safety we have Class A, B, and C. Class A is a concern like the Street Railroad who pays a percentage of the claims paid the previous year as an investment in the Safety Council work. Class B is a \$10.00 a year personal membership and then we have a two dollar a year membership where the people are members of the Safety Highway Club. In St. Louis at the present time we have practically every group supporting us actively and financially.

In our work with the Steam Railroads, there was a time not so long ago, perhaps a year or a year and a half ago, when we felt just a little bit bitter about it. To think that the Steam Railroads were the only large transportation group doing the safety job throughout the country that had not come in and supported us along with the bus companies, the street car companies, cleaners and dyers, and all the other groups I could go on mentioning—coming in and paying their proportionate sum and giving moral support in addition to the work we are doing.

Gentlemen, we have just about come to this conclusion, that perhaps it is not the fault of the Steam Railroad companies that they are not supporting us and other local councils. Perhaps it is our own fault and the fact that we have not

been able to sell them this idea. Many times a business man needs a certain commodity but if the salesman selling that commodity hasn't salesmanship ability enough he does not buy it. That may be true in the Steam Railroads. But we are looking forward to the time when we can get on an even basis of understanding with our friends among the Steam Railroads, and here is a definite recommendation that I would like to make: To the Steam Railroad Section of the National Safety Council I would like to recommend that a Local Steam Railroad Section be formed in the local council cities and that this Steam Railroad Section be composed of representatives to be selected by the president or the safety supervisor or whoever should do it, of each of these local roads running into the particular city, who would sit on this local session and determine what its activities should be, and the chairman of that Section be accorded a place as a member of the Executive Committee of the Safety Council.

There are many things I haven't time to touch on this morning that a Safety Council with such a Steam Railroad Section could do. With an arrangement of this sort the things that were actually done by this Steam Railroad Section would be entirely in their own hands and the hands of the Executive Committee. The chairman could very easily work out the plans and supervise them and approve them so that the local Steam Railroad section would have the push and backing of the entire Safety Council in the community.

It seems to me that would be an admirable arrangement. In that manner, any matter of expense concerned would be minimized just as far as possible because the program at the beginning of the year would be worked out and a budget arrived at as to the amount of money needed to support this Steam Railroad Section and then the method of securing it could be very easily worked out.

There is one thought I want to emphasize before I stop this morning and that is this: In any well organized local Safety Council we are not just coming to the railroad and asking them for their moral and financial support. I know how it is in many of these smaller cities, many of them do not have local Safety Councils. They want to start some sort of a movement to support, for instance, the National Council on Streets and Highways, and the first fellow they think of is the railroad. Without going anywhere else they run up to the railroad and present their desires. It is not fair. I agree to asking the railroads to come in and support something, but not unless the others are doing their part. But it does seem to me, especially in every large city where we have a local Safety Council and where we have the support on every hand by the transportation interests, by the industrial people, by the business and commercial people of our city—then it does seem to me that some sort of cooperative plan should be worked out between that Safety Council and the largest transportation group running into the city.

One thing more: Some time ago I was discussing this matter with the divisional superintendent of one of our big railroads, and he said to me: "Well, we don't have any tracks in St. Louis." "Well, what has that to do with it?" "Well," he said, "it has a lot to do with it." I said, "Supposing you had an accident on those tracks?" and I walked to the window and pointed to the tracks. "Does't your train pass over those tracks? Supposing you have an accident, who pays for it?" "The Terminal Railroad Section pays for it." "Who pays them?" "Well," he said, "we do."

Even though your tracks don't run into the city, if your trains run over those tracks, you certainly have a definite responsibility at every grade crossing where your trains run; you are going to have to pay the bill the same as if your tracks ran through. It is true. No question about it. If you can only prevent one small accident in a city, it is going to far more than pay for any contribution or membership that any Safety Council might be asking you to pay in any Local Council community.

I think that about covers the thing I have in mind and I want to thank you for the opportunity of being here and I hope we will have a chance to work out a real constructive agreement between the Safety Councils and the Steam Railroads.

CHAIRMAN COTT: I am sure we appreciated Mr. Varnum's outline of the subject of cooperation. He has given us a new thought that may be helpful and may be worked out. I am going to ask if Mr. W. H. Jones, Assistant Director of Safety and First Aid, Canadian National Railways, Montreal, Canada, will respond to Mr. Varnum.

MR. JONES: I certainly appreciate the opportunity of representing a young country like Canada in this wonderful country of yours. Especially in view of the fact that you people just 100 years ago were where we are today in Canada, from the standpoint of (what shall I say) enjoyment of Liberty, progress and development. But yet, with a young country like Canada, our railway situation in Canada is not (what shall I say) 100 years back of you. We are just as modern in railwayism as you are in the United States, due to the fact, as you suggested, that the Steam Railroad Sections in different localities should be represented on the local Safety Councils in the different communities. May I assure you, Mr. Chairman, that in Canada with all our beautiful cities, there isn't a city in Canada that our railway members are not members of the local Safety Council. That is something for you when I again repeat we are not so backward with our modernist railways in Canada.

Personally I have a very happy recollection of hearing Mr. Varnum a few years ago in St. Louis, and we shall always remember that very effective address he gave us at that time. You know two cities today that are so similar in my estimation are St. Louis and the humble city of Montreal, from which I came this morning. I will tell you why. They are notable today because everybody knows one is the city where the Spirit of St. Louis is famous and Montreal is the city of spirits.

That reminds me of a little Church in London, England. I understand some of you don't respect the railways so much over there. But they have a little church in London and it happened to be necessary from an economical standpoint to rent the space above for commercial purposes and the space below for religious work. It so happened the above was rented for a saloon and this is what they said of it. "The Spirits above are spirits of wine, the Spirits below are Spirits Divine," and those are the two spirits so popular between Montreal and St. Louis.

But, getting away from any attempt of looking at things in a frivolous manner this morning, I may say that this Convention is at this time a very sad one to me personally. I noticed in the original program outlined for this Convention that the man who was to respond was a man of eloquence, who could have done the work 100 per cent efficiently. And I am looking into the past of a few weeks ago of our popular friend, Mr. Brennan, who has passed away. I think, gentlemen, we are human enough to look into the past association with a real staunch, loyal friend as we had in Mr. Brennan, and at this hour, if you will permit me, couldn't we be human enough this morning as a little memorial to stand in silence for a second? Let us all rise. Shall we bow our heads?

Almighty and Infinite God, we come to Thee with a Spirit of humility and gratitude, realizing Thou art the Creator and Sustainer of all good things, that we are but little. In our smallness we approach unto Thy Presence at this time with gratitude in our hearts that Thou hast made it possible for human fellowship and associations, and we realize that Thou hast created in us that spark of fellowship. We Thank Thee that Thou art a God that makes manifest unto us, Thy Self.

Oh! God, we look up and revere the adornment in Thy Majesty and Glory but we thank Thee for the gift of Fatherhood—that relationship that makes each and everyone of us to regard ourselves as brothers and sisters. And as we come to Thee with our hearts full of grief that one of the links of our association has been

broken, grant that the Gift of immortality may be placed on these humble and human associations, and that looking up unto Thee, we may sometimes declare our best friends are up There.

O! God, grant that these human associations shall not be broken but continue to all Eternity when we shall be called, all of us, to Thee. Hear us in our humble pleading and bless those who are mourning; give them the gift of strength; succor to sustain the losses of human life. These prayers we ask in simplicity, with the forgiveness of our many sins. We ask it in the Name of Jesus. Amen.

CHAIRMAN COTT: While Mr. Varnum was talking I was reminded of the method of the local Safety Council in Toledo to secure the cooperation of the Steam Railroads in this particular instance in cooperating with them. The local Safety Council there, three winters ago, introduced a series of Railway Safety rallies. Several of the gentlemen in this audience have addressed them, Mr. Bentley, I see here; Mr. Hill also. He addressed them two or three times. Mr. Carrow has been there, Mr. Shedd was to be there, I don't know whether he got there or not. But some of you, at least, have had the opportunity of attending these rallies. They sell tickets to the railway company, which tickets in turn are given free to the employees.

These rallies have been highly successful. They have had from 900 to 1,600 railway employees and members of their families to these winter rallies. In that manner, the railways have helped to support the work of the Local Council because they have been profitable. The railway safety officer running into Toledo, and I think Mr. Hill, and every one having a line running in that town (and there are about thirteen of them) will agree that the work has been helpful in every respect. It has created a new interest and enthusiasm.

That is a thought I would like to leave with you; some of you who have local Councils in your City or along your line, that such a similar plan might be worked out along your railroad. You will find it both helpful to your Council and to your Railway employees.

The next item on our program is item five of yesterday's session, by L. G. Bentley. I don't need to introduce "Safety First Contest" Bentley, everybody knows him that has ever attended a Railway Safety meeting.

Safety Contests

By L. G. BENTLEY

General Safety Agent, Chesapeake & Ohio Railway Company, Richmond, Va.

I have within the past seventeen years enjoyed many privileges within the gift of this Section, but never have I enjoyed any privilege which carried a more vital spark of good for the Association than the privilege that confronts me today, of talking to you about Safety Contests which in the very expression itself, signifies the bringing out of the best there is in mankind.

It is in my mind to talk to you about Safety Contests today, somewhat on the basis of my own experience, the manner in which we have organized Safety Contests, the method of conducting them and the degree of success that has attended our efforts. There are many others present who have gone farther than we have and I have it in my mind that an opportunity should be given to such men as Tom Carrow, George Warfel, Art Rohweder and all of these other live fellows, that they may tell you what they have done in their safety contests.

It is my other thought that we should enter this discussion with this thought in mind. Safety contests are righteous. They are right, not only because they have saved lives and limbs and suffering and the loss of money, but because they

link more vitally those interests of foremen and men, those interests of management and employees, with the result that not only is there greater safety but there is a more harmonious contact between management and men. There is a cleaner organization from top to bottom and there is a more efficient organization. There is a speedier service and a smoother service. Whether we would acknowledge it or not, those of us who are actively prosecuting safety contests, those of us who are not, are in the midst of a National Safety Contest calling for a 35 per cent reduction of accidents, or greater. If we can organize local activities on our own line that will bring us even beyond that goal and those of us who have not yet reached that goal, so much the better; and it is my hope that this part of the program may influence some railroad safety man who has not a safety contest on his line, to return to his property and start one forthwith.

In the days gone by we have had "Safety Weeks," safety months, spirited safety contests that were effective for the time being but not permanently. A definite thought that I would leave with you, every representative here today, is this: That if you contemplate a safety contest it must be an institution and not an incident. There is a difference. An incident is something that comes and goes, its influence is but transitory. It is with us today and forgotten tomorrow; but an institution is something that is founded on a solid basis, it is progressive, it remains permanently with its everlasting influence. Therefore, let us make our safety contests, not flashes, but a strong, illuminating light that will be perpetuated in our organizations as long as they are organizations.

Safety contests must be fair. And there are various ways in which advantages may be taken by local organizations. I want to touch upon them. In the first place they must be departmentalized so that the spot-light of approval may rest upon successful organizations and a helping hand extended to those that are not so successful. Then, by organizing our safety contests by departments, let us put them on a fair basis.

May I refer to the manner in which our safety contests are organized? We have five groups; briefly they are: the transportation groups, the several divisions on our railroad and embraces the trainmen, the station employees of those divisions. Our main shops are grouped under the master mechanics. We had a second group which comprised outlying shops under the general foreman. We have a maintenance of way group, which includes all the track and bridge men within the supervision of each divisional engineer. On some railroads they are called assistant superintendents. Then we have a supply department group.

The bulletins I am going to mention just at this time, that we get out monthly showing the standing of these groups, have some significance. The white bulletin covers the supply department, because on our railroad the supply department is noted for its cleanliness, for the shining spotlessness of the supply department premises. The blue bulletin has reference to the large shops—dark blue because of the blue flag that protects the men working under or about cars. The yellow bulletin has reference to the track men because we use a yellow flag on our pump cars to protect our men. The green bulletin refers to the transportation department because green means "Safe"; and for each one of these bulletins the color of the bulletin is selected, as I mention merely as information.

We use the man-hour as a basis of determining the exposition to hazard. We believe that the cause of an accident which renders a man unfit for duty for twenty-four hours may be in itself as serious as the cause which renders a man dead. At the same time we believe that there should be a penalty attached to a death. Hence, we have weighted our accidents in this way. A fatal injury is penalized at five debits, and a reportable injury at two debits, and a loss of time injury at one debit. Therefore, we have all of these classes charged against the several units and several groups by debits. Our reason for penalizing for a death only five debits, whereas it is customary to penalize fifty, is that in some units,

as I mentioned a few moments ago, when a man is killed the cause of that accident may not have been any more serious than the one that took him out of the service for twenty-four hours; and if we penalize that at fifty debits and that unit had had but very few injuries, they would be discouraged for the balance of the year. There would be no opportunity to recover ground, and we have found that to penalize five debits for a death, two debits for a reportable injury and one debit for a loss of time is fair and gives every one a chance.

Reporting accidents. It has been my experience that if there is the right kind of an interest in a safety contest, you cannot hide your injuries. I have heard some comment and criticism on my own property, that I have heard nationally. Gentlemen, please remember that in criticism and suspicion, success is a shining mark, and if in directing your safety contests you have one unit that is disposed to say Bill Jones is ahead because he is covering up his accidents, the best way in my opinion to determine the fallacy or the truth of that allegation is to get that complaining unit to send a committee over and investigate the records of the other fellow. We have done that and we found he had a clean bill of health.

Nothing could inspire that complaining unit more to do good work in his safety contest than to go over there and find the other fellow is actually doing the work he says he is doing. If I should find within our organization a unit that was willfully covering up and not reporting accidents I would bar him from the contest for the balance of the term, and this is known.

There is another feature that enters into safety contests, that is extremely valuable if properly conducted and it may be the reverse if it is not, and that is in getting the injured man back to work. The time has been on my railroad and on yours when we knew (but we could not confirm) that men were remaining away from work when injured, for their own purposes. There was no check on their disabilities or on the time when they might be returned to duty without detrimental effects to themselves or the work which they were engaged in and the consequence was we were charged with hundreds of injuries that were not, as Mr. Cott says, injuries at all.

The safety contest inspires the foreman, the supervisor; it establishes a policy in regard to these matters, to the end that men are returned to duty as soon as they are physically able to do that work efficiently. On the contrary, fellows, I can think of nothing more discouraging to an organization, and nothing which would more quickly point the finger of suspicion at any organization contesting, than to go into that organization and find men working with their arms in slings or hobbling around on crutches. We will not have that in a 100 per cent safety contest.

Once more, what does the safety contest produce in a safety organization? It produces a fact-finding commission. If your safety contests are what they should be and what they can be made to be, those responsible for the standing of those several units are going to find the facts in regard to accidents where that responsibility belongs. I have been before committees investigating accidents when the words were put into the mouth of the witness by the examiner. You will never find the actual cause of an accident or trouble if your investigations are conducted in that way. I believe any accident that occurs on any railroad or in any industry is sufficient cause for an investigation because although that accident may have caused the loss of but nine hours' time, it might have resulted in death.

Statistics in regard to safety contests. I have a word to say on that. I do not believe a mimeographed sheet tacked on the wall is sufficient evidence by the management of an official interest in that contest to justify the units in contending with their whole hearts and souls.

I do not believe, that if it is worth while to engage in a safety contest to save lives and limbs, that contest justifies the getting out of a bona fide, dignified, impressive

and printed report so that every unit that is contesting may know at a glance where he stands and what difficulties he has got to climb over to get to the top. And let these details of statistics be so simple that even the most ignorant man can read and understand them. I believe that an occasional telegram from the president is worth while. "The love of praise how e'er concealed by art, reigns more or less and grows in every heart." If you have the contact with your general managers which will justify him in signing the telegram, even if you write it, complimenting the organization on its showing, you are not only going to encourage that unit to do better but you are going to put before the eyes of that general manager, so that he will understand and therefore be interested in the telegram he has sent. Many an officer has been influenced to give cognizance of such things as that by having to sign a letter he did not know anything about.

Another effect that safety contests have on the physical property and therefore on the personnel of an organization, is the fact that it induces cleanliness. The efficiency of your organization is advertised by the degree of cleanliness there is in this organization and the men take their cue from the physical cleanliness of the premises wherein they work.

Safety Boards for the Posting of Bulletins. As I intimated a moment ago I do not believe in tacking bulletins of this kind up on the wall. I believe in providing a regular and dignified and attractive place where those men may see where they stand. I believe a large bulletin board showing the standing of the intimate units of that unit as you might say—take a large shop wherein there are ten departments—make that board progressive. Have a vertical column for every day in the month and have a horizontal column for each department in that shop and let there be recorded on that board every morning, before the night shift comes off and the day shift goes on, what has happened in that shop the day before, so that these men as they come to work and go from work may know that that shop is interested and is recording promptly and in a dignified manner exactly where that organization stands. The boards should be lighted and then the night men can see what is going on. They should be absolutely kept up to date. Nothing in my mind could be more discouraging than to go down through their plant and see where their records had not been posted in four days and I have found such conditions on occasions. Then, I would say a word about trophies.

Thomas Carrow has some very beautiful trophies displayed in this auditorium. George Warfel has some beautiful silk flags and banners on his railway. My friends, they are necessary. They ought to be displayed, but they are not the whole story in a successful safety contest. Happy is that man who when there is a question of success, looks into his work for the reply. Not into the market for his services, not into the praise of friends but into his own consciousness of a job well done.

There must be love of achievement if we would make our safety work successful. It was the love of achievement that inspired Alexander to conquer the World. It was the love of achievement that induced these great engineers to build the Castleton Cutoff and to bore the Hudson tubes. It was the love of achievement that sent Byrd and Lindbergh to France, and Byrd to the North Pole. Others have flown, they have flown for gold, they have flown for fame and the plaudits of the Nation; but these two men flew for the love of achievement and nothing else.

Let us take a page out of the book of these boys when we would go back and start our safety contests and let us plant in the minds of our officers and the minds of our men, the love of achievement; that regardless of trophies or any other visible evidences of efficiency, will spur them on to the saving of human life. Friends, we do not need these trophies if our organizations are right. We cannot see God but we believe in the righteousness of His campaign of salvation.

We do not need these trophies if we can get our organizations so closely knit, so interestedly working for the mutual good, that they will work really for the love of the work.

CHAIRMAN COTT: Gentlemen, before we have the next paper we have approximately fifteen minutes which might be devoted to a discussion of safety contests. Mr. Hill and Mr. Carrow and Mr. Warfel and Mr. Bailey have been doing this work for a number of years. We have all had Safety Contests of one kind or another and I think we are deeply indebted to Mr. Bentley for his splendid presentation of this subject and we suggest now, that we do devote, not to exceed say fifteen minutes, at this time, to the discussion of safety contests. To get it started I am going to ask Mr. Thomas Carrow to say a word or two on the safety contest.

THOMAS CARROW (Pennsylvania Railroad, Philadelphia): Just to disabuse your mind that there is nothing cooked up between Mr. Cott and myself, this is the first time I knew we were going to talk about this. Bentley's talk crystalized the thought in my mind that I am going to give you for what it is worth.

The reason we have had to have contests, I think, to a very large extent, is because we had no data suitable for executive action. Here is what has transpired in our management. The contests are now a part and parcel of the means that our management used to drive home accident prevention and as soon as these figures are regularly systematic, as Mr. Bentley says, and intelligently prepared, particularly in a manner becoming to an organization such as we represent, then the people become cognizant.

Our contest, very briefly, consists of a comparison of the performance of the respective departments of our four regions in the Altoona Works. Those several departments are listed separately and stacked up one against the other. The original conception contemplated the division would carry on a similar contest, but I am ashamed to say our divisions have not as yet been sufficiently advanced to do something that would add to the management's contest. But it is my intention in the coming year to have every division of our railroad pitted against the several departments of the region.

In addition to that, the general manager gives a gold banner to the region having the best record and a silver banner to the one having the best reduction. Now, here is what happens with systematic, excellently prepared records. They go to the highest officers and the highest officers themselves have a part in the performance and they cannot witness the stellar champion all the time without recognition.

One more second and I will tell you how it is ramified. I had occasion to go into a bank president's office about a matter involving safety and I referred to these plaques over here and he said, "Yes, I saw them at the Board of Directors Meeting." The vice-president was a member of the Board of Directors and every month we put up the standing of the several regions of the Pennsylvania Railroad in the Board Room of the Board of Directors of our railroad. And so far as I am concerned, if the Pennsylvania Railroad doesn't make a good record it is nobody's fault under God's Heaven but that of T. Holmes Carrow, formerly of North Carolina.

CHARLES E. HILL (New York Central, New York): The New York Central lines were among the pioneers in the handling of safety contests. We started contests about five years ago and I shall state briefly how they are conducted.

We have twelve railroads that make up the New York Central lines and we divided them into two groups—A and B—based upon mileage, and we conduct an annual contest allocated to these two groups. The trophy you see here, next to those displayed by T. Holmes Carrow, is one awarded by our president, Mr. Crowley, to the road that makes the lowest employee casualty ratio for the year. We have two such trophies. The roads in group A are competing with each other and the roads in group B are competing with each other. While we have been

conducting contests for many years, during the past three years they have been on a more systematic basis.

We also have evidence in the board room of our Directors. On the 28th of February of this year we had a meeting in the board room of the New York Central in New York City at which time our president, Mr. Crowley, in person in the presence of every general manager and operating vice-president and practically every general officer of the entire railroad and a good many of the members of our Board of Directors, made this award to the two general managers on whose roads the trophies had been won for the year of 1927. In addition to the contest by roads, we also have departmental contests on a quarterly basis. We have our department of contests somewhat similar to that mentioned by Mr. Bentley. We have five major departments, transportation, motor car, rolling stock, maintenance of way, and stores.

These departments are competing with the same departments of their respective units. That means that each of these five departments has an opportunity to win a safety pennant four times each year. We publish monthly bulletins showing the standing of the respective roads, cumulatively and also the standing for the current month. In addition, we publish quarterly the standing of the respective roads and the different departments in their contests; and I want to tell you that there is no pamphlet that is looked for more eagerly, not only by the employees on the firing line but by the president of our railroad, than those bulletins and pamphlets.

They are considered almost sacred, by reason of the important part they bear in the operation of the railroad. I deem it unwise to take much more of your time, but I should like to go into just one other feature in connection with these contests.

We have, as I stated, many roads that make up our system and in addition to the other activities, quarterly we have staff meetings of the respective heads of departments of these different roads, at which time we display photographic charts showing the standing of the roads and respective departments. We assume the role of a physician and become a little more analytical and we go down and point out the weak spots, and those who may not know just how bad they are, begin to squirm, when they see those long lines.

I sat in a luncheon meeting in Cleveland last Friday at which time we had such a display of charts. The head of one of the departments referred to a similar meeting just one year previous at which time there was hardly room on that chart to give the length of line showing his standing; but he was happy to say at this particular meeting last week, the line had been materially shortened. In fact, it had gotten back to almost the edge of the figures, and he told some other men why it occurred. I rather suspect that the other officer whose standing is not so good will be in good standing next year.

It has awakened the safety consciousness of the men more than any other agency that we could employ. We could speak all day on this subject because I feel it is so important in the conduct of our Safety work that I should never think of stopping that particular part of our efforts.

MR. HARTENSTEIN (Lehigh Valley Railroad): In listening to the other speakers I don't see but very little difference in the conduct of their contests than on my road. We have conducted several safety contests on the Lehigh Valley Railroad. We started off on thirty days' duration. The results were fine. It resulted in substantial reduction in accidents but the last one we had was for a period of ninety days and it became stale. I would like to hear from some of the other members as to what they think the duration of a safety contest should be.

CHAIRMAN COTT: Mr. Hartenstein puts the question: They have run a series of contests for thirty days and they have had excellent results and they attempted

to carry it over a ninety day period and it became stale. That is contrary to Mr. Bentley's theory of an annual contest. It brings in a new viewpoint.

MR. HARTENSTEIN: Before an answer comes—when we had the ninety day contest we kept behind it with all the force there was in us but it grew stale just the same.

D. G. PHILLIPS (Wabash Railway, St. Louis, Mo.): When you get on this contest question you are getting on to something that means a lot to me. I want to say frankly that the splendid safety record we have on our road today, which is the Wabash, is largely due to the safety contests that we carry on. I don't want to steal any of George Warfel's thunder but you all know that the Union Pacific Railroad (at least you suspicion it) has a good safety record.

Last May at Chicago, prizes were presented, one for good safety records; one of these was presented to Mr. Calvin, operating vice-president of the Union Pacific system, and here is what Mr. Calvin said when he accepted that tablet. He said, "I attribute a large measure of the success of the safety movement on the Union Pacific Railroad to safety contests."

Now, if the Union Pacific made their good record based on contests, the rest of us can. I want to refer to what Mr. Hartenstein said. I don't believe that a thirty day contest is long enough, even in spite of his experience. Our experience has been not only to make the contest for a year, but to make the prize or trophy that is awarded by the president to the various departments, only a temporary property of that division or the department winning the prize. That is, we have five trophies offered by the president to about the same departments as Mr. Hill and Mr. Bentley spoke of. At the end of the year that trophy goes to the department or division making the best record for that year, but only to be held by them during the next year. Our president, in order to avoid some one saying that it is a scheme to make money, with the presentation of each of the five trophies, provides a substantial sum of money so that the winner can have an entertainment and dance, the value of which is much more than the trophies presented and the trophies themselves are to be at least \$150 each.

Here is the reason we have done that. It is a whole lot more pleasure. It gives you a lot more satisfaction to take something from the other fellow than to get the original in the first instance. I know as a boy it gave you a lot of pleasure to take that apple away from your brother, more pleasure than if your father had given it to you in the first place. And we have found out on our railroad, we have more enthusiasm when one division or department wins the prize; it becomes a slogan. All the other departments want to take that prize away from that division.

"Boys! Let's show them how we can do it," and we have never had the least bit of difficulty in keeping up interest throughout the entire year.

Just one more comment. I don't care how bad a record any railroad has if they will establish an honest to goodness contest system their records are going to be good. I don't care how good your record is, if you establish such a contest system it is going to make it better.

ROBERT SCOTT (Atlantic Coast Line Railroad, Wilmington, Delaware): It has been with the greatest difficulty that I have sat in my chair since the convention opened yesterday morning, because there have been so many interesting things under discussion. When you come to the subject of contests that is something I am very much interested in and I am sure all of you are. I think we should have contests. It was back in 1923, at Salt Lake City, that Mr. Carrow shook the whole United States with his proposition that we conduct a seven-year contest on all of our railroads. I ask Mr. Hartenstein, has interest waned in the slightest in that contest? Backed up by wonderful statistics Mr. Carrow has given us from time to time, hasn't our contest become a heated one?

I just want to cite you one instance of a contest on our system. We have a contest between our big shops. It has been run now for almost three years. It took us one year to get started, and last year was the best of all except this one; and I believe, gentlemen, if you want to do as Mr. Phillips says, make a bad record better and a good record still better, adopt the contest method and you will put it over. One of the shops I mentioned in 1923 had 249 personal injuries and in the first eight months of this year they have only had eleven personal injuries. That shows you what can be done by contests.

CHAIRMAN COTT: Mr. S. H. Osborne, Engineer, Maintenance of Way, Union Pacific, R. R., Omaha, Nebraska, will speak to us on "Motor Cars—Their Use, Care and Operation."

Track Motor Cars—Their Use, Care and Operation

By S. H. OSBORNE

Engineer, Maintenance of Way, Union Pacific Railroad, Omaha, Neb.

The maintenance of railroads presents two distinct branches, namely: the construction, inspection, and repairs to power, rolling stock and machinery, centralized at terminal points where concentrated supervision can be continuously applied; as compared with the construction and maintenance of track, bridges, and other structures, presenting a more difficult problem due to distances and necessity of transporting men and materials to and from the work.

A retrospection of the movement of men in the earlier days of the railroads brings to the memory of many here assembled the laborious hand car with its varying speeds of from two to six miles per hour, the operation of which with adverse grades and prevalent head winds encountered, resulted in the gang expending a considerable portion of the available man power in simply arriving at the point where the daily operations were to begin. In addition, there was more or less resentment filtering through the minds of the workmen a long time after this strenuous effort to arrive at the real work of the day.

In the early 90's experiments were made and some progress experienced in the development of gasoline engine propelled track cars. These, however, were makeshifts as compared with present types of cars, and it was more than fifteen years later before any really satisfactory improved type had actually come into general use. Today there are more than 55,000 track motor cars in service on American railroads representing an investment in excess of \$12,000,000.

It is obvious that such a large expenditure must have been justified beyond any question of doubt by fundamental economies and increased efficiency of forces having been obtained by the use of track motor cars.

The primary function of a track motor car is the transportation of men and tools to and from the work. In the bridge and building and water service departments, considerable quantities of materials used are also handled by track motor cars. Quick movement by track motor cars results in direct savings, in that the full efficiency of the gang is reserved for the day's work, but little effort being expended in arriving at the job. While there are no supporting figures to substantiate the savings made, it is evident that a considerable loss is prevented in the labor turn-over being minimized by the use of track motor cars.

Another feature in which the motor car has proven its efficiency is the quick mobilization of forces in emergencies to either reduce or prevent entirely traffic interruptions.

The additional uses made of motor cars are many. Various railroads have reduced hand work to a marked degree by the use of mechanically operated labor saving devices, propelled by the motor car or its motor. The use of track mowers, gravel dressers, weed burners, discing machines, etc., is made possible by the track motor car. Many railroads are using tie tampers, grinders, rail saws, drills and other devices driven direct from the motor of the track car.

Under systematic supervision the motor car has been responsible for reduction of work train service. Unless heavy materials in large quantities are to be distributed or picked up the use of work trains cannot be justified. A work train costs from \$75 to \$100 per day and much of its time must of necessity be used up in clearing other trains with resultant loss of working time of the gangs, while track motor car expense accrues only while cars are being used and the full time of the men is had where supervisory forces program their work ahead.

A comprehensive study of motor car operations by supervisory men with the proper allocation of gangs, results in definite, direct savings. An intensive time study of bridge and building gang operations and resultant programing of work with the elimination of haphazard gang movements has reduced the moving time between jobs and to and from work about 50 per cent on the Union Pacific.

The extent of diversified uses of track motor cars depends entirely on gang to which assigned, as also does the abuses so frequently encountered. Constant follow up by road-masters, supervisors and master carpenters is mandatory in order that full efficiency is derived and abuses and misuses minimized.

Of necessity, track motor cars and also trailers, must be light enough to be easily removed from the rails at points adjacent to the work yet amply heavy to withstand ordinary usage.

Such is the track motor car of today; a highly developed, simplified power plant, which any man of average intelligence can operate.

The average life of a track motor car is estimated to be ten years, and considering the comparatively few hours per week that a motor car is actually in operation, with the proper care and maintenance, this estimated life of ten years seems low enough. The track motor car in itself is an inert machine requiring the human element to convert it into a power plant in placing it in service. Its life and the service rendered depends entirely on the personal interest its operator uses in the operation and care given it. Heavy repairs should be made at shops equipped and manned for such work. Gas engine repairing is in itself a specialized branch of mechanics and most roads have sufficient work of this nature to employ competent mechanics constantly on this class of work. Replacement of minor parts and general adjustments are performed by field repairmen, leaving for the foremen and other operators the making of slight adjustments, also the keeping of all nuts tight, making minor repairs, applying proper lubrication and keeping the car in a clean and tidy condition.

Show me a dirty car with mechanisms covered with oil, grease and dirt and my reaction immediately is a careless operator with like habits extending into every portion of his daily work. A clean car denotes pride and renders every portion of that car open for minute inspection. A clean car is also subjected to less wear account of sand or abrasive substances entering movable parts. All cars should be inspected daily for loose nuts, improper adjustments, and both expected and unexpected defects. A more thorough inspection should be made weekly of every portion of the car in detail, including the motor transmission or friction disc, brakes, frame, bearings and flanges.

Proper alignment and gauge of wheels is paramount at all times. Correct lubrication insures against wear and gives car more power. Ignition will not follow paths broken by dirt contacts or gaps, hence the necessity for clean spark plugs and tight connections. Magnetos and coils are delicate and should not be tinkered with. Such parts are vital to a car and only experienced men should make repairs. A detailed cost of shop expense and repairs by the field repairman will readily develop the cars that are not being given proper care, and this matter can be adjusted along educational lines, or in case of a failure of this method, by suitable disciplinary action.

An alert operator can easily detect any unusual sound in his motor and in case of such sound developing, immediate attention should be given to insure against possible further damage, as motors have been completely wrecked and employees injured by connecting rods becoming loose or bearings burning out.

Cars should have only specified standard equipment. The use of special seats, boxes, trays or other contrivances makes extra weight which might overload that portion of the car on which placed, cause a stumbling hazard, or in some other way jeopardizing the safety of the employees required to ride the car.

The engine of a motor car must not be running when car is placed on or taken off the track, as employees have sustained serious injuries to their feet when standing on the front end with motor running while car is being turned. The engines must not be raced at any time, as this causes extreme vibration to all parts of the motor and car generally, resulting in unnecessary wear.

The safe carrying capacity of all track cars should be stenciled on each car and this specified capacity not exceeded, as the operation of an overloaded car is extremely hazardous.

Track motor cars should have the front wheels lifted out of flangeways where crossings are planked, before rear end of car is swung around to avoid bent axles and twisted flanges. More damage is done in one bouncing of the wheels over the rails where the ground is below top of rail than a month's ordinary wear on the car, as this strains rivets, loosens bolts, distorts the frame, may damage bearings or their pedestals and crack flanges. A summary of the accidents with resultant injuries and fatalities caused by cracked flanges, worn axles and thin treads on wheels coupled with high speed, reveals astounding figures and places a sad commentary on maintenance men.

Before any track motor car is put in service it should be fully equipped with safety rails which extend across both front and rear ends, with a hand rail extending over the full length of the deck between them to prevent men from falling in case of sudden stop or derailment.

Brakes, unless in proper adjustment, are a potential cause of many accidents. They must be maintained in such a manner as to assure a quick and positive stop. Soft iron facing on brake shoes has been found preferable to leather, rubber or wood. Brake levers must be readily accessible to the operator and care used in loading so that tools or materials placed on the car can in no manner foul the brake action. Foremen or operators of track cars will be in charge of brakes at all times and must give proper warning when brakes are to be applied.

Only after it is known by inspection that the track motor car is in good operating condition, should the car be placed on the track.

No one should be permitted to operate a track motor car until he has passed an examination on the rules, sight and hearing, which insures against possible ignorance of the rules and personal physical defects.

Every operator must carry a standard watch inspected at frequent intervals and must have a copy of the current time table in his possession, and also then make frequent comparisons with standard clocks or employees who have the correct standard time.

As much as practicable, each track motor car should be operated by one person who should be thoroughly familiar with the car.

Before starting a track motor car there should be a definite understanding as to what part each employee in the gang is to take in the handling of the car should an emergency arise. Three or four men who have been drilled in the details of handling can remove car more quickly and safely than eight men in confusion.

Necessary flagging equipment, as prescribed by the rules, should always be in readiness on the track motor car so that proper flag protection may be provided the instant it is necessary.

None but employees in discharge of duty should be permitted to ride upon track motor cars, except on authority of the Superintendent. All employees required to ride on motor cars must be seated and the capacity of any car is limited to the number of available seats. Men to be seated so that operator's vision is unobstructed. Men should be seated to face both front and rear to serve as lookouts. Where more men are to be handled than the seating capacity of a track motor car will accommodate, a trailer with seats and safety rails should be attached to rear of track motor car. Employees should not be permitted to ride on flat top of push cars or with feet between the cars.

No car should be pushed ahead of a track motor car. Any car attached to a motor car must be pulled. Such cars should be coupled with a rigid coupler having a minimum of slack and be so fastened that there is no possibility of cars becoming separated.

The placing of tools or material on motor cars or trailers must be carefully done, so that there will be no chance of same dropping off or sliding out to derail following cars or trains. Ends of tool trays should be high enough to prevent lining or bridge bars from slipping out. Such tools or material must in no way foul any of the working parts of the track motor car.

Everything about the operation of a motor car should be done in a cool, methodical manner, each man knowing what to do and no scuffling, horseplay, joking or unnecessary talking should be permitted. It is as essential that men be quiet and watchful while riding, as while at work on a busy track.

All employees riding upon track motor cars should be taught and impressed with their own individual responsibility so as to be alert at all times and not be permitted to depend on the operator or foreman for their personal safety.

Speed restrictions should be definitely fixed and religiously adhered to. If the operation of inspection cars is permitted at faster speeds than ordinary track motor cars, such cars should be specially designed and built for such service and especially excepted from established speed restriction, as it is a perverted reasoning that permits an officer (general or subordinate) to break himself, the very rules that it is his duty to enforce.

Cars must be operated at all times with caution, this is particularly necessary at night and during foggy or stormy weather. When necessary to use track cars at night or during storms or fogs, a white light must be displayed to the front and a red light to the rear, and when such movements are made extra precautions must be taken to ascertain exact whereabouts of other track motor cars and scheduled or extra trains. If communication cannot be established with the dispatcher, all such movements shall be made under full flag protection.

The operation of track motor cars while passing trains on adjacent tracks, has caused many accidents. On lines of more than one track, cars must be

stopped and all employees required to dismount and stand outside and clear of both tracks during passing of a train on adjacent track. Track cars must not pass between a standing passenger train and a station unless there is a fence between the tracks. When passing standing trains or cars set out on adjacent tracks, care should be exercised to avoid possible collision with any person coming around or from between the cars.

When operating motor cars on lines of more than one main track, the current of traffic must be followed unless deviations are permitted by special instructions due to grades, curves, or other conditions involving restricted vision or special operating conditions.

Track motor cars must not be attached to trains, and a distance of 500 feet must be maintained between track motor cars and the rear of trains on the same track, and 200 feet between all track motor cars.

Heavily loaded track cars which cannot be removed from the track promptly must be protected in both directions by stop signals. Heavy material must not be carried on track motor cars except in emergencies.

Employees must not get on moving track cars, except when necessary to start the car, in which case the pushing must be done from the rear end only. When a direct connected track car is coupled on front of a push or any other track car not equipped with safety hand rails, it may be started by not more than one man on each side pushing on the safety hand rail at front end of the motor car. Employees must not get off moving track cars, except in an emergency.

Only motor cars with free running engines should be used as gang cars, as there is always a hazard of accident in pushing direct connected cars to start them, with men compelled to board the cars when moving. Here enters also another evil with direct connected cars—that of the tendency to race cars for grades, it being impossible to shift speeds on such cars. Such cars also invite the practice of running across obscured highway crossings, when it is known that reducing to a really safe speed will necessitate dismounting and pushing the car to start.

Foremen and others in charge of track motor cars should be required at all times to keep themselves informed as to train movements in the vicinity of their operations, to avoid unnecessary hazards from running on short time ahead of trains, or in the face of traffic in single track territory. Foremen and operators of track motor cars must watch closely for signals carried by trains so as to know if there are more sections following. Dispatchers should give line ups to foremen of gangs and other employees operating motor cars when requested to do so and employees receiving this information must understand that they are given such line ups as a matter of information only and it does not relieve them of the responsibility of protecting themselves wherever and whenever necessary, for operating conditions may require running additional trains or light engines at any moment after a line up has been given.

Suitable setoffs should be maintained so that cars may be readily removed from the track. These should be in the vicinity of cuts, fills and ends of bridges and so provided at such other locations as operating conditions necessitate.

In dense traffic territory the operation of motor cars may demand special rules to govern their movements.

Gasoline being an explosive, requires careful handling at all times and must not come in contact with an open flame or spark. Carbon monoxide is fatal—never run a motor in a closed building.

Clothing is also a safety factor in motor car operation. Excessive or bulky clothing, such as to impair vision, hearing or prompt action, should not be

worn when riding track motor cars. Turned up overalls, ragged or torn over clothes can easily contribute to an injury when riding on track motor cars.

When rails are slippery due to wet weather or frost, additional care must be taken to insure the proper stopping of motor car. This must be taken into account by foremen and other operators when approaching switches, derails and highway crossings. Track motor cars should be pushed through spring rail frogs and over point derails and run at slow speed through interlocked switches.

A vehicle has the right to cross ahead of track motor cars at public highway crossings where flagmen or gates are not maintained, and track cars should stop and motion to vehicles to cross ahead of them, if both arrive at a crossing about the same time.

For years we considered it sufficiently safe to permit track motor cars to approach crossings of city streets or other public highways under control, and to cross without stopping if there was an unobstructed view of two hundred feet each way; and while collisions with automobiles and auto trucks were substantially reduced by intensive supervision, they continued to such an extent that just recently it has been considered necessary to require all track cars to come to a full stop before proceeding over crossings, and where the view is at all obscured, dismount and flag over the crossing.

Since the advent of the track motor car its operation has been a prolific source of accidents, perhaps contributing to more accidents in proportion than any other factor. Much of this is due to the natural obstacles of a railroad with its curves and grades, the ever increasing complexity of train movements and the continued extensive growth of the automobile traffic.

The first duty of railroad officers in furnishing track motor cars is to procure simply operated track motor cars, maintain them with every possible safety device, and supplement their operation with every known self-operating feature and condition.

It has been said that some profit more by intuition than others by a lifetime of experience. This is borne out forcibly in the operation of track motor cars. In dealing with accident prevention the human element is the colossal obstacle to surmount. Rome was not built in a day, nor is the selling of the safety idea to the rank and file accomplished easily or quickly, but rather by constant schooling by precept and example in a friendly democratic spirit.

A safety organization is not purely a departmental feature, but must be a well defined, deep-rooted movement, receiving its inception and sustenance from the head of the official family, thence filtering down through all the channels to the most remote employee in the service in such a manner that he is cognizant of unsafe practices, and has a definite course to pursue.

Detailing a safety agent to correct all the unsafe conditions and practices is comparable to a missionary in a heathen land,—it is a slow uphill problem of uplift. It requires the unqualified support and concerted action of every officer and employee of the property to put over a really effective campaign which will show a substantial reduction of personal injuries each year.

Were it possible to weed out at the source the misfits and derelicts, the problem of safety would be less difficult. Much has been done by physical examination when accepting skilled labor for service, but this still leaves the induction of the common laborers, who generally are not required to pass a physical examination, entirely up to labor agents and foremen. It is, therefore, imperative that the best material possible be trained for foremen, as the foreman is the one man standing between the treasury and the work at hand. It is he who is in direct contact with the rank and file, and it is very essential that he have the qualifications that his position demands. A maintenance foreman, due to his isolated position does not receive constant personal

supervision of general or subordinate officers, and it is mandatory that he be of the progressive clear-thinking, positive and courageous type. It is he who directly conveys to both the new and the older men of the gang the rudiments of "Safety First," and not only is he expected to instruct men in safe methods of conduct and proper manner of performing work, but also explain why such conditions are absolutely necessary.

It has been found highly beneficial to get all maintenance foremen together at stated intervals for round table discussions and general dissemination of instructions and interchange of ideas. At such meetings short talks are made by general and subordinate officers, stressing the feeling of kindred interests and democratic spirit. Every man is urged to handle his work in a cool, methodical and careful manner, with a feeling of pride in a job well and *safely* done. The details of practice are worked out at such meetings from the experience of the whole personnel.

As railroad officers, we are guardians of a trust jointly to the corporations we serve and the commonwealth from which we derive our revenue. Upon us rests the direct responsibility of the promulgation of rules and instructions pertinent to the safe-guarding of both the employees and the traveling public.

To the individual the prevention of accidents looms as a stupendous task, but with the coordination and lively interest of every officer, general and subordinate, the problem is simplified to the point where the individual employee can be reached and his conversion to safe methods obtained either by moral suasion, or if not amenable to that, by disciplinary action, even to the extreme measure of dismissal.

Loyalty cannot be purchased nor fixed, but is the spontaneous outgrowth of contact where the officers meet the rank and file of employees with a fair and friendly interest. It is then only that men can be taught to respect the rights of others, to reason methodically, act with inherent selfrestraint and control, and to hold the rules inviolate.

"Safety is fundamentally a habit of mind which may be acquired by all through the exercise of ordinary caution and forethought in the small details of each day's duties."

CHAIRMAN COTT: I want to thank you, Mr. Osborne, for that splendid paper. We are deeply appreciative of it. Mr. Rohweder, will you please report for the Committee on Nominations?

Report of the Nominating Committee

A. V. ROHWEDER (D. & R. D. M. & N. Railway, Duluth, Minn.): The Committee on Nominations, Mr. Walsh, Mr. Phillips and myself, beg to report as follows:

Chairman, Mr. John E. Long, Superintendent of Safety, the Delaware & Hudson, Albany.

Vice-Chairman, Mr. C. F. Larson, Superintendent of Safety, the Missouri Pacific Railroad Co., St. Louis, Mo.

Secretary, Mr. A. W. Smullen, Superintendent of Safety of the Chicago, Milwaukee Railroad.

CHAIRMAN COTT: You have heard the report, gentlemen. Under the By-Laws and Constitution you are entitled to make nominations from the floor.

(The report was accepted and motion made and carried, electing the officers named.)

ADJOURNMENT

October 3, 1928

Luncheon Session

E. R. COTT, Chairman

**Supervisor of Safety, The Hocking Valley Railway Company
Columbus, O.**

J. E. LONG, Toastmaster

**Superintendent of Safety, The Delaware & Hudson Company
Albany, N. Y.**

The luncheon session was called to order at one o'clock by the chairman, Mr. E. R. Cott.

CHAIRMAN COTT: The Toastmaster I personally selected, because I believe that toastmasters, contrary to the usual practice, should be seen and not heard, and I think you will hear very little of the present Toastmaster; so I take pleasure in introducing to you, to those who may not know him, Mr. J. E. Long, Superintendent of Safety of the Delaware & Hudson Railway, Albany, New York, recently nominated and elected to be my successor the following year.

MR. LONG: I deem it a pleasure and a privilege to act as Toastmaster for this Luncheon today. May I at this time extend to you a welcome. I am glad to see you here. I am especially glad to see so many ladies present and just before the luncheon started I remarked to my good friend, Tom Carrow, that you ladies look good enough to eat. I am glad to report from this vantage point that you did.

When my good friend, the capable chairman of this Section, requested me to act as Toastmaster, I told him it was a mistake, because in my opinion a Toastmaster should be able to tell funny stories. His reply was "Don't worry. You don't have to tell funny stories. They will laugh when they look at you." Ever since then I have been trying to figure out whether that was a knock or a boost and I am wondering, when you did laugh, if you laughed with me or at me.

Incidentally, speaking of the ladies here, a prominent man who frequently acts as Toastmaster said recently that when the ladies were present it cramped his style. He said that the ladies had cleaner minds. And a voice from the gallery said, "They should have, they change them more often."

I presume, as Toastmaster, I should exercise my prerogative and make a speech, but I am sure you did not come here today to listen to me, but to listen to the gentleman whom I am to introduce to you. However, I do want to say that accidents are not prevented by just hoping you won't have them. Successful accident prevention requires a carefully conceived plan, thoughtfully carried out. Everything worth while needs effort. Safety requires work and work is good for us. Practically everyone works. We worked yesterday, last week and last year. Did you ever hear of Adam walking around in the garden of Eden with his hands in his pockets? You will get that in one minute.

Incidentally I know some people say that the trouble in the garden was caused by an apple. Personally, I think it was caused by a "green pair."

In the past we have been favored at these luncheons with distinguished speakers, but I am sure we have never had a more distinguished speaker, nor one who is better or more favorably known in the city of New York, than our guest and speaker of today. Ladies and gentlemen, I take great pleasure in presenting to you Dr. Thomas G. Darlington, formerly Commissioner of Health and President of the Board of Health of the City of New York.

Address

By THOMAS DARLINGTON, M. D.
New York City

Mr. Toastmaster, Ladies and Gentlemen: It is a great pleasure for me to be here. I too would like to tell you some stories but there is not time and we will pass them over for I have so much else to tell you.

Sometime ago I was one of the Commissioners of Compensation of the State of New York and at that time made many investigations of the cause of accidents. My experience is that most accidents are due to carelessness; to lack of thought, a person's mind on something else. As for instance on Monday morning they are thinking of the Sunday before or something of that kind. There are many causes of accidents, but that seemed to me at the time when I was investigating the matter to be the greatest cause, and next to that and a very large factor was fatigue. Accidents frequently occur when people are tired, and it is to that cause which I wish to devote these few minutes.

The question of getting tired and how we many avoid it. I wrote a pamphlet on this once for the American Iron & Steel Institute and it was published. It was entitled "What Causes Fatigue? An address by Dr. Darlington." My daughter said that was a question and an answer.

To know something about the body getting tired we must know of the human body itself. You know it is made of bones, muscles, skin and nerves and various organs and glands. The principal thing we have to deal with, or one of the main things we have to deal with, is the muscles.

Getting tired or fatigued is the opposite of energy. How do we have energy in the body? I take my arm and move it up this way (raises his arm) what happens? This muscle the biceps pulled along the front of the arm and pulled the arm up, through the will. What happened? That muscle had energy in it, something to use up, it had fuel. What is that fuel, ordinarily? (I am trying to make this very simple.) The muscle contains sugar and we will put it in a chemical constituency. C-6, H-12, O-6. When I pulled up this arm what happened? That split into two parts. It becomes C-3, H-6, O-3. If you know anything about chemistry you see you have a different product, it is Lactic acid the acid of sour milk. We keep doing that and the muscle is getting sour. The strange thing that some of the lactic acid in the muscle goes back to sugar. That is what you cannot do outside of the human body; and it sends it back into sugar and it does it over and over again and finally the Lactic acid splits up and becomes CO-2, Carbon Dioxide which passes out through the lungs and H-2-O, water, which passes out through the kidneys.

We must compare the body in energy to the simplest thing, water in a boiler with fuel under it. Suppose we put coal under a boiler and we want energy. You light the coal. But doesn't it depend a great deal on the quality of the coal? There is a wonderful difference between some of the slaty coal I have seen and Pocahontas coal. Again, it depends on whether you get a draft under that boiler, whether you give it draft. Supposing you shut it up and don't have any oxygen, you do not get energy or steam. It depends also on the third thing, on getting rid of the ashes or waste.

The human body is like that. Our energy depends on the fuel, the food we eat, upon the oxygen we breathe in whether we burn the food in the muscles or not, and whether we get rid of the ashes or waste.

The first thing then is a question of food. Don't you see that if we have no fuel we have no energy, and fatigue is the opposite of energy. In other words if we lack food and lack fuel we get tired. I remember examining 150 lunch buckets in one day and after going through them, in the Carnegie Steel Company—I thought it was no wonder they got tired because of the character of the food. Some of

it was sour not worth while eating. There is a great deal in regard to this food business. Whether you digest it or not. Can you store it in the muscles and put this sugar away, for the sugar is not only stored in the muscles but in the liver which is the coal bin of the body. It is stored by food. It is a great thing to know what kind of food to eat and the right quantity to eat and the right time to eat. There is also a good many other things dependent upon the digestion of that food. In the first place, have you good teeth? Has the workman good teeth? Has he abscessed teeth containing bacteria that spoils the food after it gets into the body? And after he has swallowed the food does he digest it? That depends a great deal on whether he has gastric juices or not, a contented mind or not, upon anger, worry, etc. People who are in a stew all the time do not have gastric juice and do not digest their food.

On the shores of Lake Champlain some years ago there was an old Doctor lived there named Alexander Beaumont and he had a patient named St. Martin. St. Martin had been shot across the front with buck shot and there was a hole in his stomach. You could watch the food digest. Dr. Beaumont made a great many experiments. One day he said "I made St. Martin angry and all secretion of the gastric juice ceased." The mind has to do with it. It is like men who transact business over the luncheon table. They do not get the taste or flavor of food which is shown to be absolutely necessary for the secretion of gastric juice, and then wonder why they have high blood pressure.

Now, it is not only a question of digestion. Is the liver in a good condition to store away the food? There is a good deal in the food itself. I do not want to talk too long for I remember once I talked on Temperance and it is one of the first speeches I ever made. The people kept getting up and going out and coming in again, they each went out for a drink and by the time I got through with my lengthy speech on Temperance they were nearly all drunk. However I do not think you can do that here. Now, we come to the second proposition and that is the question of oxygen. It is the same as getting the oxygen to the coal under the boiler. The oxygen is carried around in the body by the red corpuscles in the blood known as Hemoglobin. Very few people have the full complement of blood, sufficient red blood to carry the oxygen properly. Most people are down to 80 per cent or less and if they have had any disease it is much less than that, especially some form of infectious disease. Unless one has a sufficient amount of red material in the blood, the oxygen is not carried to the tissues and a person gets tired because they do not have sufficient oxygen to burn the food to give them the energy, and therefore have accidents.

Under what conditions do we have anemia? I am thinking of a case of pernicious anemia. A person who came into my office and had just stepped out of an automobile yet she couldn't stand a minute, tired. Because the blood stream did not contain sufficient Hemoglobin, red material in the blood.

If the person's bowels have not moved, if they have not slept nights, if they do not eat the correct food; if they have abscesses in the sinuses or teeth, any form of local infection or typhoid infection, then the Hemoglobin is found to be down and a person gets tired and accidents occur very often because they are not in a condition to return to work.

In that connection there is something else with the blood. The blood must remain alkaline. Now, the human body is like this: We will draw a circle (draws on blackboard). This is the alkali and this is acid. Over there we have a slight range. The alkali in our blood is about the same as tap water that you drink and we put it in here. That is our range. If you lose your alkali over to this point you go to sleep and you never wake up. You get that in diabetes. Too much the other way you get convulsions and die. It is a very slight range you have. If the blood changes in its alkaline content they call it acidosis. It is a wrong name, for nobody ever has acid blood. If your blood is acid you die

immediately. The slight change of the soda in the blood and all the carbon dioxide, which is a product of the body, is not carried out through the lungs and it accumulates in the system and makes us tired.

Acidosis comes from a great many things—eating too much fried food and persons who are fat and try to diet too much have Acidosis. Then you are tired.

Finally the great thing about it is, the thing that makes people more tired than anything else is not getting the products of waste out of the body. You know very well that if under a boiler you allow ashes to accumulate and put on coal, and don't get rid of the ashes, it will not work, and it is so of the human body. I will show you just how it works. Let us say, that too much meat has been eaten, too many bacteria, and they have gone down through the intestinal tract so the movements become more or less putrid in character, there is then Indol Skatol and Mercaptan, but the most common one is known as Indol. When you go to a Doctor and have your urine examined you find in the report, so much Indican, that means the Indol absorbed has combined with sulphur and potash. But when it is in the form of Indol it is poisonous. Absorption of putrid materials from the intestinal tract lessens muscular efficiency. How do we know it?

This is an iron stand (draws on blackboard). This arm is movable. This is a muscle from the frog's leg. We get two of them. You take it very carefully with a razor. Apparently it does not hurt the frog much for he does not jump if the razor is sharpened. You get this muscle of the leg, put it in this machine. Here is a cylinder. That muscle still contains energy and will move under electrical stimulus. We, therefore, put a current through here, that pulls up the arm and we get a record of this cylinder. We can tell what it is worth in value. Now, we will take one of these; the two muscles from a frog's leg and we will put a small hypodermic of salt and water in so as to have the prick and disturbance to the muscle itself and then take a record of it and then take a small amount of Indol and put it in the hypodermic and put it in the second muscle, the muscles being alike and see what is the difference in the record of those muscles. From the normal muscle we will get a record like this. That is the record of the normal muscle with just a little salt water in it. Now, we take the second muscle which has a small amount of Indol in it and what does it do to it? It cuts off the energy. It does not work. What does that mean? A man who has a proper toilet and proper movement from his bowels is worth let us say \$6.00 to his employer, but that man who did not and who has absorbed the putrid materials is worth just \$2.30. That is putting the movement of the bowels into dollars and cents and you can put everything in welfare work in many.

What then does fatigue depend on? On these several things. There are numerous others—There was a boy visiting me in the country this summer and I wanted some pine limbs sawed off from the lower part of the trees. He started in and he went this way (indicating a fast movement of the arm) and of course he went so fast he couldn't get the oxygen into the tissues. Too rapid a movement will produce fatigue. It soon remedies itself though for you cannot keep it up. In general, most of these things depend upon everything pertaining to the man himself and to her—his home, his living and his home life.

During the war I was asked to do a great many things. Among others was to look after the welfare work of Hog Island, and one of the first things we did was put in twenty-two large places where the 22,000 men could be fed because we wanted them to have the right kind of energy and food. Upon that very question, to show you what that means (I am going to keep you only a few moments longer) there was a large factory up in New England that turned out an enormous amount of ammunition, but they were not turning out sufficient amounts. Why? Because they got tired.

We took the hourly output. The workers came in at seven o'clock (indicated on blackboard). They came from all over, some had to come from distant towns

and all they would have for breakfast would be a cold biscuit and a cup of coffee or something like that. Here is the output from seven to eight o'clock. It goes up from eight to nine and from nine to ten and then from ten it goes down and out. That is very simple. All we did was blow the whistle at ten o'clock and pass food, hot chocolate, ice-cream, molasses cake, anything they wanted and what happened? The output went up there instead of going down. Simply a question of feeding and proper care of the human body.

If you will think this matter over you will find the question of fatigue depends a great deal upon food and anemia and that the condition of a man's health and his general well-being often prevent accidents.

I know that you want to go to a meeting so I will close by saying this work you are doing and all the others are doing—(we are just now putting over a great fight against diphtheria) is a fight against ignorance, poverty, negligence and all the diseases that spring out of these things—I have unlimited hope in the future and abiding faith in the people for I know that

In the long days of God, In the wide paths untrod
The World will be led, Its Heart be Comforted.

Others may sing the Song, Others may right the wrong
Finish what we Begin and all we fail of, Win.

Not looking for the Millenium but for a brighter, happier, nobler civilization.
I feel like one who

Pulling hard against the Stream
Sees the Gates of Eden Gleam
And does not dream at all, a Dream.

CHAIRMAN LONG: On behalf of those assembled here today I wish to thank you for your able and interesting address. I hope we may have the pleasure of seeing you and hearing you again at some future time.

We are also honored today in having two other distinguished gentlemen on this platform. I am going to introduce them with the hope that they will stand up and say a word or two to you. Mr. Walber, the vice-president in charge of personnel of the New York Central Lines, who is with us as the personal representative of President Crowley.

MR. WALBER: You need not worry. I am not going to make a speech, but I am here to represent President Crowley and to convey to you his regrets at not being able to be here personally. I am sure he would have enjoyed this wonderful address by Dr. Darlington which brings out so clearly and simply a phase of the situation in which we are all interested.

I only want to make one remark and that is, no matter how many phases are involved in this wonderful work you men are all engaged in, the outstanding phase of it that appeals to our president is the humanitarian aspect of what you are doing. There are economies in it, there are monetary advantages in it, but above all, the human side of it, the prevention of injury, the prolongation of the life of the employee, more than compensates for all the time and energy and money an employer can expend in this kind of work.

You men, in addition to doing a real practical work for the railroads, are engaged in one of the most Christianlike works imaginable, and from that standpoint alone it should be in the heart of every employee to have a real enthusiasm in this branch of the very necessary work you are engaged in.

With these few remarks I want to leave with you the regards of our presi-

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dent, Mr. Crowley, and convey to you the deep interest and personal concern he has in this subject, wishing you unbounded success in the work in which you are engaged.

CHAIRMAN LONG: Thank you, Mr. Walber. We are very glad to have you with us. The other gentleman is Mr. Bagwall, general manager of the Seaboard Air Line.

MR. BAGWALL: I came to this meeting for selfish interests. I came to further the safety work of the Seaboard Air Line. I had no idea of talking to you, much less being up here in this elevated position with these illustrious gentlemen. I told a man this morning that I attended one safety meeting and that was in Salt Lake City, and I obtained an idea that I went back home and put into effect. I was divisional superintendent at the time and I said today that I wanted to get one thought to take back home that I could put across that would do good to the men on the railroad and the railroad as a whole.

I have heard Dr. Darlington's speech with a great deal of interest. I have just been wondering how to put that thought over on the Seaboard. I don't know yet whether that is the thought I am going to take home, but I am going to take one thought home and I have that thought of Dr. Darlington's very well registered in my mind.

I am very happy to be here and I hope to get a good deal out of this convention and I know I will.

CHAIRMAN LONG: Thank you, Mr. Bagwall. We are happy to have you with us.

ADJOURNMENT

October 3, 1928

J. E. LONG, Chairman

**Superintendent of Safety, The Delaware & Hudson Company
Albany, N. Y.**

The third session was called to order at two o'clock by the chairman, J. E. Long.

CHAIRMAN LONG: As I promised you at the luncheon just closed, the first numbers on our program this afternoon are some selections by the Keystone Quartette of the Pennsylvania Railroad, which has come here through the courtesy of Mr. Carrow. The members of the quartette are W. G. Harshaw, J. C. Mainwaring, E. A. Rodig, G. C. Hartel and C. C. Hallman, Pianist.

(Selections were rendered by quartette.)

CHAIRMAN LONG: Thank you, gentlemen. I think the applause shows that those of us who are here appreciated that Keystone Quartette. Personally, I would very much prefer to sit here and listen to that for the balance of the afternoon but time flies and we have work to do. My sole remaining duty is to turn this meeting over to Mr. Carl T. Bailey of the Oregon Short Line, Salt Lake City, who is to conduct the Round Table Discussion this afternoon.

CHAIRMAN BAILEY: This is going to be a job of work. I was watching you as the quartette was singing and I thought, what a peaceful crowd! Now, this is one of those meetings where we call a spade a spade and we expect everybody to participate in this Round Table Discussion. It is one of the outstanding features of our session.

I am going to ask Mr. J. A. Carney, superintendent of safety, Chicago, Burlington & Quincy R. R. Co., Chicago, to start us off on Item (a) "The Whistle and the Highway Crossing." I think it is a subject of considerable importance to the American Railroads and I think we should get a good discussion.

The Whistle and the Highway Crossing

By J. A. CARNEY

Superintendent of Safety, Chicago, Burlington & Quincy R. R. Co., Chicago

In the horse and buggy days, the whistling sign for road crossings was located from 990 to 1,320 feet from the highway grade crossing and the whistle signal was two long and two short blasts sounded near the whistle sign. The movement of the vehicle was seldom over eight miles an hour and usually much less. The vehicle was usually open and the whistle could be easily heard. The temperament of the horse was in many cases a factor in preventing a crossing accident.

With the introduction of the automobile, the speed of the vehicle approaching the grade crossing was increased to twenty-five miles or more per hour. The vehicle was closed and the whistle could not be heard easily. The result was that when the whistle sounded, the engine was nine hundred or more feet from the crossing and the automobile approximately six hundred feet away. The automobile driver did not hear the whistle for the crossing.

To overcome this condition, we tried sounding the standard crossing signal a second time. This made extra work for the engineer, annoyed the passengers and the first sounding signal was superfluous.

It, however, seemed to solve the problem by keeping the whistle blowing until the crossing was reached. With these facts before us, we decided to adopt the highway crossing signal of two long, one short and one long blast of the engine whistle, holding the last blast of the whistle up to the crossing. The following bulletin was issued:

"Enginemen and Trainmen. Effective 12:01 p. m., Saturday, August 7, 1926, joint bulletin dated December 1, 1925, joint important bulletin issued during October, 1925, and Special Time Table Instructions with reference to the sounding of highway crossing whistle signal 14-L, are cancelled.

"Rules 14-L and D-14-L are modified as follows:

"Two long, one short and one long.

"Approaching public crossing at grade. The last blast of whistle to continue until engine reaches highway crossing.

"Enginemen will give consideration to speed train is moving in gauging the distance from the crossing that whistle signal 14-L or D-14-L, will be started.

"The warning signal approaching public crossing at grade is for the protection of pedestrians, drivers, and occupants of vehicles. Their safety and safe operation of trains depends on the vigilance and judgment of enginemen in approaching the crossing and sounding the whistle signal as provided by rule."

This bulletin was issued by the general managers and approved by the operating vice-president.

We are fully convinced that this system of whistling is good. We have had favorable comment from automobile drivers and have personally observed cars that made short stops at grade crossings. We have had a few cases of automobiles struck at the grade crossing while the last blast of the whistle was in progress. We sound the whistle in accord with the rule but we cannot guarantee that the people who ought to heed it even hear it.

One great menace is the driver who runs into the side of trains. This varies from 25 to 45 per cent of our crossing accidents. Taking this fact into consideration and the cases where the whistle would be useless; a back-up switch movement for instance, we are satisfied that two long, one short and one long blast of the whistle, the last blast continued up to the crossing, is making a reduction in the number of crossing accidents where the locomotive hits the automobile.

It is our practice to make checks at grade crossings to know that the crossing whistle rule is being lived up to.

We know that some automobile drivers are thoughtless and unobservant and often fail to note they are approaching a railroad crossing.

To such drivers, the whistle continued to the crossing, should prove a life saving influence. The sound of the whistle should awaken them to the danger confronting them.

Some railroads continue two long and two short blasts of the whistle, but specify in their rules that the sound of the whistle must be continued until the crossing is reached, the engineer to use his judgment as to when the crossing whistle shall commence.

An analysis of highway grade crossing accidents as published by the Interstate Commerce Commission shows that the Burlington Railroad in its efforts to reduce grade crossing accidents is well toward the head of the list of the larger railroads.

We believe our rule for whistling for railway-highway grade crossings to be a good one but whatever system of whistling may be adopted by any railroad, the real protection to the public is to keep the whistle blowing until the engine is on the crossing.

CHAIRMAN BAILEY: Mr. Carney, that was a very nice leadoff. I think this is a subject that interests every railroad man in the country, particularly a safety officer. Is there anyone who wishes to discuss the paper just presented?

J. L. WALSH (Missouri Pacific R. R. Co., St. Louis): I would like to ask Mr. Carney what his experience has been in the tests he has made as to where they stop blowing the whistle? As to the point with reference to the crossing?

MR. CARNEY: Personally, my observations have been this: when the engineer

can see that the road is clear he usually stops the whistle shortly before the crossing is reached but where there is any evidence of the approach of an automobile, he holds the blast of the whistle until the engine is on the crossing. I will say this: the employees of the Burlington R. R. are just as reliable as any other railroad but unfortunately old fellows have gotten into the habit of giving a "Toot, Toot, Toot," and it is pretty hard to get them gaged in some places.

We have had to use a little discipline to wake them up to the fact that there was a rule that had to be followed.

MR. WALSH: Our rule is similar to the rule of the C. B. & Q. It requires the last blast of the whistle to be sounded until the engineer has passed over the crossing. In addition, our rule requires a second sounding of the whistle when the crossing is obstructed or where an automobile is approaching. I think those two things in our rule are a little better than the C. B. & Q., perhaps, and on numerous checks, we found that our men were stopping the last blast of the whistle anywhere from 100 to 200 or 300 feet from the crossing. I have contended all along and believe firmly that the last few seconds elapsing when the automobile gets on the crossing and the engine gets on the crossing has averted a good many crossing collisions. I believe from our experience that the automobile driver has an opportunity of turning parallel with the track and I am sure in many cases avoided contact with our engines, where, if the whistle was not sounded clear over the crossing, he would have been hit.

Our rule is based on giving the engine man a very definite place in which to stop blowing his whistle, that is when the engine is over the crossing. In other words, when the cab of the engine is in the centre of the crossing, we consider our rule fulfilled. We have many failures, of course, but checking of the time of the whistle in accordance with the rule is being made all the time and our checks in that regard have proven it. I think it a very important rule to all of our railroads.

CHAIRMAN BAILEY: Is there any other railroad that has has similar experiences as Mr. Walsh has stated?

ROBERT SCOTT (Atlantic Coast Line, Wilmington, N. C.): This subject can only be of interest—it seems to me—to those railroads that have not adopted this new crossing signal whistle. I can only reiterate what I said last year, that there is no officer, no engineer on our railroad that would care to go back to the old original signal. To those of you who have not given consideration to this phase of the question, I would urge and recommend that you get hold of your management and undertake to educate them and impress upon them the importance of changing to this approved whistle signal arrangement.

J. J. HEALEY (Erie R. R., Huntington, Indiana): With such an appeal as we had for a change of the standard rule I recommended for consideration to our management, the changing of that rule, but they did not feel disposed to do so at that time. They did issue, in bulletin form on the West End of our territory, specific instructions to our engineers to carry on the last sound of the whistle up to the crossing. Not in accordance with Mr. Walsh's reference, over the crossing, but up to the crossing; and from a careful check-up almost daily, that is literally carried out on our fast trains. Some of you may not think the Erie has any fast trains but we have. But our tonnage trains is the problem that I think ought to be regulated through this association or through the American Railway Association.

Now, this thing of one railroad doing this and another doing that is not getting anywhere. I have heard lots of flowery speeches on the floors of these conventions, but we go back home and forget about them. I would like to recommend to the Committee of Direction that we go into the proposition by reaching the proper channels and have that standard rule changed in all our operating rules on our American railroads. I am fully convinced that Mr. Walsh's reference to the last

half second of the sound of the whistle is the solution of the prevention of many crossing accidents.

CHAIRMAN BAILEY: This matter was discussed by the Executive Committee and also the Committee of Direction and I believe submitted to the Rules Committee of the American Railway Association for their consideration, I think it is still being given consideration by that committee. Before any standards are changed it has to have their approval.

T. H. CARROW (Pennsylvania R. R., Philadelphia): I think with Mr. Healey's eloquence he might be more successful with the American Railway Association than I am and I suggest he try to do so. I would like to ask Mr. Walsh, if when a train is not going so fast, whether his engineers make a comparatively long interval between the third and fourth blast or sound. In other words you can comply with the rule by blowing "Toot, Toot—Toot—Toot." I would like to know if you have an interval between the third and fourth blast?

MR. WALSH: On our slower trains we begin within the 200 feet from the crossing and just give an ordinary Highway Grade Crossing signal. Of course, we have made changes and found that some of our men would strike that whistle too far from the crossing and it would make it long. It is discouraging to the people and we have had a good many complaints; but an engineer with judgment, if he is running 15, 18 or 20 miles an hour, will regulate his whistle so he can comply with the rule and not disturb the people along the way.

MR. CARROW: I take it the laws of your State do not require it to start at the post.

MR. WALSH: Yes.

MR. CARROW: You ignore the law then?

MR. WALSH: No. By law they sound the whistle 120 feet from the crossing and if not obstructed in the vicinity of the crossing, it is not necessary to sound that whistle again. If it is clear so you can see half a mile up the highway it is not necessary to blow that whistle at all but when it is obstructed in any way, by trees, houses or cars, then that whistle must be sounded in accordance with the rule.

CHAIRMAN BAILEY: Some rules have been so constituted they may omit it. That has been adopted by many Western lines.

D. G. PHILLIPS (Wabash Railway, St. Louis, Mo.): One of the things I am crazy about is this matter of the crossing whistle, because I have become firmly convinced that by the right kind of whistling, lives are saved. Here is a rule we have on the Wabash. No whistling is good no matter where it is, where it commences, or how loud it is—unless it extends clear up to the crossing.

Now, fortunately in some States through which the Wabash passes, we don't have to begin the whistling at the whistling post. Take the State of Missouri, for instance. The law there states that the whistle must be started or the bell, at the whistling post, so we start the bell at the whistling post and then start the whistle at least nine seconds from the crossing. Now, there is no point at which whistling can be located that will indicate the proper place to start all trains. It is easy enough to see that if a train going 70 miles per hour, like they go on the Erie, should start at the whistling post—where should a train start if going 12 miles per hour? It is ridiculous to insist that those two trains start whistling at the same point, so we have got to locate a starting point of the whistle by something else other than space, and why is it not reasonable to make that a period of time from the crossing rather than an appointed space?

MR. CARROW: What do you do on places where the law requires the whistle?

MR. PHILLIPS: Just what you do. We violate the law. I know nobody will take offense at this but I am going to say there isn't a railroad running through the State of Illinois that observes the law at all times. The State of Illinois says that the whistle must be sounded from the whistling post, one quarter of a mile

from the crossing. Now, there isn't a railroad that is going to require an engine moving 15 or 20 miles an hour to whistle all that distance. I don't care whether it is the law or not. They are not going to do it. Now, if I tell our engineers this, I say: I can't tell you fellows to violate the law but I can tell you this much, if you are determined to violate the law as you do when you don't whistle all the way, I suggest that you do your whistling up next to the crossing where you save lives, and quit whistling and violate the law back at the whistling post. We have never yet had an engineer arrested or a law-suit based on our failure to whistle at the whistling post. We have a great deal of complaint on account of the noise from the whistling though.

The other day, near St. Louis (I won't mention the road) an automobile was struck and five people instantly killed; sixteen people had to be taken to the hospital and a number more were slightly injured. It was a bus load of people. All the evidence pointed to the fact that the engineer on that train had whistled at the whistling post. That seemed to be understood. He gave a signal back at the whistling post, but here is what a further investigation developed. It was a heavy freight drag running 12 miles per hour. The automobile was travelling 35 miles per hour. Now, where was that automobile when the whistle was blown? No matter, it did not hear it. Where was that crowd of people at the time that whistle was sounded? It was three times as far away as the freight train was. No chance to hear it. A lot of women and children on it; of course they were all talking at once and the driver could not possibly hear the signal.

A few mornings after, I happened to have the privilege of riding on a special train on which were a number of high Wabash officials. One of them had ridden on a special train over the road the night before (and on these special trains they do not have a lot of baggage cars and express cars between the engine and the place where these men are sleeping). He said to me "I pretty nearly went back on your whistling rule last night. The Engineer never missed a crossing all night long, they never failed at the whistling post and my sleep was disturbed." I called him by name and I had the newspaper in my hand that told of that accident near St. Louis and I said, "Which would you rather do? Get up as you did this morning with the knowledge that you had lost a few minutes' sleep or have a message like this handed to you—five people killed and sixteen injured?"

Then there were the damage suits, the lawyers were going to sue the company because they had not done a good job of whistling. I think that is true of everyone. Down deep in your heart you would rather be annoyed a little by it than to hear that somebody had been killed, and that is what whistling is for... To keep people from getting killed.

It is not that the engineer likes the music of the whistle; they are trying to save human lives, and when you get complaints for whistling from people along the road, explain to them why it is; that it is to save lives; their lives and their neighbors'; not to make a noise.

MR. HEALEY: A point of information. How does the Wabash establish that nine seconds period?

MR. PHILLIPS: Our engineers have pretty good judgment and we feel they guess it when we tell them to start whistling nine seconds from the crossing. Our engineers are intelligent. They don't always get it just right but they do come pretty near it.

L. H. COLLETT (Santa Fe R. R., Topeka, Kansas): We have a couple of engineers here and I would rather hear them than to get into it myself.

J. A. KOWALSKI (Santa Fe R. R., Emporia, Kansas): We haven't the Wabash rule in effect, that is in so far as the nine seconds rule is concerned. We haven't anything like that.

CHAIRMAN BAILEY: That does not clarify the situation as to the terminating of the whistle at the crossing with reference to the speed of trains.

L. T. SHEDD (Rock Island R. R., Chicago): Some six months ago the train rule committee of the American Railway Association presented for consideration and hopeful adoption, the new standard code. The committee did that after a long and tedious labor. It was adopted practically unanimously by a committee who met before the rule was presented. That committee saw fit to preserve two long and two short whistles, but appended a note to it, that the whistle should be sounded up to and (I think it said) over the crossing, either by continued blowing or by repetition as the case required; and I think you gentlemen assembled, if you will refer to it, it would be enlightening. My own opinion is that the rule thus adopted covers the situation in every particular and would meet all requirements.

CHAIRMAN BAILEY: I think an attempt on the part of this organization to make any effort to change that rule would be rather futile in view of the action taken by the committee of the American Railway Association and I believe the recommendations from the American Railway Association to the respective lines may be adopted.

MR. HARTENSTEIN (Lehigh Valley Railroad): I was present when the Rules Committee of the American Railway Association made their report to the Executives and, briefly speaking, they left it to the discretion of the railroads as to whether they would adopt a new rule or carry on the old rule which has been effective for so many years. We, on the Lehigh Valley, practically cancelled rule 14-L and adopted the same rule Mr. Carney speaks of here. We are going along, we think, very successfully with it. From checks made from time to time we are well satisfied that our engineers are trying to comply with it.

CHAIRMAN BAILEY: I might say, representing a railroad, that we thought we had that old rule effective. I had occasion to go out and make some tests and I found every engineer was hanging on to the last blast of the whistle up to the crossing.

J. H. WRIGHT (Union Pacific, Omaha, Neb.): I am a locomotive engineer on the Union Pacific and, naturally interested in this talk. I thought this thing over quite a little. I don't see where you could improve on the crossing question. The signal is all right if properly handled and in my experience I have been able to call the attention of parties at the crossing to it by the short blast where the long blast was confusing. It depends largely on the way the signal is given. I start at the whistling post with my first long blast of the whistle. Sometimes, if I am going to make a stop, I may make an application of the air before I reach for the whistle, but I always thought the short blast of the whistle immediately before reaching the crossing best, and I think that is the way, the proper way, it should be handled.

MR. CARROW: Did I understand you to say you strung the long one out?

MR. WRIGHT: Yes, sir. I wait a little space between according to my speed, then the next long one and then a space and then a short and then a space and the last one immediately before I come to the crossing. It is very effective. The last one is short. Two longs and two shorts.

MR. CARROW: In actual practice doesn't it come out a little longer?

MR. WRIGHT: It depends on the situation. I believe I have said all that is necessary. That is my view of the matter and I don't think any change in the rule is necessary.

I would like to call your attention to another point in considering the public. The engine man ought to have a little consideration too. Remember we have to sit behind that long whistle all day and it affects the cars. That is why I object to those long whistles. You don't get any more out of them than the short.

MR. KELLY (Baltimore & Ohio R. R., Baltimore): I have made a number of tests in so far as the blowing of the crossing whistle signal is concerned and I

want to say that it is not a question of whether the train is running 12 miles or 70 miles an hour. We, of course, have a standard rule in effect, of two long and two short, and in order to overcome anything that might happen because the driver of an automobile did not hear the first whistle, we have a rule in effect, which says to our engineers—if necessary blow it the second time, or the third time if necessary, if your judgment so indicates. I believe when the whistle is sounded the second or third time it is a great deal better than to have two long and two short and waken the neighborhood.

CHAIRMAN BAILEY: I think you are right. The Chairman will have to rule this discussion suspended. There is one matter I would like to speak of which we are all interested in. You know for many years we had the extreme pleasure of having with us, one of the pioneers of safety on the American Railroads, Mr. John T. Broderick, and I think it is fitting on the part of this assembly that some time during our session we forward him a message expressing our hope that he is progressing in life and the Secretary has a message I would like to have read to the assemblage.

John T. Broderick:

Baltimore, Md.

Your friends of the Steam Railroad Section assembled at the Seventeenth Annual Congress National Safety Council miss you and sincerely regret your absence. We enjoyed your counsel and feel that your thoughts are with us. We wish to assure you of our prayers for your happiness.

E. R. COTT.

CHAIRMAN BAILEY: The chairman, Pro Tem, will order the message sent. The next subject is of vital interest, and was to have been handled by Mr. H. M. Mayo but he is unable to be here with us but he has very kindly forwarded his paper and I am going to ask our Secretary to read the paper as a start off on this suggestion.

The Front Foot Board

By H. H. MAYO

Superintendent of Safety, Southern Pacific Lines, Texas and Louisiana,
Houston, Texas

At the suggestion of D. G. Phillips, president of the Safety Section, A. R. A., and a gentleman who has been persistently and successfully forcing safety to the front ranks in the world of railroad effort, in common with a host of enterprising and ingenious co-laborers, I have set forth here a brief thesis upon the "front foot board."

Every railroad man having active knowledge of yard service and a definite sympathy with safety as applied to the human units who function in this department of rail operation, has long realized the menace of the front foot board. That it represents a constant threat to life and limb and has been the cause of tragedies, both numerous and harrowing, is a fact universally recognized, yet not sufficiently acute in the minds of the old-timers to justify a change in methods of long standing.

I mean by this that it is somewhat difficult to cause the antiquated canine to sidestep carefully acquired habits of thought and action in order to try out something that does not conform to standards often born of reckless hardihood and a haste that was seldom ever justified.

On the Southern Pacific lines of Texas and Louisiana, there is no "front" foot board on a switch engine, at least so far as its occupancy is concerned. With our lines, the front foot board is that board which leads in the direction

moving, and employees are prohibited from riding this board under penalty of severe discipline. The rule has been in effect since January 18, 1920, and in spite of early criticism and objection, has overcome practically all opposition.

A recent questionnaire sent to all division and terminal superintendents on the Southern Pacific Texas and Louisiana lines, dealing with the foot board rule and as to its modification, elicited a unanimous objection to any change in its present provisions and reaffirmed the efficacy of our positive regulation prohibiting use of the front foot board in the direction moving. It was also the consensus of opinion that the rule did not slow down yard traffic or movement and, as one of the officials suggested—even, if it did, the added safety to employees would fully justify the delay.

That the adoption of the positive rule was somewhat revolutionary may not be denied. However, we cannot be expected to proceed along lines fashioned when the railroads were yet young and be governed by conditions that were created when the industry was in the process of early development. Not to digress into avenues opened by advanced thought and methods or take advantage of experience, would be to deny to operation the benefits of modern achievement, and we all know that the railways of today in the character of their organization, equipment, facilities and service, and the personnel of their employes, represent a distinct advance upon the same factors a quarter century since. However, as revolutionary as it may have been, the rule was based upon a generous desire of the management to save life and limb by decreasing the opportunity for its loss. It followed close upon the heels of two or three fatal accidents due to derailments of switch engines and the instant demolition of front foot boards upon which our illfated employes were riding. What counted the delay to car movement even if, as one yardmaster estimated, it would add one full engine shift to the yard; why figure on the expense if life was to be conserved or suffering decreased? This was the attitude of our management and the years which have followed unto the date of this writing have demonstrated the wisdom and humanity of the decision and the profit which counteth more than dollars to the yard employees whose duty is on or about cars.

The history of all switching yards contains one or more chapters which chronicle the front foot board accident or injury. Either it was a derailment, spring hanger breaking, obstacle between the rails, low joints, failure of drawbar or coupling while shoving, as applied to the physical equipment, or foot slipping while mounting, falling while running ahead of engine, caught while making coupling, adjusting coupling apparatus from board, or similar failure as applied to the human factor. No matter the cause, the front foot board furnished the opportunity and with the inhibition of the front foot board, the cause and opportunity departs.

During the nearly nine years the prohibition of the front foot board has been in force, there have been two accidents due to the front foot board. Yardman ran engine over a derail causing board to be demolished and employee to lose both feet above the ankles. Another yardman fell from front footboard while mounting and was so badly injured that he died a few days later. In both unfortunate cases employes violated the rule and in both cases paid the penalty of the disobedience. These two injuries represent the physical cost of the rule and practice, but numerous instances of switch engine derailments in our several terminal yards in which destruction of front foot boards was recorded during the period, suggest pertinently and significantly what might have been and what probably would have been had the old rule of operation governed.

Owing to the physical construction of several of our larger passenger stations, it was thought wise to modify the prohibition in order to additionally

safeguard the interests of our patrons. Thus at Houston, San Antonio and El Paso, switch engines passing through the station and on tracks adjoining and paralleling tracks on which trains are coming or leaving, and over which passengers are required to pass, are permitted if not required to carry one switchman on leading foot board during the passage of engine. This to better control movement of locomotive at a time when passengers were liable to become confused and inadvertently place themselves in a dangerous position by attempting to cross tracks immediately ahead of engine.

I am not prepared to state that the revolution was accomplished pronto, or without a constant and consistent policy of friendly education and support. Men who had been accustomed to use the lead foot board in their early training and through the years which had elapsed since their novitiate, found it difficult to coordinate their thoughts in harmony with a rule that switched them, *nolens volens*, from one end of the machine to the other and which added a mile or two to the usual footwork of the shift. Many of the boys "fell down" time and again, but only through habit. The older boys were at times rather cynical in their comments but few there were who did not recognize the added element of safety. While occasional infractions of the rule crept into the records of our operation, these were treated as the occasion demanded. In several instances employes were dismissed from the service after being repeatedly cautioned. Others were charged with demerits, but the "hard boiled" violations were infrequent, and I believe I can safely assert that the yardmen, including the yardmasters charged with the duty of proper and expeditious terminal operation, are solidly behind the practice and would object strenuously to its elimination or change.

Very competent and capable yardmasters the country over are ready to assert and do assert that with the leading foot board "verboten," transportation in terminals will be seriously hindered. Our records and experience fail to manifest this condition. We believe we have moved a step forward in the direction of safety and efficiency, for real efficiency can not nestle under the wings of possible disaster. One life is worth what it is worth. Who can estimate its value?

CHAIRMAN BAILEY: The subject is one of considerable importance to yard operation and I believe it is a problem that you are all confronted with and if there is anyone wants to bring up the question the opportunity is now afforded.

MR. HARTENSTEIN (Lehigh Valley Railroad): Mr. Mayo's paper takes me back a good many years when I was switching in a yard. I stood just a short distance from the yard engine which I had charge of that time, and at a frog the engine left the train. It was coming head on toward me and as she left the track the front footboard caught the rails, bent it right around the wheels of the engine and I immediately said, "I can see where I would have been if I had been on that footboard." From that day to this I have never attempted to climb on the footboard of an engine when it was moving toward me. I have discontinued entirely the practice of getting on the footboard. We have a rule on the Lehigh Valley, and while it may not be strictly adhered to, we are trying to enforce it.

CHAIRMAN BAILEY: It is a matter of supervision that the rules be adhered to.

MR. PARVIN (Ann Arbor Railway): I believe the matter deserves further discussion or more enlightenment. In the first place the gentleman's paper does not confine itself to the question under discussion. Mr. Hartenstein's statement just made was not confined to the question under discussion. As I understand it the question is, "in operation, how many men are you going to permit on the front footboard?" Mr. Mayo's paper speaks of various things that happen that were in no way connected with the man who was simply riding the front footboard. Mr. Hartenstein speaks of getting on the front footboard, I presume, when the engine

is approaching him. We all have that rule and it is a good rule. It seems to me when you say to your switchmen that they cannot ride on the front footboard you are going just a little too far in the interest of safety. Anyone who subscribes to that plan will next introduce a plan to put folding steps in the gangway of an engine, the engineer will let them down after the engine is stopped and he will raise them when the engine is started. Every moving engine or car has a hazard. I believe you can make a step forward in the riding of the footboard. How many accidents spoken of here would have happened if you adopted the simple rule of the man riding the footboard placing himself outside of the rail and only permit two men—not three or four—a maximum of two men on your footboard? If each man were riding outside of the rail how many accidents would happen that today are contributed to the front footboard?

J. W. HOPKINS (Pennsylvania R. R., Pittsburgh): We prohibit the riding of front footboards except at the passenger stations at Pittsburgh and that is under special rules of the general superintendent. It does not slow up the movement, it saves lives. It can be done. We don't allow any to ride it.

CHAIRMAN BAILEY: Under the present safety devices we have cars and switch engines equipped with, we do not permit switchmen to ride the front footboard. I would like to ask Mr. Warfel, of the Union Pacific, what his experience has been with that rule? They have a rule permitting one man to ride under certain conditions.

Various Ideas About the Front Footboard

GEORGE H. WARFEL (Union Pacific, Omaha): Mr. Chairman: It has been our experience and it is our belief that it is advisable to have a man on the footboard of a switch engine in the direction that engine is moving when it is moving in territory where there is likely to be any damage done by that moving engine to persons or cars. We therefore have a rule requiring one man only—forbidding more—to ride the leading footboard of the engine, except when the engine is making long moves from one yard to another over territory where there is likelihood of encountering trouble. That man rides on the engineer's side of the draw-bar, on the outside corner of the footboard in a position to see around corners as you come to the corners of elevators, buildings or other quarters and around curves when the fireman may be engaged or the engineer can't see, to immediately pass signals to the engineer should any condition arise requiring the stopping of the engine.

We permit only one man, and we would like very much to take that one man off, but we believe the interests of safety are better served under those conditions by requiring one man and one man only to do the most good with the least danger to himself.

J. A. CARNEY (Chicago, Burlington & Quincy R. R., Chicago): We permit men on the front footboard, one on the right side and one on the left side, and specify they shall ride on the end of the board outside of the rail. We do not permit anybody else.

MR. HARTENSTEIN (Lehigh Valley Railroad): This question of having a man ride on the outside of the board outside of the rail is interesting to me. I would like to know in what respect these gentlemen claim it removes the danger. Take, for instance, clearance. We all know men have been injured. We all know in the winter time in deep snow it is dangerous to ride there. My contention is it would be safer in the winter time in the middle of the board.

C. W. HAMMOND (New York Central, New York): We have special instructions that only one man shall ride at any time when he is not switching or yard lead. We find that one man on in switching or yard lead is perfectly safe riding

on the leading footboard. We may have a switching lead of 20 or 30 cars, which is common on the New York Central; perhaps five or ten switches long, fifteen switches against you. We feel that the man on the leading end, to go up and throw that switch, is perfectly safe and that is the only time we allow him there. If he is going from yard to yard he is absolutely prohibited from riding the engine, on the footboard. He must not ride there except when absolutely necessary, and it is very seldom necessary to ride on the road engine. Take local men doing local work in the summer time. They found it was a nice place to ride to cool off. We fought that and today our accidents are practically nil with reference to men riding the footboard and it is because we have enforced the rule.

E. J. COTTER (New York City): We don't permit anybody riding on the front footboard of engine in terminals and have not for some years. We have not experienced any slowing up on that account. The last accident we had, a man lost his life riding the front footboard of an engine going about four miles an hour. He attempted to get off and the cut-off lever was in his pocket. After that no more men were allowed to ride on the engine and we have all kinds of corners and things right in New York City. Nobody on the footboards.

The Strict Footboard Rule a Safety Matter

CHAIRMAN BAILEY: I think the consensus of opinion is that the strict footboard rule is a real safety matter.

MR. KELLY (Baltimore & Ohio, Baltimore): I am very familiar with that rule. We have a president that always stands for one thing and that is safety first, Mr. Willard. I want to say that our rule prohibits riding on the leading footboard in the performance of duty unless absolutely necessary to be there to do it and then his position shall be on the outside of the running rail; making switching movements from one side to the other we don't permit. We don't have any trouble and do our work safely.

MR. WARFEL: To answer a question that was raised with me I would like to say further, the man whom we require to ride the footboard is not permitted to remain on the footboard when the engine comes in contact with the cars. He is not permitted to mount the footboard when the engine is moving. It stops for him to get on and stops if he is throwing a switch.

W. R. SPETTIGUE (Los Angeles & Salt Lake R. R., Salt Lake City): About three weeks ago we had a switch engine making up a train, in a backward movement, and they knocked down and crushed the legs of one of our workers. The men were discharged for the responsibility. Our rule requires that one man must at all times be riding the leading footboard in the direction the engine is moving under such circumstances. They did not do it. Our rule also requires that only one man will at any time ride the footboard in the direction it is moving the same as the Union Pacific Railroad.

MR. COTTER: I can't agree that a man should be on the footboard at any time, neither can I agree that they should be protected. My thought is when the blue flag is lifted from the shuttle, keep all employees outside of danger, before the flag is lifted. Footboard riding is a dangerous practice and I can't see where it is any benefit to anyone.

CHAIRMAN BAILEY: We will have to terminate this discussion on account of lack of time. I am going to introduce Mr. J. E. Long, who needs no introduction, to start the argument on "Freight House Accidents and Remedies." We will ask him to step up front.

Freight House Accidents and Remedies

By J. E. LONG

Superintendent of Safety, the Delaware and Hudson Company, Albany, N. Y.

There appears to be a slight difference of opinion between the representatives and my safety colleagues in the Wabash and Hocking Valley Railroad. Perhaps you will recall that my good friend from the Hocking Valley, in introducing me, stated that I was selected as Toastmaster because I was a man of few words. Apparently my good friend from the Wabash doesn't believe him because when he asked me to lead the discussion he told me he wasn't expecting me to occupy the floor for more than three minutes. With the understanding that my talk was not to exceed three minutes I have not attempted to prepare a paper but have made a note or two on the subject I am hoping to help you with.

Instead of discussing details, such as handling freight, gang-plank slipping, falls of men and material, I prefer to touch on what I consider to be the basic cause of freight house injuries. My study of the situation has led me to believe that those injuries caused by faulty supervision are most frequent. By this I mean the failure to properly educate freight handlers in what I choose to call "safety sense." If this education in safety sense were started by the supervisor, regardless of what that supervisor's title is, at the time the employee entered the service and continued during the time the man remained in the service, we would have mighty few freight house injuries.

That is all I have to say, excepting that at freight stations where we have been able to convince the supervision—the supervisors, if you please—that this is the right method of preventing freight house injuries, we have had very few of those injuries. Unfortunately I have not been able to sell my idea to all of our supervisors.

CHAIRMAN BAILEY: I would like to afford the opportunity at this time to discuss this important subject. I think our freight house accidents are at a very low minimum. I know I saw a graphic chart of those accidents chargeable to station forces on our own line and it was very small compared to some of the others but I presume from the fact that the program committee had it placed on the program, a number of persons had requested it to be discussed.

A. B. HOFF (Erie Railroad, New York): We have, like every other railroad that has business in a large terminal like New York, this problem but far from having the experience that the Union Pacific has, we have quite the opposite. We have in the Erie, just begun to tackle this subject because a short time ago all our freight house handling was done by contract labor, so we are attacking it from sound fundamentals such as we are all agreed upon. We are putting into effect now what we hope will be a real standardized system. We have about 1,200 to 1,500, sometimes going as high as 1,800, freight handlers in the vicinity of New York. They come and go. The average freight handler stays about five to six days on the job. If he stays two weeks we consider him almost due for a pension. So you see, this is quite a difficult and quite a separate problem from our standpoint with freight handlers on our line from here to Chicago. Where we have comparatively few accidents most of them are local boys who know their supervisors, know their agents, amenable to reason, don't want to get hurt, and so on.

I am not going to take up much time except to show you that there is for some of us a very real problem. I know from talking in previous years with Mr. Carrow and Mr. Hill, they have had this problem presented to them. We have found that supervision of course is the answer where you have casual labor—just as this morning you heard of the casual labor in the gangs where they have Mexicans and so on. Supervision is the whole thing. It is difficult to instill the ideas of interest and competition although we are starting that system which I

believe they have on the Baltimore & Ohio, New York Central and Pennsylvania. We are also introducing the same methods of local safety committees among the oilers, flag-men, etc.—people more or less permanent. It must be a matter of supervision to keep men from overloading the trucks, to get some kind of ideas in their head which will improve the situation.

CHARLES E. HILL (New York Central, New York): I am not going to tell you how to avoid station accidents but I hope to get some information of value to our lines in the Metropolitan District. There is a great need of safety in the stations. In our own organization we have taken the position that there is no reason why we can't have so good a safety record in our stations in New York as we can in Chicago or any other large terminal. But we are not undertaking to be too specific. The ratios vary all the way from practically nothing. In fact we have several large stations that go months and months without an accident, with the ratio for the full year of only one casualty for a million man-hours. We take the position that it matters not what conditions are, we have to meet them. Those of us in the safety work day in and day out, know what the fundamentals are that produce real results. One of the difficulties we have here in the Metropolitan district—this is not an alibi, but is one given to us—is men mostly are floaters. They may not be working under their right name or the proper address. They disappear from the face of the earth. You are unable to locate them. I would like to hear from those who have this problem, particularly in the Metropolitan district of New York. If they can give us any solution you don't know how happy we will be for we are in a real dilemma, so far as station accidents are concerned.

MR. HARTENSTEIN (Lehigh Valley R. R.): I will only talk concerning the Metropolitan district here because in our other large freight terminals we have very few terminal injuries. The forces are regular and old experienced men. For illustration at Piers 8, 34 and 166 in New York City: We have regular forces to some extent at all three of those piers, but there is a certain turnover every day and that turnover consists of new men, and it is among those men that personal injuries occur. We very seldom hear of an injury to any of our old employees. Our agent or freight manager on these piers will get a report in the morning as to the amount of incoming freight and of course you can't tell about the amount of outgoing freight; but he places the number of men required upon the report of incoming freight received in the morning. He may need several more gangs than his regular force and as I said before, it is among those fellows we usually have personal injuries. We have no difficulty with our foremen. They are all sold on the safety movement and do all they can to keep men from getting injured.

CHAIRMAN BAILEY: The labor turnover is the main factor. I believe it is a matter that representatives should get together on and work out. It is a matter of supervision.

JAMES PRATT (Reading Company, Reading, Pa.): We have made greater reduction but I believe that the two committees working together, the freight claim and the accident prevention committees are making that reduction. I would say that we have more than twice the reduction with the freight handling than we have with any of the other occupations but we do have trouble where we have contract labor, by tonnage. That is under our men too. They watch but they do destroy freight and injure each other. We have more trouble with that class.

MR. HARTENSTEIN: I want to say we have contract labor too in Jersey City but those forces are pretty regular too and we have very few injuries among them. Once in a while we have one. The handling of freight there is on a tonnage basis and the contracting, too, the railroad company is held responsible for it.

CHAIRMAN BAILEY: The next subject is a subject interesting to railroads centering here, "Marine Accidents" and I presume they have a relationship to your accidents occurring in freight houses. I am going to ask Mr. A. B. Hoff of the Erie Railroad Company, New York City, to come forward.

Marine Accidents

By A. B. HOFF

Manager of Safety and Employment, Erie Railroad Company, New York City

Are there any marine superintendents or gentleman of a slightly different title here? If so I would like them to come to the front. There were nine marine superintendents, head of marine departments asked to be here today. I don't know whether any of them are here or not.

The question of Marine accidents is also covered by the Marine Section which is meeting simultaneously with our own. There are two classes of Marine accidents, one of which might interest railroad men such as we are, and the other which interests solely, marine people; that is the accidents that occur solely from the operation of the ships, tugs, lighters, etc., in their capacity as floating equipment; ferry boats and others which interest us in the handling of freight and their contact with floats, bridges, docks and other places where they meet the railroad.

Now, there is to some extent very little to start this off on. Examination of our marine accidents, both those reportable and those of which no time is lost, show the largest number come from very much the same causes that we have on the docks among our stevedores and freight handlers—slipping, falling, stumbling and so on. That is magnified when you get in contact with floating equipment. You then have the added hazard of water—I mean water on the deck, not water in the river. On a dry day on shore it is often wet on the ships, especially low ships where lines and so on are being slapped over the decks. I might say, I was a sailor by trade before I became a railroad man, and that is one of the reasons they pinned this to me. However, I find we have such accidents in our marine equipment as being hit with lines, hooks; falling into frog plates on the decks, bumper plates; getting caught between the float and the car; rails breaking on a tug or lighter; a man falls from the next deck below and catches his hand between the line and the bit making it fast; closing a door on thumbs, which might happen in any place.

Then we have planks breaking between the ship and the shore. In those cases we don't have these plates. We had one man washing windows on a ferry boat in mid-stream. I question the advisability of that, while moving; I don't think it will occur again. The variation in those accidents could be carried on and on in detail for a considerable time, but in the main and essentially they are the same. They come mostly from the slipping, handling of lines, falling down between the floating equipment and the dock or between two lighters; and the answer to that is clearly, get better supervision.

To get better supervision is a favorite alibi where you are handling a lot of men but it is the only thing you can do. In other words where we are handling casual labor, such as we do on the docks and such as we have among the stevedores, not among the crews of these vessels but among the stevedores. It has got to be supervision and the supervisors are the ones that have to learn to do it right. They can't use the same kind of supervision or the same degree of supervision or the same amount of effort that they do where they have men that are with them day in and day out, know their ways and carry out their routine performance of duties. They must use more and greater effort and that is the message I am personally going to bring to my marine department. I have already brought it as far as that. I am speaking of accidents connected with the operation of the marine department. That is of course, not marine employees in all cases.

We have our dock stevedores, passengers, etc., and dock stevedores come under Class 5 the same, as marine employees do, but the answer is, as far as I can see, greater effort and a more intelligent and intensive performance on the part of the supervisors.

The physical characteristics are generally good on all floating equipment. Men

had been going to sea hundreds of years before they ever went on railroads; and people in the seafaring end of life had been handling the safety question and putting it forward in prominence long before we ever heard of a railroad. So that end is not a menace as a rule. It is what people do around docks, the way they behave and in handling freight, etc., on or off floating equipment.

MR COTTER (Erie Railroad, New Haven): In talking about marine accidents I have noticed around New York Harbor a tug boat captain has the habit of trying to get a boat into a narrow space where there may be 75 or 100 men working. They have no knowledge of the tugs coming in and the tugs hit the dock whereby the laborers are injured. Furthermore, there have been accidents due to unloading and loading cars from floats when tide is too high or too low. Cars become uncoupled, and that is a case where I believe people should eliminate the handling of floating equipment during such tidal conditions. I think that has something to do with our friend from the New York Central. We have about 300 men on our piers in New York and we don't have many accidents. We aim to notify them before the arrival of a tug boat coming in to pick up a float or lighter to move away from that point.

C. W. HAMMOND (New York Central, New York): I would like to ask Mr. Hoff how many men he has in the marine department and if he is showing a reduction of accidents in the marine department?

MR. HOFF: We have about 800 men in the marine department, and I can't say we are showing a reduction, because we don't have many accidents among the marine employees, that is reportable accidents. They run all the way from none in a month, or a bad month, five. But, we have a number of accidents that don't lose time. One or two cases affected passengers, such as slipping while getting on or off a ferry boat. That is what makes it difficult to check up on this subject because the accidents we have are hardly marine accidents. They occur to people in the marine department.

REGINALD FEY (New York Central, New York): As the marine superintendent of the New York Central and having at one time served my apprenticeship on a tug boat, I am quite familiar with those conditions. The only thing about the accidents in handling a tug, is that on railroads you do not have that tidal condition and there is a little bit more motion on tugs in the river than a freight train in the yard. But the handling of lines in bad weather, I mean snowy, wet weather, when you can take five or six turns on a nigger-head and they won't hold; slipping on the decks, breaking of lines and getting caught between the barge or float or whatever it might be—these weather conditions make it rather perilous and in some instances we might have more accidents due to those causes than otherwise. But in the handling of heavy equipment such as the railroads are building today; for instance, a float 366 feet overall; and the wind blowing hard, say 47 miles per hour, we don't operate much after that period; it is rather perilous and you have got a good deal to think of both from a personal standpoint and accidents that might happen to other equipment. So I think the conditions on the river in New York Harbor are at times rather strenuous.

MR. HARTENSTEIN: We also have several men in our marine department and our friend from the New York Central and Erie has described the marine hazards which occur and there is very little difference. However, we do maintain a marine department safety committee consisting of the assistant superintendent of the marine department who is chairman, the captain, engineer and deck hands, and we cover pretty close to every department on that committee and they are working very conscientiously in keeping down accidents.

CHAIRMAN BAILEY: I think some committee should make a study of this subject edifying to the Steam Railroad Section and also to the marine section.

W. W. FULLER (Seaboard Air Line, Savannah): I only want a minute. I would like to ask Mr. Hoff as to the clothing worn by the men in their work.

We operate tug boats and frequently have accidents on the Seaboard due to improper clothing and I would like to know something as to what requirements they have in safe clothing, shoes especially.

MR. HOFF: I am not the marine superintendent, I am manager of safety. I don't know except that I see the men and I don't notice the clothing being any different from anybody's else around the docks. In looking over the accidents of the past year I found no injuries or accidents that had any reference to the clothing worn. These sailor men know pretty well what to wear. They know they must be warm in cold weather.

CHAIRMAN BAILEY: We will have to terminate this discussion. The next subject will be by Mr. Z. B. Claypool, St. Louis, San Francisco Ry. Co., Springfield, Mo. We will ask Mr. Claypool to start off this discussion.

Falls in the Mechanical Department

By Z. B. CLAYPOOL

**Assistant Director, Accident Prevention, St. Louis—San Francisco
Railway Company**

The Interstate Commerce Commission's "Accident Bulletin, No. 96," for the calendar year of 1927, shows that on roads of all classes, 51 deaths and 6,693 reportable injuries occurred from falls of employees in non-train casualties.

Just what percentage of this number of casualties is chargeable to falls from elevations, we do not know, but believe the majority are from that source, with the temporary scaffold one of the chief causes.

A great many of these falls could be eliminated by adopting the policy of moving the job to a permanent scaffold instead of taking a temporary scaffold to the job. For example, the car department repair track, where rebuilding is done, the work can be specialized and handled on the progression system in much the same manner as an automobile is built. Start at the head end of the track with the truck rebuilding gang. The trucks when rebuilt are moved on down the track to the workers who apply the car sills, from there to the carmen, who do the framing, with their permanent scaffolds necessary for such an operation, and so on down the line until the car is rebuilt by the time it reaches the opposite end of the track from where the first operations began. The workers have remained in fixed locations and performed their work in less time and with greater safety as the job and material was moved to them. We have adjustable permanent scaffolds in our coach repair shops and coach paint shops. Why not on our freight repair tracks?

We can never entirely eliminate the use of, or the necessity for, the temporary scaffold, but any temporary scaffold can be made safe. The average employee, however, seldom uses the time it takes to make a temporary scaffold absolutely safe, and that is where the supervision must step in with education and discipline, if necessary.

Falls from stepping into depressions, such as cinder pits, engine house pits, or air and steam line hose connection pits in train and repair yards, are all too frequently a cause of personal injury.

Some pits may be amply protected with iron fences or railings while with others it may be necessary to cover them entirely. Pits which are covered should have the covers as light in weight and as small in sections as possible to equal strength requirements. This will insure better and quicker replacement when job is complete for which pit covers were removed.

Pits in train yards with removable covers are not sufficient protection, since the cover lids may be left open or thrown to one side. The standard on our lines is to have such lids flush with the ground, hinged on one side with a

short chain underneath the side opposite the hinges. This chain to be connected short enough that lid can be opened less than half way which will make the lid self closing when pit is not in use. All lids of these pits to be painted white so they may be more readily seen at night.

Falls over obstructions such as scraps or misplaced material as results from bad housekeeping in or around shops is a direct reflection on the supervision even though the injured person may have appeared to have been careless. The foreman who keeps a clean shop and has for his motto: "A place for everything and everything in its place" will not have injuries of this type charged against him.

In conclusion, how are we, as organized Accident Prevention workers, going to reduce this number of 51 killed and 6,693 injured last year due to falls of employees on American railroads? Briefly: first—by sufficient and efficient scaffolds, second—by safeguarding openings, and third—by clean housekeeping.

CHAIRMAN BAILEY: That is a very good presentation of the subject for discussion. Is there anyone wishing to discuss this matter?

MR. CLAYPOOL: I would rather you would waive the discussion of this and take up the time left for Safety Contests. I would be perfectly agreeable.

CHAIRMAN BAILEY: Does anyone wish to discuss the subject on the program? If not, we will give the time to the discussion of Safety Contests. This is a very important subject, a matter of vital interest to many of the railroads and I am going to afford you this time to ask questions.

H. W. HUDGEN (St. Louis, San Francisco Ry., Springfield, Mo.): The gentleman raised the question about his contest giving out. I just want to tell you briefly about our experience. In 1926 our president put out two plaques. One for the mechanical department and the other for the maintenance department, won each quarter by the superintendent or division having the least number of accidents and the same as to the mechanical job. We have been running that contest almost two years and we have just as much enthusiasm at this time as we had when it started. That is all.

MR. LAUTEN (Gulf, Mobile & Northern Ry.): We have, from time to time conducted these thirty and ninety day contests but we found that after they closed, the interest began to lag and eventually we go back to the same old rut; so on June the first of this year we inaugurated an all year round campaign. Now, on our road a safety contest begins at the top. The president, general manager or vice-president is the leader but while the foreman is the key to the situation, we have established a fair rating for the ranking of each foreman or supervisor. Every injury is reported regardless of whether time is lost or not. For every hour or fraction of lost time, one point is charged against that foreman, supervisor or trainmaster and against their records. Two hundred points is the maximum to be charged against any injury; of course that includes a fatal injury. The standing is published monthly and includes cumulative figures as well as those for the current month. This provides a means whereby the trailers can eventually come back as leaders.

Since May 19th of this year we have not had a single reportable accident or injury to an employee on duty. I will qualify that. From May 19th to September 28th, we did not have a reportable injury. That one September 28th was due to pure carelessness. A colored section laborer started to get on a motor car from the side, violated instructions and broke his leg. That supervisor had come to our assistant manager just a few weeks before and said, "Mr. Brock, I wish something would happen on our division. I am getting nervous. We haven't had any injuries since the campaign began. I would like to see somebody get a finger mashed or something, it might relieve the tension."

When that was broadcast through official notices you can imagine the effect it

had on the railroad. It meant instead of a perfect record for the third quarter our casualty ratio was reduced to six tenths.

C. F. LARSON (Missouri Pacific Ry., St. Louis): In the month of July the Wichita Division of which he is master mechanic had three lost-time accidents aggregating twenty-four hours lost time for the whole division. That division has made month after month a clear record, but I think that is about the best that has been done on our railroad; the Missouri Pacific going for a whole division, thirty-one days with three accidents that aggregated only twenty-four hours lost time.

CHAIRMAN BAILEY: I would like to ask if you attribute that to the fact that you are carrying on contests?

MR. LARSON: Absolutely; and I would assure you our contest was started in the early days of 1925 and is just as acute today as it was then and I would feel a severe reflection on myself if it slipped.

CHAIRMAN BAILEY: I think the consensus of opinion is that this discussion has proved conclusively to the minds of some of the brothers that have doubted the wisdom of instituting contests on their lines, that contests really bring about results.

L. G. BENTLEY (Chesapeake & Ohio R. R., Richmond, Va.): As I started this thing, I thought I would just have a word to say in closing it, and that is, that while I would not detract from the value of a short safety contest, the whole value of it may be summed up in the perpetuity. Carry it on year after year and the longer you carry it on the more lively it will become if you inject the proper spirit in it. I appreciate most sincerely the discussion of this subject which, as I said this morning, is paramount in so far as carrying on safety work is concerned. Your discussion has stimulated me and I have enjoyed it all.

JAMES PRATT (Reading Co., Reading, Pa.): We are sending circulars to the section men twice a month giving them the standing of all the divisions.

MR. HARTENSTEIN: I started this discussion on the length of time the contests should be conducted. I don't want the men to understand that I don't favor these contests, for I do. I think they are a mighty fine thing but the length of time was a large question in my mind and I am glad to have the information I have obtained.

CHAIRMAN BAILEY: The time has now come when we must adjourn and I will turn the meeting back to Mr. Long, the Chairman.

CHAIRMAN LONG: I am going to use my prerogative as Acting Chairman this afternoon to give a thought to our friend from Frisco which may help him. We have monthly meetings of our supervisors in the maintenance of way department; monthly meetings of safety. What I mean by the supervisors, are the divisional engineers who are chairmen; our bridge and building men, road masters, our railroad and track supervisors and the general foremen on that division having the larger gangs. To those meetings we invite four or five track foremen. Different foremen every month. Now, the way our message is carried out to the foreman on the job in the outlying points is through the track supervisor, the road master, the bridge and building master and his assistants. In addition to that, these foremen who are brought into the meetings, for instance, this month are at the meeting for a sufficient time until they give their ideas of what the track foremen should do to promote safety, and their ideas are embodied in a letter addressed to all foremen, after it has been dressed up a bit by the division engineer's chief clerk. If those letters would be of interest to any of you I would be glad if you would write me at Albany and I will send any of you copies of those letters as they have been coming out for the past two or three months. I hope you won't ask me to go back but I will send the current ones as they come out.

I think our track foremen today know just as much about the mechanics of safety, despite the fact that some of them are a good many miles from headquarters, as our shop foremen do.

ADJOURNMENT

October 4, 1928

E. R. COTT, Chairman

Supervisor of Safety, The Hocking Valley Railway Company
Columbus, O.

The fourth session was called to order at nine o'clock by the chairman, E. R. Cott.

CHAIRMAN COTT: We have an item on our program this morning which is not on the printed program. The speaker is here at the request of a number of railway engineers interested in the safety men learning something of a problem they have. The man who is to address you is engaged in a work that is non-commercial; in other words, he has undertaken a study for the American Railway Association and the American Engineering Association in connection with train accidents due to transverse fissures in rails. The chief engineer feels that he needs some support in the campaign which will probably be undertaken before long, following a series of acceptances of a device that has been perfected by Mr. Sperry. As I say, it is non-commercial, it is something that should be of interest and which will enable you, knowing of the device, to be of some assistance to your chief engineers of maintenance of way in handling this problem on your road.

I take pleasure in introducing Mr. Sperry, who will talk to you on "Transverse Fissures in Rails."

MR. SPERRY (Sperry Gyroscope Company): I hope you will come up forward for we haven't any slides and I want to show you some pictures of queer kinds of cancer that grows inside of a steel rail. There is no outside indication of where it is; no indication of the tragic thing at all. The late Mr. Felt (I am sorry to say "late"), then president of the American Railway Engineering Association and chief engineer of the Santa Fe Railway, wished the job on me and I said, "How can I look inside of a steel rail any farther than anybody else?". He simply said, "You have got to do it."

There was a challenge and we went to it. After working some four years we found a way to look inside of a rail and when you look inside of some rails you are rather surprised at what you find. I have some pictures here. I told them if they would send me some rails that had broken in service and were therefore under suspicion I would see what I could do. I don't suppose you can see that picture. Those are fissures; we have located many. Here is the head of a rail with one of them, you can imagine the rest of the rail down here. That is *some* break. I think you can see it very well.

These things grow inside, starting from a very small thing and finally they are so nearly cut in two that the locomotive does the rest and sometimes starts out through it for a ten-acre lot. It is a mighty good thing if there is a ten-acre lot to receive it. Sometimes there is not. Here is a case (exhibiting picture) where the ten-acre lot failed to appear and there was a pile-up. Three of those have occurred this year.

These fissures have grown until they have cut the rail in two to the tune of about 5,000 of them the last year, so it is serious. The process is sort of a wireless process, we don't necessarily touch the rail, simply look at it. The committee sent me some eighty-five rails supposed to have fissures in them. One rail had no less than eleven fissures in it, and when I notified the Rail Committee they didn't believe it. I don't blame them much, because as a result of other investigations, they had seen hundreds of rails broken up and never found a fissure.

"When you come down here we will break this rail and I will show you what is in there," I wrote them. So they started from their headquarters in Chicago and gathered railway men as they came until about twenty walked into my office and wanted to know what I meant by finding fissures. "Come down to the laboratory

and I will show you. I will break a rail up and see what is in there." Before we did that we had this blue print of the rail made, showing exactly the location of each fissure and exactly the size of it. So I said, "Here is a case where you can hang me if I don't find fissures."

Well, we broke the rail up and found eleven fissures exactly as we stated we would and here are the photos of the eleven fissures on the two sheets. So we strike twelve once. Now, the funny part of it is (I ought to knock on wood) we have never located a fissure, determined its size and broken the rail but what we have found two things. First, the fissures were where we said they were, sometimes within a thirty-second of an inch and, secondly, they were about the size we said they were.

The roads have had some rather severe experiences in that line. This pile-up is a report of the I. C. C. and that is the fissure that did the trick. This poor road for that one accident was sued, I believe, for two and one-half millions of dollars. That would pay for looking into the rails pretty carefully, but there was then no way of doing it.

Now, there is a sunny side to this thing. The New York Central sent a lot of fifteen rails which had broken in service and another lot of eleven. Now, do you know that only three rails of all those pieces that came to us had fissures? These fissures, by the way, have been known to grow over night in a brand new rail, and have cut the rail in two. Then some of them take fourteen years to grow, so you can't most always sometimes tell what you least expect most in this job. Mr. Bronson of the New York Central felt that in the first lot of fifteen rails that he sent us there must be a number of other fissures. We examined them and found it was the finest steel you ever saw and there was not a single fissure. They would not believe it, so in reviewing the matter with some officials it was decided to pick out three rails of the fifteen. We re-examined them, refined the process, and absolutely found nothing there, not one-half of one per cent. Nothing in them at all. Still they wouldn't believe it.

A friend of mine has a great big steam hammer and we loaded the rails on our truck and had them broken up into chestnuts, four or five bushels of chestnuts. You bet if any fissure had been in those rails, under the method of breaking, not shearing at all, but breaking, they would have broken exactly where the fissure was. But there were none. We took photos of the pieces of rail so as to have a permanent record. So, that is the bright side of the story. There aren't as many fissures sometimes as we expect there are.

The best part of it is that we have been able not only to tell where they are but to make a record of them, making each fissure sign its own death warrant, as it were, in red ink, and the apparatus is all contained in a car which is rather a practical sort of apparatus. It is enabled to go up the track, pulled by a good, strong power hand car, about ten miles per hour. In this car there is a recording apparatus that is shown here. There is a table with a paper tape coming along that has seven lines on it, three for one rail and three lines for the other, and the middle one showing where the rail joints are; we number the rails as we go along and also squirt white paint on the side of the rail when we find a fissure. That is all done automatically, so we have a permanent record of what is inside of each rail, and the ones that have any trouble down to one per cent are marked. We can tell the size; if it is a small fissure, one pen operates; if it is a middle-sized fissure, the first two pens work and if it is a big one, then the three pens work and that rail ought to be taken out of service.

The car was accepted, as your Chairman stated, the day before yesterday by the American Railway Association and is now operating on the tracks of the New York Central. That car is to be taken and loaned six days to each of the roads in the United States so they will all get a taste of it. Of course that can't remove all the fissures, but it will show the practical operation of the apparatus that we

have devised. It so happens I am chairman of the National Research Council, Engineering Division, and it was along the line of research, as your chairman stated, non-commercial, that the work was undertaken.

I have some fissures here. I don't know that you can see them from that distance, but when they get about that size they are very dangerous. That is a smaller one and these others show them with the growing pains when they are smaller. I think you can see that fissure plainly for it is darkened. Now, then, I think that presents the matter. If there are any questions you practical people have, I should be very glad to struggle with them and see if I can enlighten you on any point I have not made clear.

CHAIRMAN COTT: There are several chief engineers of the railroads here.

W. L. ROLLER (Hocking Valley R. R., Columbus, O.): I would like a more detailed explanation of the method of detecting the fissure, if Mr. Sperry cares to give it.

MR. SPERRY: Now, your Bureau of Standards tried some eleven years, using magnetic methods, putting magnetism into the rail and expecting the deflections to tell what was in it. Such of you as are engineers know every generator and motor in the world has such a thing as an air gap: Here is a stationary field and here is a revolving armature and an air gap through which the magnetism has to pass. So, in the normal operation of a motor or generator an air gap is its middle name and these air gaps may be a large fraction of an inch. These fissures constitute a very minute air gap. Science has never known how small the air gap was until some months ago when we tried an experiment on one. Knowing exactly where the transverse fissure was within a thirty-second of an inch, we put a drill hole in so the point of the drill went right down into the hidden fissure, as you can see there. Then we put iodine in and each morning for a couple of weeks, adding a drop at a time, knowing that the tincture of iodine would go in and discolor it. Then when the Rail Committee came down we broke the rail, expecting to find the dark color, but when we broke it it was silvery like the things we have before us there, showing not one particle of the tincture of iodine could get in. Why not?

If you went into a pattern shop, took a back-saw and made a slit down in a plank and took buck shot and tried to see if the shot would drop down into the narrow slit, you would find they wouldn't. They are so large they can't commence to look at the slit even. This molecule of the halogen group, though the smallest molecule we have, was so big it couldn't squeeze itself into that little crevice. So, when you use the magnetic method, the gap is so minute that magnetism passes through as if nothing were there. That is why they never found any fissures. We use the electrical method. By that I mean we use electricity, making it pass through the rail. The contact points consist of thirty-two heavy copper brushes that pass along the rail with the car. Two thousand amperes pass through the interior of the rail. When it comes to this little air gap, even if it is only half a molecule thick as we know it is, electricity is different from magnetism which passes with perfect ease. Electricity says, "Here is an awful chasm; I can't cross it, I will have to go round," and we just catch him in the act of going around.

D. G. PHILLIPS (Wabash Railway, St. Louis): Do those transverse fissures exist in rails as they come out of the mill?

MR. SPERRY: They do not. We have just taken the system down to the Illinois Steel Company and put through 1,000 thirty-nine foot rails. We could find but little in them except shatter zones in the "A" rail of the heat. These, it is barely possible might develop into fissures later, but "A" rails having such zones, if known, need not be used at critical places on the road. Never any fissures in new rails, but possibly nuclei. You know Mr. Moore down at the Illinois State University has been conducting tests for about twelve years. It so happens that I was vice-chairman of a committee here that furnished about \$40,000 to conduct

those experiments and he has tried out many thousands of test pieces of steel. There is one peculiarity in the breaking of steel from fatigue. You understand every wheel that goes over the rail, produces a visible deflection, not only under drive wheels but every wheel, and our wheel loadings are constantly growing higher and higher. This deflection causes the fatigue. But Mr. Moore has found in his thousands of tests that many breaks occur where the flexure is not the greatest. It breaks somewhere else. Why? It is because there is some little thing in there that starts it, so we have an idea there may be some small thing in the rail that allocates where this fissure is going to be. The rail mills are giving us very good product, especially considering the fact that the roads are demanding steel that is excessively hard. If you want to know how hard a piece of rail is, give it to your foreman and tell him to put it on the planer and take a cut off it. He will come back for some very peculiar hard tools, for it is so extremely hard it is almost impossible to tool it.

They are doing their best. They are giving us superfine steel. What causes the fissures to develop? I should say fully 95 to 98 per cent fatigue after they are laid and 2 per cent allocating fault or inclusion in the rail. In rails with shatter zones this percentage may almost, on occasions, be reversed. Constant bending creates and brings about new molecular conditions of stress.

Method of Locating the Fissures

MR. HARTENSTEIN (Lehigh Valley R. R.): I would like to ask Mr. Sperry what his method will be of informing the railroads just how he detects each fissure in the rail. I may have misunderstood him, and what his method will be of displaying them to the railway.

MR. SPERRY: That car is owned and operated by the American Railway Association, involving all of the railroads of the country, and they have started out on a regular program.

MR. HARTENSTEIN: Then the car is under their supervision?

MR. SPERRY: To help you along I might tell you on this particular point that a company has been formed on advice of the roads to make some of these cars available to them for quick service, using our trained men, because we have about five thousand of these fissures occurring per year. It is a serious thing and it was thought wise to have a number of cars out on the various roads apprehending these fissures, pointing them out, as to size and exactly where they are, so that those rails having large fissures may be lifted and our railroads swept clear of these awful menaces.

CHAIRMAN COTT: I want to thank you, Mr. Sperry, in behalf of the Steam Railroad Section of the National Safety Council for coming here on our request and giving us some enlightenment on this subject. Science has here come to the aid of safety as it has in other cases and there is a possibility that the menace which is terrible so far as the railroads are concerned, is about to be brought from darkness to light.

My attention was called to this; I knew nothing about it before, by our chief engineer, Mr. Michael, who knew of the fact that the first car owned and operated by the American Railway Association was now on the New York Central lines. Mr. Phillips, chief engineer, also made a request that we hear Mr. Sperry. I am glad we had the opportunity and I wish to thank you for the Association.

We will get immediately into our program now. We will ask Mr. W. P. Mountford to come forward and present his paper.

Mr. Mountford is just recovering from an illness, Mr. Neff tells me, so Mr. P. T. Neff will present Mr. Mountford's paper for him.

Safety in the Shop

By W. P. MOUNTFORD

Safety Inspector, Pennsylvania Railroad, Philadelphia

"Safety in the Shop" may now be looked upon as an actuality whereas a few years ago this was viewed as a gigantic task. During the year 1925 the casualty rate per million manhours of injuries reportable to the Interstate Commerce Commission for employees in the maintenance of equipment department of all roads was 35.45 as compared with a rate of 19.62 for 1927.

It should be remembered that year after year the casualty rate for injuries to employees reportable to the Interstate Commerce Commission for all railroads was worse in the maintenance of equipment department than among any other group of employees. But it is pleasing to note that the latest figures show a material reduction in the rate for this group of employees, which is now among the best.

In view of this performance it is fair to state that accidents can be reduced and thus produce safe working conditions in the shop.

Reasons for Improvement in Rate

To effect such an improvement there must be some underlying conditions responsible so that it is necessary to set forth briefly some of the reasons, a few being as follows:

1. Increased interest and added stimulus given to safety among the officers and supervision.
2. Cooperation of the employees.
3. Definite appreciation among the immediate supervision of their responsibility for injuries.
4. Stable forces.
5. Thorough investigation of all injuries to definitely establish and place responsibility.
6. Recording injuries to employees to avoid "repeaters."
7. Appropriate action with respect to observations before an injury occurs.

We strive to instill in the minds of the supervision and employees the thought that "a report of a preventable accident is a record of failure in the performance of duty, either on the part of the employee involved, his supervisory officer, or both."

It should be borne in mind that, to a very large extent, most of the employees in the maintenance of equipment department are assigned to definite locations, making it easier for the supervision to properly control the situation, which does not obtain in most other groups of employees. Under the circumstances it is not unreasonable to expect that at each shop they should have a rate equal to or better than the average for the system.

Supervision's Responsibility

You can make all kinds of overtures to the employees for an improvement in the accident record, and you may get temporary results, but a continued and sustained performance will only obtain when the supervision fully appreciates that it is their responsibility when an injury occurs to an employee. They must further make it their duty to analyze and know their job; understand and appreciate all the conditions in their immediate department or unit that are likely to result in injury to employees.

After they have mastered this information they must not be hesitant in im-

parting it to the employees. When an employee is observed performing a duty in an unsafe manner it is their duty to promptly take corrective action to prevent an injury, but infrequently we find that corrective action is not taken until an injury has been sustained.

An illustration of this recently occurred at one of our shops. An employee in removing a peep hole plug from a cylinder, the threads of which were badly corroded, placed a grate shaking bar on the end of the wrench, the shaking bar slipped off the wrench and caused injury to the employee's foot. It is needless to state that after the injury instructions were issued stating this to be an improper manner of performing the work. In this particular instance no action was taken until an injury was sustained, which is to say, that if the injury had not occurred they would still be performing work in this haphazard manner.

We are all familiar with the usual practice of corrective action when an employee, especially machine operators, spoil material, but how lax we have been with respect to holding the supervision responsible when it comes to human wastage.

Employee's Responsibility

It should be distinctly understood that the employee has a responsibility in the prevention of accidents. When this has been fully established we should not hesitate to take the proper action.

It is the duty of the employee to accept the advice of those who have made a study of safety. When his attention is called to an unsafe practice or careless manner of performing the work he must appreciate that it is for his good and that he is the one to derive the most benefit. He should, therefore, whole heartedly assist those who are endeavoring to improve his working conditions and methods of work.

Causes of Injuries

Most of us are familiar with the general causes of injuries due to removal of guards, inadequate inspection of tools, failure to wear goggles, failure to display blue flags and many other causes which occur from day to day, but the supervision and employees need to have pointed out to them unusual conditions, many of which result in serious injury, a few being listed as follows:

- A. An employee removing brass screws from a cylinder jacket, screws badly corroded, top screw had been removed and was turning next screw, which broke off at the head the tension in the sheet causing the screw head to fly out with terrific force, striking the eye. An unusual condition not generally covered in the goggle rules but which resulted in the loss of an eye.
- B. Tool rests on emery wheels allowed to be more than a permissive distance from the stone resulting in tools jamming causing them to fly or weaken the stone. Faulty maintenance. Rests should follow the wear of the stone.
- C. Failure to properly maintain limit switches on overhead cranes, or to test them daily, resulting in the block falling on employees working on the floor, invariably resulting in a fatality. Also, accumulation of tools, grease cans, buckets, etc., on the runways. The supervision seldom go on the cranes.
- D. Overhead crane cables secured to loads or loads suspended at lunch time, cranes not equipped with rope ladders making it necessary for operator to get to stationary ladder by walking along the runway, straddling the rail.

- E. Men working under cars with truck removed, car suspended on jacks, failure to use trestles.
- F. Use of high ladders to build platforms alongside of locomotives, planks placed on top cross piece which are not provided with end stops permitting planks to slip off ladder.
- G. Working in stationary boilers without having crown valve or blow-off valves closed and locked.
- H. Stationary firemen firing boilers with roll flue curtain immediately above their heads left in an open position.

These are but a few illustrations which could be considerably increased but are given as an indication of what the supervision should look for and guard against. It is easy to determine the possibility of injury when operating a machine, but there are many other operations about a shop which does not readily indicate the danger connected with them, making it necessarily a part of the supervisor's duty to be able to visualize the possibility of danger and subsequent injury and to instruct his employees accordingly.

It is a sad commentary on shop management when serious injuries and fatalities occur before the danger of an operation is developed and instructions issued to avoid a recurrence.

Observation of Improper Practices

How many of us are aware of the repeated observations of safety inspectors and safety committees? What is the significance and what is done about it? Are we performing our duty in permitting an employee to continually work in an unsafe manner without taking action? An employee may indulge in 50 cases of carelessness before an accident occurs but when that accident does happen it definitely places the responsibility on the supervision for not taking corrective action when the observations were made.

All observations of violations of rules, improper practices and carelessness must receive the same attention and cause the same action to be taken as when an injury occurs, otherwise we defeat the very purpose for which safety inspectors, safety committees and the safety organization were appointed.

There must be some arrangement provided whereby an employee observed working in a careless manner and whose attention has been directed thereto will know that such information will not be treated lightly but that persistent violations will be charged against him and should an injury result from failure to correct a practice he must necessarily stand the consequences.

That these dangerous practices are not regarded the same as when an accident does occur is probably one of the reasons for poor records at some shops.

Minor Injuries

In the past too little attention has been paid to the large number of so-called minor or first aid cases, many supervisors directing their attention to reportable injuries. A reduction in reportable injuries is heralded as a great achievement, but it is only part of the work.

As an illustration of this an employee may have a foreign particle lodged in his eye, go to the first-aid room, have it removed and return to work. The seriousness of the situation is not considered, notwithstanding the foreign particle lodged in the eye as a result of failure to comply with the goggle rules.

This provides a vehicle for minimizing the value of goggle rules, also a disregard for safety rules in general, and lays the foundation for a more serious accident which might result in the loss of an eye.

It is not unreasonable to insist and expect that each injury, regardless of disability, shall be treated in the same manner as serious injuries are treated.

Have we been lax in our safety endeavors or have we permitted ourselves to think that scratches, bruises and laceration on a large scale are inevitable in shop operation? Where a reduction in reportable injuries has been effected it should be expected that the same appreciable percentage of reduction will obtain among the no lost time injuries.

When we fail to find such a condition the efforts along safety lines are obvious. Efforts are concentrated on the reduction of disability rather than the reduction of accidents.

Record of Injuries

Most of our master mechanics keep a daily "blotter" or running record of all injuries occurring to employees under his jurisdiction. This blotter shows the name of the supervisor responsible for the safety of the employee, name of employee, cause of injury, disability, responsibility and action taken and other pertinent information.

This information is posted daily and indicates the trend of his performance from day to day. It enables him to determine in what departments or units injuries are occurring. Should one department have too many accidents or accidents occur through faulty maintenance he is then in a position to take such action as may be deemed necessary to bring about increased activity among the supervision.

We have found this to be an excellent arrangement which has helped materially in the reduction of injuries in that it provided for immediate action rather than waiting until the end of the month for a tabulation of the injuries. Waiting thirty days to make comparisons with the previous month is too long and does not enable the master mechanic to take action to bring about an improvement in the record.

Recording Injuries

On most of our divisions a record is maintained of each injury, being posted on a separate index card. Careful investigation of injuries at points having poor records indicate that a few employees are usually responsible for a large number of the injuries.

As a result of the adoption of this method the divisional or shop people have been able to take prompt action against those employees who have proved themselves to be habitually careless or unfit for the work. These employees are referred to as "repeaters."

You can readily appreciate that an improvement will be effected when the master mechanic writes to a department head citing the poor record of an individual employee. By this method we have made safe workers out of habitually careless men and in many instances have removed men from their regular position or out of the service as being a "misfit" in the position they were holding.

Does it not seem inconsistent that we provide machinery for recording all employee derelictions with respect to poor workmanship, absence from duty without permission and many other causes, but fail to record personal injuries sustained by the employee or injury to others for which he is responsible?

As a matter of good management this information should all be recorded so that when the master mechanic reviews the employee's record he has before him the complete performance of the employee and can readily determine his natural tendencies.

Investigation and Follow-up

One of the features we stress in our safety activities is that a prompt and thorough investigation and follow-up be made of each personal injury accident regardless of nature of injury or extent of disability, to determine:

- (a) Cause.
- (b) Responsibility of employee or supervisor.
- (c) Whether absence from duty is warranted.
- (d) Whether injured person has been previously injured within, say, two years.
- (e) Whether injury was the fault of injured person or due to conditions over which he had no control.
- (f) Where consistent, supervisory officer, his assistant or someone delegated for the purpose, will accompany injured person to first aid room, hospital or home, or call upon injured person, if necessary to ascertain facts.

In conducting investigations they should be inaugurated with the sole view to definitely establishing the cause and responsibility without regard to whom it may affect. The management should be willing to accept their responsibility just as readily as they are to carelessly charge them to the employees.

I say "carelessly" advisedly. Statistics have been presented showing that approximately 85 per cent of all injuries are due to carelessness, indifference, thoughtlessness, ignorance and many other causes and supervisors, safety agents and others have grasped at these causes in fixing the responsibility. Many illustrations could be cited where the responsibility was placed upon the employee under the above causes when as a matter of fact the supervisor failed to visualize the danger connected with the operation or through failure to properly instruct the employee. The following illustrations will emphasize the point:

An electrician was working on the junction box of a multiple unit car, with trolley removed from wire. A helper came along and replaced the trolley pole resulting in the electrician being shocked and burned, sustaining approximately 60 days' disability. Since the accident positive correcting action has been taken which I am sure will remove any possibility of a similar accident. In this instance responsibility was placed on the helper. But the basic cause was due to failure to visualize the possibility of injury by the supervision through lack of coordination long before the injury occurred.

A gang foreman and a number of employees were riding on a motor car, the gang foreman leaning on the front guard rail. When they reached the point of work an unauthorized employee reached over and applied the brake, throwing the gang foreman forward with the car passing over parts of his body. Several fractures resulted, the employee losing approximately 90 days. In this case the responsibility was shown as that of the gang foreman's, due to weakness of the guard rail, but nothing was done with the employee who applied the brake which induced the accident. If the brake had been applied by the operator gradually as he was accustomed to rather than suddenly as by the unauthorized employee, it is doubtful if the rail would have given away.

The desired result will not obtain if the investigations are held in a perfunctory manner and responsibility placed without regard to basic causes.

At many shops, it is the practice for the department head or his assistant to accompany the injured employee to the dispensary. This gives him the advantage of first hand knowledge as to the seriousness of the injury and also information as to whether loss of time will result.

One advantage to be derived from such an arrangement is the effect of responsibility placed upon the supervision. It also arouses his interest in safety and causes him to take prompt action on observations of unsafe practices, thus

reducing the number of trips to the dispensary. This has been found to be very successful and is now employed at other shops on the system.

Conclusion

We have found nothing cumbersome in any of these methods, all of which have been tried and proved practical and the adoption of these methods will tend to greatly reduce the number of accidents and gradually reduce the amount of time now employed in the preparation of reports, investigations, etc.

We should not direct our efforts solely along the lines of reduction of disability but concentrate on the reduction of injuries which, when accomplished, will bring about the former. Thus when accidents are reduced to a minimum it will not be necessary to reassign forces, conduct investigations and other actions which will then permit the supervision to apply more time to productive efforts.

In presenting this paper I have done so with a view to avoiding generalities and theories, actual conditions and experience being more productive and convincing and the results indicate that we are arriving at the solution of the problem.

We do not feel that we have any secret formula or control the panacea for this trouble, realizing that many other shops on other railroads have equally as good a record, but I have simply talked about methods which we know have produced results.

Something About Repeaters

CHAIRMAN COTT: Thank you.

MR. WALSH (Missouri Pacific R. R., St. Louis): May I have just a moment? I would like to stress what the gentleman brought out about repeaters. We are keeping a card index of our trainmen and engineers, our shop men, and our section foremen and we have found it to be very beneficial. For instance, after we started this card index system, going into the records of engineers who had had accidents on crossings, we found one man would have six or eight accidents in five years, while the man running opposite on the same run didn't have any. We get from the claim department a statement of every settlement made with an injured employee or others and we keep that and add the cost on this card to this engineer, charge him up with \$1,200, \$1,500 or whatever the claim amounts to. When he has another accident we furnish that record, giving the amount of money the company paid out by reason of this particular man and add it all up for the benefit of the Superintendent and General Manager. When they see the amount of money paid on account of this one man and we call their attention to the other men on the same run not having trouble, they go after this particular engineer pretty strongly.

There is something wrong where one man is doing all the damage and we have found one particular man who had killed eight or ten people in five years and cost the company something like \$35,000. That was several years ago when we developed that and in his case it has resulted in his not having any accidents in the last two or three years. It is not hard to keep this index record. One foreman will have six, eight or ten laborers injured in the course of two or three years. We give that to the District Engineer, to the Superintendent or the Roadmaster. In other words every accident that comes to our office—we go to the card index and keep the Superintendent advised on what is going on. You might say the Master Mechanic should do it himself. They don't do it. They lose track, in the course of their work, of the offender. A brakeman may be injured once a year and the total claim payments made to that particular brakeman amount to nearly

as much as his salary. That is valuable information for the superintendent and it points out very clearly that that particular man is an offender.

Something ought to be done about it and they do it in that way. They keep close tab on those men that are getting injured so a repeater is called to the attention of his Superintendent in such a way that we have found it to be very beneficial and the work is not particularly hard at all. It is easier to keep that up than you might imagine and it is very, very good.

CHAIRMAN COTT: Thank you, Mr. Walsh. We also keep such a card index system for the purpose of locating repeaters on our road but I would be rather inclined to doubt the advisability of keeping such a record. I wouldn't feel the responsibility entirely theirs, I am quite sure.

The Power of Imagination and Vision

I want to go back just a moment to Mr. Mountford's paper. Mr. Neff, as a pinch hitter made a home run. I was thinking, as he read the paper, of the need, so far as all of us are concerned—and it implies just as much to myself as the rest of us—for the visualization of things that may occur. In other words, for the power of imagination and vision. You know, a child imagines things and one of the most terrible tragedies is to have a parent who feels whenever his child has had some kind of a dream and imaginary vision that he ought to put his foot on it. It is only by imagination that children learn and grow, and if we stifle that power in a child we stunt the growth of a man.

I recall an accident a number of years ago in which we followed the usual procedure by learning all about it after it occurred; when, if someone had taken a few minutes to study this one particular man's tour of duty and had some power of vision and imagination, they might have foreseen what eventually happened and therefore prevented it.

We had in the yard certain inspectors and oilers on one side and an oil house on the other, and there was a certain gentleman's agreement among ourselves, that when the trick went on duty they would furnish oil through the next trick; and it so happened that the first trick got the day, the second trick secured the next day and so on. They all had their turn. It so happened that the third trick, of course in the middle of the night, had to cross through a repair yard at about an hour when the blue flags in the locks were removed and the engine crew was taking the repair cars, coupling them up and putting cripples in the repair shop. A man was coupled up between two or three of these cars, the father of something like eleven children—I have forgotten just how many. But after that accident occurred we saw the picture very clearly so arrangements were made by the master mechanic to send this oil across to the other side of the yard in the day time when the movement could be done with safety.

Now, if someone among that particular force had sat down and reviewed the tour of duty of that one particular man, had had a little power of vision, a little foresight with a long view, that man might still be in our employ.

There is need of foresight on the part of supervision, and on the part of the safety men. Sometimes we are accused of looking ahead at things that never happen, of harping on a thing until it does happen; but I don't think the power of suggestion is going to cause very many accidents while the lack of foresight and vision, imagination, or whatever you want to call it, is the cause of a great many accidents.

I think that was an excellent paper of Mr. Mountford's. I recommend it to you for study.

The next subject will be handled by Mr. W. L. Butler, chairman of the Engineering Committee of the Hocking Valley Railway, Columbus, Ohio.

Safety in the Maintenance of Way and Structures Department

By W. L. ROLLER

Chairman, Engineering Committee, The Hocking Valley Railroad Company, Columbus, O.

In a very true sense, the safety work in the maintenance of way departments of American railways ante-dates the present safety movement a great many years. In fact the element of safety of operation of freight and passenger trains entered as a primary consideration into the construction and maintenance of bridges, roadbed and track from the very beginning. It has been the continuing and ever absorbing aim of the maintenance man to provide a good "factor of safety" in structures, equipment and roadbed over which his jurisdiction reaches.

This aim has involved no little effort on the part of the maintenance engineer. With the rapid growth of population, the constantly increasing demand for transport of freight and passenger, has come a phenomenal and almost incredible increase in size and weight of locomotives and cars, while at the same time greater speed in the movement of trains was demanded that the railroads might cope with their growing business. This constant change has required the development of a technique in an engineering way which, in its growth and its effectiveness, is as unique as the growth of the railroads themselves. It has involved study and research into the bearing power of soils, the ultimate strength of materials such as wood, stone and steel. It has led to the development and further refinement of concrete. This demand carried the engineer far afield in the realm of metallurgy in order to discover suitable alloys for specific uses where strength, lightness and durability might be combined; the proper ingredients in steel rails producing the requisite hardness without being brittle, the necessary ductility without being too easily deformed.

The question has always been an economic as well as a safety problem, requiring the engineer to produce a safe result within certain economic limits. This has been productive of a highly technical, but very reliable fund of information bearing upon all sorts of materials and properties of materials, the use of which is so productive of good results in the widely heralded safe operation of railroads. We have come a long way in the matter of material safety in the operation of railroads and nothing should be allowed to interfere with the continued use of the knowledge gained over the past or the continued research to insure even greater safety to life and limb of railroad employees and the traveling public as well.

It should be at once the privilege as well as the duty of the engineer through the knowledge he has acquired and will acquire to provide better materials for railroad use; improved appliances for the execution of work and perfect methods of operation; design and construct better roadbeds, etc.

The results of the experience developed and the value of the research in matters of material safety is best attested to in the marvelous record which is now being made in the operation of passenger trains on the railroads of America today—a record which shows that it is safer to travel by rail than to pursue many of the so called safe occupations.

There is a tendency oftentimes to cheapen the quality of materials which enter into the construction of railways, to compromise in the purchase of equipment and tools with which the work of the railroad is done and with which the worker has to work. Cheap or shoddy tools have been responsible for a great proportion of injuries to the maintenance of way worker. It should therefore be the aim of those responsible for the maintenance of railroads to use every effort to find the tools best fitted for safely doing the work and then insist that they be purchased or other-

wise provided. This is done usually by proper specification. The wholesome cooperation and coordination of the purchasing and using departments will go far to reduce the number of personal injuries among railway workers.

We have been emphasizing the material phase of safety work on the railway, the material safeguards which the company and its responsible officers throw around the worker, the traveler and even the trespasser, but there is another phase of safety work which, to my mind, far transcends the material phase. It is that phase which finds lodgment in the mind, yes, in the very soul of the worker himself. This phase of safety work depends upon the mental and moral fitness of the maintenance of way worker as well as his physical fitness. The continued success and progress in safety work and the reduction in personal injuries will depend very largely on the mental and moral attitude toward the idea assumed by the railroad employee, whether he be in the shop, on the road or elsewhere. Progress will be commensurate with the degree of enlightenment brought by the various agencies to the mind of the average worker as to the true aims and significance of the safety movement. The frame of mind of the worker brought to bear upon his work, his enthusiasm for his work, his loyalty to his employer, his confidence in his superior officers, all have a direct and potent bearing upon the future safety record of his department and the railway as a whole. While we are not ready to assert that right living always goes hand in hand with safety, yet we have learned that right mental and moral attitudes in the worker are the best known preventives of personal injury. The man who is mentally alert, wide awake, interested and enthusiastic, rarely contributes to the personal injury record but on the other hand is one of the greatest assets in the matter of accident prevention. He is the nucleus about which the safety movement is to grow and wax strong. He has been set right on the very fundamentals of safety. He has achieved the true safety view-point and one may be well assured that the other essentials will follow.

Stress the Education Idea

A great deal has been said about the progress of safety work in the future depending upon education in safe methods and practices, and rightly so. Too much cannot be said about the cultivation of habits of safety but it seems to me that the first essential is the development of an incentive to "safety first," the desire, if you please, to live and to live greatly, even nobly. With this incentive developed among your workers, it will only be a mere matter of form or routine to teach them safe methods and practices, in fact, these things then come as a matter of course.

How is this to be done? How are we to create this moral and mental attitude? How are we to enlist the loyalty and enthusiasm of our employees? How are we to arouse their undivided interest in the safety idea?

I find the answer to this question in many of the activities which have already gained great headway on many of our railroad systems, namely, the organization of health and recreation departments through which employees and their families are encouraged to participate in wholesome social and recreational activities. One is the publication of an employees' magazine for distribution throughout the whole railroad organization. These magazines are messengers of good cheer to every railroad employee and his family. They convey the message that the railroad company is not a heartless corporation but an organization built up for the prime purpose of giving service to the public; that the door of opportunity is not shut to those who aspire to rise but in reality opens into a broad avenue for those who aspire to positions of greater responsibility and greater opportunity for service. Through this magazine the most lowly railroad employee learns of the importance of the part he himself plays in the organization, of the sacredness of his task and the importance of doing it well.

Other activities such as the younger men's movements having to do with the education of the younger men in the railroad organization, in the solutions of problems relating to railroad operation and maintenance, are productive of a better degree of understanding and will go a long way toward creating and fostering the proper mental attitude toward safety.

As regards the more specific means of creating the proper mental attitudes in the maintenance of way department, there are many ways of encouraging a more active interest and enthusiasm in the safety work as well as other laudable ventures; means by which the maintenance worker will know that the company is interested in his comfort, physical and financial welfare.

Better housing conditions, more comfortable quarters and more cheerful surroundings for maintenance of way workers temporarily denied the comforts of home will be helpful in creating a spirit of cordiality and awaken the interest of the more aloof.

Another means, the solution of which will make for a better mental attitude, is the elimination of seasonal employment as near as may be in the maintenance of way department. The work of maintenance on railways especially in this latitude may be so planned as to maintain a greater continuity of employment thus insuring to the steady reliable railway worker employment and an independent income throughout the year.

Get-Together Meetings

Great good may be accomplished in the interest of better understanding and greater cooperation by holding frequent get-together meetings of foremen for the discussion of mutual problems and to promote a closer contact between officers and men. These meetings are mutually helpful to officers and men in eradicating false impressions and creating a better *esprit-de-corps*.

There are two schools of thought in relation to the safety movement: one in which violation of safety rules is deemed justifiable cause for discipline. In this plan safety becomes a matter of coercion, the violator is penalized for his infraction of the rules. The other school depends upon the power of moral suasion to engender obedience to the safety rules by awakening in the employee an active interest in the movement itself as well as a more intelligent participation in the affairs of his organization. I think no one can deny the right of an organization to penalize any of its employees for damaging or otherwise putting in jeopardy the most valuable of their assets, namely their man power. But it seems to me that more will be attained and the movement will go farther and do more for the eternal good of man when pursued on the principle of voluntary cooperation, rather than on the principle of compulsory participation. By the one you achieve your material ends but neglect the spirit; and the Good Book says:

"Man does not live by bread alone but by every word that proceedeth from the mouth of God."

CHAIRMAN COTT: It wouldn't be polite of me, I don't believe, to express how good a paper I think that was. I think it is, so I won't say anything more about it.

The next number on our program is to be given by a man from a busy, busy terminal, from a city in the State of Ohio, where there are twelve or fourteen railroads: It is a busy town and he represents one of the busiest railroads going through that town—Mr. J. H. Spooner, Terminal Trainmaster, New York Central R. R., Toledo, Ohio.

Safety in the Yard

By J. H. SPOONER

Terminal Trainmaster, New York Central Railroad, Ohio Central Lines,
Toledo, Ohio

Let me say at the start that it strikes me as being rather out of place for a transportation officer to attempt to tell a group of men, many of whom have made accident prevention on railroads a life study, how to prevent personal injuries, and from the subject assigned me do not believe I should do that, I will endeavor, therefore, to confine myself to the experience gained in furthering the safety movement on that part of the New York Central terminals at Toledo, which I have the pleasure of representing.

To give you some idea of the scope of our operation I might say that during the year 1926 we handled a total of 1,497,554 cars; in 1927, 1,514,380 cars; and in 1928, to October 1st, we have handled 1,032,000 cars. During the lake shipping season about 25 per cent of the total cars handled consist of lake coal, each of which is handled from two to four times. The daily car handling runs from 4,000 to 6,000 cars; including crews engaged in transfer service we work from 50 to 60 eight-hour trick engines daily; the total capacity of the several yards is approximately 7,000 cars; an average of approximately 22 trains are made up and moved out onto the road daily and about the same number are received from the road and classified either for connections, or in the case of lake coal it is grouped according to lake consignee, of which we have about 75 at the present time, and held for arrival of a boat to handle a particular grade; the above in addition to approximately 14 transfer runs handling interchange business from and to the yards of our connections. We also operate a coal machine dumping approximately 600 cars daily into boats for movement to the upper lake ports. Aside from the above, of course, we have an engine house, car repair branches, and the various other auxiliaries which go to make up a terminal of this size.

We in railroad service, and especially the transportation officers, usually refer to the Book of Rules as our Bible. The first rule in that book says "Safety is of the first importance in the discharge of duty;" Rule 107 says "In case of doubt or uncertainty the safe course must be taken;" those two rules if followed literally will accomplish the results which this body is striving for, although it has been truthfully said that every rule in the Book of Rules is a safety rule.

Safety Committees

In my judgment every terminal of any consequence should have a safety committee; the local heads of the different departments should hold membership on this committee, and, of course, the rank and file from the different departments should be represented. At Toledo we have a live, wide-awake committee, of which I have the pleasure of being chairman, and feel this committee has been largely responsible for any small measure of success which we may have accomplished. There are approximately 750 employees under the jurisdiction of this committee. To secure success from a safety committee it is of the utmost importance that the chairman should have the confidence of its membership; you men who have advanced from the rank and file are familiar with the feeling that exists toward an employee who reports another for an infraction of rules. In an effort to overcome this feeling I have promised the membership of our committee that discipline will not

result from any reports of unsafe practices made by them and this has brought good results, although there is still hard work to be done in this direction.

It is almost unbelievable, to one not familiar with the facts, to understand to what extent railroad employees are criticised by their fellow-employees for reporting infractions of safety rules; however, I am glad to say the officers of the Brotherhoods are helping me in every possible way to break up this feeling. Too many men when appointed a member of the safety committee get the idea that their job is to find all the unsafe conditions that exist without giving much thought to the unsafe practices indulged in by their fellow-employees; and yet safety statistics tell us approximately 85 per cent of accidents are due to unsafe practices.

Another thing to be guarded against in handling unsafe items reported at meetings is the disposition on the part of some employees to use the safety committee for selfish purposes and to avoid doing some disagreeable job, although there may be nothing particularly unsafe about it. Have tried to impress upon the membership of my committee that where they observe an unsafe practice they should endeavor to correct it at once with the employee involved and if they are unable to accomplish results, to refer it to me and I have a talk with the offending employee.

Written Instructions

We all appreciate the necessity of written instructions on safety but unless these instructions are followed up and enforced on the ground nothing is accomplished. It is natural for some men to follow the course of least resistance and as some safety rules require additional steps they will not be observed regardless of all the written instructions unless we can make the men understand such rules are for their benefit. Take for example our present footboard rule which requires that the lead footboard must not be boarded while the engine is in motion, and that only one man can be on the footboard at a time, and then only on a switching lead. Many of the old timers in the past have expressed the opinion to me there is nothing unsafe about getting on the footboard as an engine approaches, and as riding some other part of the engine means additional steps when coupling onto cars or handling a switch, it was hard to enforce this rule when first established. Our answer to their argument, of course, was that while we do not have many footboard accidents—those we had usually resulted fatally. It is just as natural for a switchman, especially an old timer, to step on the lead footboard as to perform any other part of his work and after this rule was established I have actually seen men get on the footboard before thinking and then immediately get off; it did not occur to them until after they had gotten on that they had violated the rule.

This is our big problem, gentlemen, to teach the men to think before rather than after they do something unsafe. Too frequently one lapse is sufficient to remove an employee permanently from railroad service. At the present time the big majority of our men are making an honest effort to observe this footboard rule.

Along this same line take Rule 104a, which prevents fouling a switch before it is lined; we are all familiar with the practice in years past of seeing engines drive up into the switch points and in some cases spring them to avoid extra steps for the switchman. To enforce this rule we had to get the cooperation of the engineers, and while at first there was considerable grumbling on the part of the switchmen, with few exceptions the rule is being observed.

There is still some disagreement among railroad officers as to the advisability of applying discipline to enforce safety. Personally I feel after a man

has been cautioned about a particular violation by his superior officer and fails to heed the warning, he should be impressed in some forcible way that he must not repeat that violation, and if that fails to bring results he should be dismissed, because the fellow who disapproves of safety is a menace not only to himself but to the other employees with whom he comes in contact.

Handling the New Man

The problem of getting the new man started off on the right foot from a safety standpoint is a big one. Under our practice before a man is permitted to go to work he is made to understand the most important part of his duty is to keep from getting hurt. Frequently the new man tries to copy everything he sees the old timer do and in some cases tries to go him one better, and too frequently the old timer sets him a bad example. We also give the new man a letter to the conductor with whom he makes his trial trips, requesting the latter to take a personal interest in him and to show him the safe method of performing his different tasks.

A big help in accident prevention is a clean yard; draw bars, brake rigging, coal, etc., present an invitation to stumble, and to get results in this direction requires a mutual understanding on the part of all departments. To illustrate my point; while the maintenance of way department ordinarily gets no direct benefit from the elimination of stumbling hazards, unless they are willing to act promptly on the request of yard supervision to remove such hazards the accidents from this cause will be high; however, the transportation department can help itself a great deal in this direction by teaching the switchmen that the removal of such hazards reacts to their benefit. They should keep their switching leads clean by picking up small articles such as coal and tossing them to one side out of the way; also where an engine is down in a yard track and discovers a brake rigging or draw bar, it should be loaded onto a footboard by the switchman and brought out to the lead. If they wait until the section forces can get down into that track someone may stumble over it. This is especially true at night.

A prolific source of accidents in yards, especially yards where engines are working at both ends, is the practice of shoving tracks without sending a member of the crew to the opposite end of the cut to determine the amount of room. This particular form of violation reminds me of smallpox or measles, it seems to run in epidemics. About two years ago we had one of these epidemics and it was necessary to apply severe discipline to break it up; in several of the cases, however, the crew working at the opposite end of the yard laid a trap by leaving cars just in to clear. We now have a local rule which requires that in yards where engines are working at both ends cars will be left in to clear two car lengths.

Cooperation is a word which has been very much over-worked, and I might say abused, but it can be very well applied to the situation which should exist as between the operating and the medical and claim departments. It gives me a lot of pleasure to be able to say that the attitude manifested by the claim and medical departments at Toledo has been one of mutual helpfulness and they have both assisted me in every possible way in trying to improve our safety record.

The Real Loser in Personal Injuries

There are still some employees who feel the officers of a railroad are only interested in the safety movement from a selfish standpoint fortunately those who feel that way are becoming fewer every day. We agree, the railroad

loses when an employee is injured, not so much from the standpoint of claim payment but from the fact we are obliged to start a new man in to replace the injured employee, but neither of these losses compare, to the officer directly in charge of men, to the loss of a good friend and a valued helper; the real losers, however, are the folks at home.

I dislike to mention the question of hazard because every large terminal has them, and we have our quota, and off-setting the effect of these hazards is simply a question of familiarizing your men with them; however, to give you some idea of our situation in this respect I might say we have all of the ordinary switching conditions and some unusual ones. Our transfer crews make use of approximately 12 miles of a terminal switching line to enter the yards of six connecting lines and terminal men can appreciate the effort involved in educating train and engine crews to be on the lookout for all of the hazards in those different yards.

Right in our own terminal in some of the older yards we have tracks with close clearance, and that is especially true of our dock yard; but for various reasons it is not practicable to increase this clearance, and it resolves itself into a question of making the men understand the hazard is there and to be on the lookout for it. In this same dock yard we have what is locally known as our "High Buck" crews which handle coal from the supporting yard to the coal machine; these crews are working under high pressure all of the time to avoid delay to boats and on numerous occasions I have seen these boys go without their lunch to avoid such delay, and yet we have not had a reportable injury in that yard during the present lake season.

Regardless of the feeling which exists in some quarters, in my opinion safety and efficiency are synonymous. If you terminal men will check up your situation in yards where equipment damage is heavy, I believe you will also find that personal injuries in that particular yard are heavy. At times in the past I have been amused to hear some of the older men say as to a particular safety rule, that its strict enforcement would slow up the work, and then a few months later have these same men tell me their experience had shown them they were mistaken.

A good illustration of how efficiency and safety go together is represented by the situation in our dock yard. This yard has a total capacity of approximately 1,400 cars and is used as a supporting yard for feeding our lake coal machine. The lake season usually starts about the first of March and continues until the middle of December. During the year 1926 we dumped over this coal machine 4,126,673 tons, or approximately 75,000 cars, and had in that yard seven reportable personal injuries. During the year 1927 we dumped 4,616,143 tons, or approximately 84,000 cars, and had eight reportable personal injuries. During the present season we have handled up to October 1st 3,850,000 tons, or approximately 70,000 cars, and, as mentioned previously, have not had a reportable personal injury in that yard.

Selling Yourself on Safety

Looking at the safety situation from the standpoint of the supervising officer, to my mind the most important thing that officer can do is to search his own conscience and determine whether he has sold himself on safety. I am frank to say that it was not a great while ago that I really began to sell myself. I felt safety was a good thing and that we should make every reasonable effort to keep men from getting hurt, but the real problem of talking to the men at every opportunity and calling their attention each time some unsafe practice was observed escaped me, because I felt with the multitude of other duties I had not the time to do this.

This sort of attitude will not bring results and the only way we can get them is to make the safety subject one of our paramount duties and keep continually and everlastingly drilling the men on the things they must not do. Until the supervising officer can get himself into that frame of mind he is not going to produce the result which all of us hope to accomplish.

Too many of us in the past have talked safety and acted something else. It is difficult to appreciate the effect on a group of men of seeing one of their supervising officers, who is supposed to be an advocate of safety, direct, or at least permit, the performance of a particular piece of work in an obviously unsafe way with the mistaken object of speeding up operation. Safety must start at the top and come down and just the minute your men get the impression you are not sincere in carrying out the safety work, right then they lose interest; and it not only affects the men immediately involved but quickly reaches all the men in the terminal because they talk such things over among themselves, and many of you are familiar with "switch shanty talk."

Without any thought of boasting, some one has said that blowing is a function of the wind and I don't care to steal any of its force, but merely as a matter of information I might mention that at Toledo in the transportation department, with approximately 450 employees, we have not had a reportable personal injury since February 8 this year. Personally I take no credit for this showing; it has been entirely due to the efforts of the safety committee and to the efforts of the men themselves, who have become sold on the safety subject; and selling them has been pretty largely a question of convincing them by our acts, rather than by talk, that we are sincere in trying to keep them from getting hurt.

Commendation of a Trainmaster

CHAIRMAN COTT: There is a talk that I enjoyed listening to and I think every man in this audience did so. I think you will recall, some of you who saw my playlet—and I am willing to come any reasonable distance to give it—that there were two terminal trainmasters in that play. At the time I was both of them, but they were entirely different characters and I certainly have Mr. Spooner catalogued right now as to which of those trainmasters he was; and if the New York Central ever gets so unappreciative of your services, send in your application to the then chairman of this Section, Mr. Spooner, and I assure you you won't be without a job long.

We are getting along splendidly on our time but there are a few things to do following our regular program so I am going to proceed.

"Safety on the Road," by a gentleman from the M. K. & T. Lines, and I am going to let you in on a secret. He may object to it but I am going to tell it. This particular gentleman after being selected by his boss, my good friend, Mr. Walsh, proceeded to write me a letter asking me for certain information to talk about at this meeting. In it he remarked that it was all right, he could talk to the bunch of boys at the M. K. & T., but getting up here in New York was a grey horse of another color and so he wanted some kind of high minded stuff from the chairman who, he presumed, had some particularly extensive knowledge and ability, so he could talk about what the chairman had put in his mouth. So I wrote him a letter and told him what I had thought of was to comply with his wishes; but as I read his letter I saw in that letter there was a man down there of ability, and that this group up here in New York was just the same kind of a bunch of boys as he had down on the M. K. & T. and they did not want to have this man talk Cott, but talk Cole—Hugh C. Cole—to this bunch and I bet a dollar he will do it.

Safety on the Road

By HUGH C. COLE

Brakeman, M. K. & T. Lines, Smithville, Texas

To be accorded the privilege of addressing you is indeed a great honor and one that I had never hoped to obtain for I am not an orator in any degree, but an ordinary railroad trainman whose whole time and energy for the past eighteen years has been spent in the business of transporting cars, both loaded and empty, over the line of railroad by which I am employed.

Now speaking of hauling loaded and empty cars reminds me of a young fellow back home who had only been married a short while when he got into a little poker game with some of the boys on pay-day, and lost about half his pay-check. He sought to square himself with his better half by telling her that he had been handling nothing but empty cars that month, and that they were paid only half-time for handling empties, hence the small amount of money that he brought home. He would probably have gotten by with his story but his wife happened to remark to one of her neighbors that she hoped "George" would catch something besides empty car trains during the next period—and then the truth came out. The moral to this story is:—Don't play poker! But if you do, and lose, don't tell your wife that you have been hauling empties, not if you have been married as long as I have.

The subject "Safety on the Road," is such a broad one that I will not be able to cover it properly in the limited time that I have to talk, so I will endeavor to give you some ideas in a general way that will enable you to elaborate upon them in your own manner.

The first thought that I wish to give to you, and to my mind the most important one, is to read your Rule Book on Train Operation. You will note that the first rule in the book means just what it says: "Safety is of the first importance in the discharge of duty," and the next one is also true: "Obedience to the rules is essential to safety."

Our present operating rule book is the result of nearly 100 years of railroad experience. Each rule that has been added from time to time has an interesting history of its own, and if you care to go into its history and inquire how that particular rule came to be written, and adopted, you will find that it had its birth in an accident or the hazard of one, and when any rule is violated or allowed to lapse into disuse, the type of accident that caused the birth of that particular rule is liable to re-occur. Let us therefore keep this fact in mind; Resolve that every rule must be lived up to and preach this doctrine to others, every day and every hour.

Perhaps the excuse most often given for the violation of a rule is that of avoiding a delay. It is a fact that time is an important element in railroad work, and we know that delays are vexatious and costly, but we must never admit that the avoiding of delay is more important than safety.

If every supervising officer was as energetic in discovering and correcting the causes for injuries among his men as he is in investigating the causes for delays or lack of production, it would result in a certain amount of permanent good. What we need most is local officials that will comply with the rules and suggestions of their safety departments, and in turn, train, encourage and insist that their men adopt safe methods in performance of their duties.

There is an old adage which says: "As the twig is bent, the tree is inclined," and we know that if a child is trained in a certain way, that this impression will remain with him throughout life. By the same token, a new employee will retain the instructions and impressions that are given him when he comes into the service. He comes in with no habits along the line of work that he is going to do, but he is going to form them right away, and those habits will be good or bad, safe or

unsafe, just in proportion to the impressions that are put upon him at the time he enters the service. The old method of handing a man a lantern and switch key, and putting him to work, should be abolished, and instead, the trainmaster or other official employing the man should scrutinize his record closely and avoid the undesirables.

The applicant should be questioned as to his attitude on safety and willingness to obey rules. He should then be given detailed instructions and made to understand that personal responsibility should be uppermost in his mind. This will take a little time but the effect is worth it.

The student should make sufficient trips with various conductors, or engineers, as the case may be, to qualify and he must be O.K'd. in writing by these various men, who are made to feel a personal responsibility in approving him for further service.

We have a fertile field to work in when we consider the type of men who are now engaged in road or yard service. In the old days, there was little thought of safety and the fellow who got on a fast moving car or engine, regardless of the hazard or chance he was taking, was considered the best railroader. Their occupation did not appeal to the ordinary run of young men, but more to the adventurous, hardy type. Today, it is not possible to distinguish the ordinary railroad man from any other high class citizen. Many are high school graduates. Many are home owners and men of affairs in the community. What has brought about this change? Safety in railroad operation. Safety must be sold just like any merchandise. In selling goods, we educate the public to its advantages. Likewise with safety, we must educate the employees to its advantages.

Now in order that you may profit by the experience of others, I will give you a few examples of causes of injuries to men on the road, and means by which these accidents or injuries, and deaths may be avoided. Taking the figures for the year 1927, we find the cause for train accidents in this order: 1st, Derailments; 2nd, Collisions.

Causes of derailments are shown under four headings:

1. Negligence of employees—12 per cent of the accidents.
2. Defects in or failure of equipment—45 per cent.
3. Defects or improper maintenance of way and structures—24 per cent.
4. Miscellaneous causes—19 per cent.

The most frequent causes of derailments under negligence of employees were on account of switches being set in wrong position, switches run through, running off derail, and failure to latch or secure switch lever. This should impress us with the importance of watching switches more closely, to see that they are properly set at all times, switch levers in proper position, and main line switches locked. I wish to mention also under this heading, the accidents due to disregard of fixed signals. While these accidents are not so numerous as the ones previously mentioned, they are of a more serious nature.

The two outstanding causes of derailments, due to defect in, or failure of equipment, are, arch bars, bolts, etc., bent, broken or other failures, and cast iron wheels broken, overheating, or other causes, many of which could be eliminated by more frequent or more efficient inspection, thereby correcting the condition before it becomes dangerous.

The most prevalent cause of derailments due to improper maintenance of way and structures, are first, insufficient, excessive, or uneven elevation of track and improper alignment and surface of track, which accounts for nearly 10 per cent of the derailments. This condition is brought about by failure of the men assigned to this work to see that it is properly taken care of.

Broken rails is second in importance. Maintenance of way employees can, by careful inspection, detect and remove many defective rails before they break. Third

in importance is rails spreading because of joints loosely or improperly bolted, another condition brought about by improper supervision and maintenance.

The miscellaneous causes comprise 73 different headings under which the accidents are quite evenly divided.

The causes of collisions are shown under four headings, the same as derailments. The first, negligence of employees caused 88 per cent of the total collisions. This is a serious indictment of our train and enginemen on observance of rules. 67 per cent of the total number of collisions are due to switching accidents, the principal causes being failure to properly control cars or secure them with hand brakes, switches set in wrong position, improper handling of cars, or locomotives in switching or coupling, failure to keep proper lookout, absence of man on front of leading car and failure of parties supervising work to see that it is properly done.

Train service accidents: The causes of train service accidents are grouped under ten headings. The most frequent cause of fatal accidents to employees is due to being struck or run over by cars or engines, other than at highway grade crossings. This alone resulted in over 41 per cent of the total employees killed in train service accidents.

The most frequent causes of injuries to employees, and second in importance so far as fatal accidents are concerned, are due to getting on or off cars and engines. We know there is an element of danger in getting on or off cars and engines, especially while moving, and I realize that many of the accidents of this nature occurred when every reasonable care was taken by the employees. We also know that a large percentage of them could have been avoided by doing what common sense and good judgment would have suggested.

Third in importance are accidents due to coupling or uncoupling locomotives or cars. There has been so much said and written about accidents due to this cause that it would appear to be only a repetition to say more on the subject but I know from my own personal experience in train service that there is absolutely no justification for this large toll in death and injury and the large percentage of them is due to violation of rules and is the result of reckless and careless practices which the men have acquired and to which they have become so accustomed that they do their work in this manner without realizing the dangerous chances they are taking.

Next in importance is operating locomotives, and great care should be taken in getting on or off engines either standing or moving, as failure to secure a safe foot-hold or hand-hold caused 13 per cent of these injuries and almost half the fatal accidents.

Failure of mechanical devices either through defect or faulty operation, while shaking grates, dumping ash pans, operating reverse levers, etc., caused 545 injuries and the failure to give proper warning or use proper care before moving locomotives caused injury to 257 employees.

Many accidents were formerly due to coming in contact with fixed structures and while many close clearances were corrected, results were not obtained until trainmen were instructed by bulletin, time-table, and word-of-mouth, where these structures were, and a strict rule was put in force that employees must *face in the direction the train is moving* and must be alert to their surroundings at all times to avoid striking bridges, signal masts, switch stands, water cranes, platforms, etc., when riding on tops or sides of cars.

Accidents caused by coupling or uncoupling air or steam hose are eliminated by having the angle-cocks or valves closed before parting the hose with the train standing still while this is done. Care should be used in opening angle cocks to set air brakes to avoid force of air causing hose to whip and strike the man. Hand brakes and brake clubs have caused many accidents and study was made to ascertain the proper manner of handling brake clubs. I am of the opinion that the safest way is for a man to push and not pull on a club and when using the club to

place himself in a position so that if anything gives way he will fall against the car instead of away from it. In tightening up the chain he must feel it out before putting full power on the brake as it is liable to slip due to chain being knotted.

Trainmen and others should not ride between engine and cars when cars are being pushed or pulled except when necessary to make cut between engine and first car and should not ride on pilot or footboard when coupling engine to cars.

Falling off or being thrown from tops of cars has been a major cause of injury to trainmen from the beginning of railroad history. The safest place when on top of a car is to stand or sit on the running board in the middle of the car and then be on the lookout for sudden stops.

While riding in the cupalo of the caboose a constant lookout must be maintained to observe running condition of train and when waiting for other trains all cars should be inspected for defects that need attention promptly.

One of the best methods to use for this purpose is for some member of crew to stand on ground and let train be moved forward at a speed of six or eight miles per hour until entire train has been inspected. This can be done when entering or leaving sidings or when making stops to take water.

Another thing that trainmen and others riding in the caboose should be on the lookout for, is the slack running in or out, especially on trains that are moving at a low rate of speed.

The disregard of blue signals by train and yardmen has resulted in many accidents. Men must be trained to be on the lookout for these signals at all times and not obstruct the view of them. A blue signal should be regarded as though it was poison, by a trainman and should not be touched by anyone except the man who uses it for his protection.

And last but not least is the matter of employees maintaining their physical condition and in trying to keep home life pleasant, as many accidents in the past have resulted from impaired health, loss of sleep, or worry caused by unfavorable conditions. Each of us should submit to an examination at least once a year by a competent physician so that we may know our true condition and then take the measures necessary to remedy same, if found deficient in any respect. By all means get your rest while off duty so that you will be in a position to do your work in a safe and efficient manner and not be handicapped by a brain that is slow to act and a body that is sluggish in its movements.

Some of you may ask "What can I do individually to prevent accidents"? I'll tell you some of the things you can do: First and most important, you can get in the habit of thinking about your own safety and the safety of the other fellow. You men in train service can stop kicking over drawbars when the cars are about to come together; stop opening knuckles with the hand just about the time a coupling is being made; stop going between cars when they are moving or just about to move; stop mounting the front footboards of engines approaching you.

Always read the orders as required by the rules and make a proper check of meeting points with some member of the crew. When necessary to cut train at a highway crossing, a member of the crew will remain at the crossing to protect highway traffic until cars are again coupled.

When a train or engine is approaching a crossing that is obscure, the engineman will sound the regulation crossing whistle at the whistling post and then when at a distance of 600 feet from the crossing he will repeat the crossing whistle and prolong the last blast until the engine has passed over crossing.

You enginemen can get in the habit of trying the gauge cocks and not depend upon the water glass entirely. While at your work you can remember your family at home and that you have no right to do things which may cause you to be brought home to them mangled and bloody or possibly dead. They need your support and protection, but when you have been crippled for life by some careless act you will be a burden instead of a protection. We have all heard the statement so often

made by railroad men. "Oh! I'm in no danger. I have been on the job for a good many years and I have never even been scratched." Remember, that is absolutely no argument. I venture to say that out of nearly thirteen hundred railroad employees killed every year in this country, the majority have at some time or other made just that same remark, in spite of which they are today lying in their graves and their families are making a living as best they can. The fact that you have never been injured is no proof that you may not leave this meeting and go back to your work and be killed during the first hour.

Remember that it is the little careless acts which cause the greatest number of injuries. I venture to say that less than 10 per cent of the injuries on our railroads are caused by dangerous conditions, or by failure of machinery, or equipment, while the other 90 per cent are caused by little thoughtless acts on the part of the man himself, or someone who is working with him.

Every wage earner should personally and conscientiously interest himself in the matter of accident prevention, because the wage earners in this country have suffered frightfully from accidents during past years. I wonder how many of you know that each year in this country there has been an average of about two million and a half wage earners injured, more than 250,000 of whom are crippled for life, and between thirty and forty thousand killed.

It is appalling to think that in addition to this great mass of temporary injuries, each year adds more than 250,000 new cripples to this country and more than 30,000 new graves and that in all these cases the men injured and killed were among our best citizens—wage earners—valuable to themselves, valuable to their families, valuable to their employers and valuable to the country at large.

Of course, not all of these injuries occur on railroads, but the railroads contribute their share. Statistics indicate that on an average of every 19 minutes somewhere in this country a railroad man is injured and on an average of every 7 hours one railroad man is killed. Such a situation ought to be enough to arouse every sensible railroad man to his full sense of duty to help earnestly with this work of accident prevention.

I have used considerable time, perhaps too much, in my attempt to convey to you a clear conception of safety on the road as seen through the eyes of a railroad trainman, when no doubt a more experienced speaker could have told you all that I have with less words and in a manner that would be easier understood.

It may be that I have failed completely to give you an idea that will promote safety in any degree, if so I am exceedingly sorry, but you must remember that I told you at the beginning that I was only an ordinary railroad brakeman and not an orator in any sense of the word, therefore, if I have failed in my endeavor to make you understand, I can only say that I did my best, in the crude manner and with the poor language which I have at my command.

If, on the other hand, it is possible that I have succeeded in making an impression upon the mind of even one of you, by the mention of some thought, idea or suggestion during my discourse, which will enable you upon your return to your field of labor, to do your work in a manner that will be safer than formerly, and perhaps—who knows?—eventually be the means of saving someone's life or limb, then—O Glorious thought!—my efforts here today, feeble as they are, *will not have been in vain.*

CHAIRMAN COTT: If that man is just an ordinary brakeman I don't know what one is. I was down in Texas during the old war they had down there but, Mr. Cole, we do appreciate your coming here and we are sure your contribution has been appreciated.

We haven't a great deal of time and we want to adjourn on time. I asked Mr. Long, Chairman of the Resolutions Committee, if he would please come forward and present the report of that committee.

Report of the Resolutions Committee

J. E. LONG (Delaware & Hudson Ry., Albany): Mr. Chairman, because of a cold which I contracted I asked Mr. Bailey, a member of the committee, to present the resolutions and I think Mr. Bailey has them.

C. T. BAILEY (Oregon Short Line, Salt Lake City): Mr. Chairman and members of the Section: The Resolutions Committee wishes to present to you for your approval the following resolutions:

WHEREAS, Almighty Providence has seen fit to remove from our midst Thomas P. Brennan, one of the staunchest supporters of Safety on American railways, and thereby a beautiful and human character has been lost to the work in which we are engaged; therefore,

BE IT RESOLVED, that in bowing humbly to Divine Will, we recognize the departure of one of our sincere and faithful laborers whose work will unquestionably live in our hearts as well as in the annals of the Steam Railroad Section of the National Safety Council, and we express to his beloved family our heartfelt sympathy; therefore,

BE IT FURTHER RESOLVED, that this resolution be placed on the minutes and a copy be sent to his family.

WHEREAS, these sessions of the Steam Railroad Section of the National Safety Council have afforded much pleasure and provided material and inspiration which will prove of lasting benefit to those in the attendance,

BE IT RESOLVED, that we hereby express our sincere appreciation to those speakers who sacrificed their time to bring to us their valuable messages.

BE IT FURTHER RESOLVED, that our thanks be extended to the Keystone Quartette for their splendid entertainment; and,

BE IT FURTHER RESOLVED, that the thanks and appreciation of the members of this Section be extended to the officers and committees for their efforts in making this meeting so successful.

(Signed) J. E. LONG,
J. L. WALSH,
C. T. BAILEY.

(The motion on adoption of resolutions carried.)

CHAIRMAN COTT: Gentlemen, I want to acknowledge, before I call our Grandmaster up on the platform to install the officers, the services of some people who took chances, of course, when they came to my aid after I was appointed chairman. And, then to some whose services have been extremely valuable during this session. I want to tell you that Mr. McLaughlin and two or three assistants, Mr. McLaughlin and Mr. Rohweder, have taken over a rather thankless task in this registration and the sale of luncheon tickets.

Mr. Long, the vice-chairman, I might speak of him as one of the few living vice-chairmen that worked while he was vice-chairman. He has certainly been of extreme help to your chairman and I want to acknowledge his services.

Mr. Larson, here, you all know him, has been most helpful. He has worked lately under extreme difficulties due to illness, which I am glad to report is better, and I intended with his hay-fever, to have a bouquet of goldenrod on his table but I overlooked that slight feature.

The Executive Committee has been one with whom it was a pleasure to work. Some of the men were good enough to come to me following the convention a year ago and offer their services. Men that did not desire or ask for limelight but just simply had the love of work down in their hearts and who have worked during the year. Not just men who wanted to show up in front here at the session but men who were willing to travel hundreds of miles, sometimes thousands of miles, to get together and talk over some of the few problems that come to

this Chair during the session. Those men risked their reputations perhaps in associating themselves with me or perhaps, knowing my weakness and loving the Section, did not want to take any chances on the falling down of it, and naturally came to my rescue. Regardless of whichever motive it was, I am deeply appreciative, and I want to speak for the new chairman, too.

Those of you willing to work and having an interest in the work of the Section, would you be good enough to come to your new chairman and tell him you will be glad to be of service throughout this year? I speak of that because he perhaps would not care to, would not wish to, but I, singing my swan song, can do it. I hope a great number of you will give him the support you have given me.

Duff Phillips, the other day, said the chairmanship of this organization had sobered me, and now I am going to have the opportunity, very shortly, of getting down back among you and I want you to know I have never felt above you at all, but going back to my own character, I am satisfied with it, whether you are or not. But, laying all jokes aside, it has been a happy sort of year. Perhaps I have not done as well as I could or as much as I should, but nevertheless, doing what I have done has been a task of love and interest. And, so, I am going to ask now if our good friend Robert Scott, who put me in office last year, will come up this year and take the gavel of so-called authority and present it to the officers you have elected for the ensuing year. And if I, in going back down among the chairs can be of any help, I am at your service. Mr. Scott, please come forward.

ROBERT SCOTT (Atlantic Coast Line R. R., Wilmington, N. C.): I am not altogether sure whether I am to officiate as the manager of an undertaking establishment at this moment or whether I am superintendent of the Maternity Hospital. It seems that I am to assist Mr. Cott in leaving the platform and assist the new officers in coming into their new existence. I feel that I should say a few words about Mr. Cott's administration as chairman of this Section. I feel that I am qualified to sympathize with him in some of the difficulties under which he has labored, having occupied this position some years ago, and I think I express the views and the feeling of every member of this Section, Mr. Cott, when I say to you that your administration has been a success from every point of view.

Mr. Cott has handled this job as chairman, not only intelligently and efficiently, but he has handled it most courteously. In fact, Mr. Cott could not perform any sort of job in any other way.

In speaking about our meeting generally, I would like to touch upon just a few of the high spots. We sometimes ask ourselves, What do we get out of these annual sessions of the Steam Railroad Section?

For my part I am willing to take one week out of every fifty-two and spend it at these sessions because I always feel when I go back on the job I am better able to make a success of the thing that I am undertaking. I not only receive new ideas but I receive much needed inspiration. I am sure that all of us do need inspiration in our task.

One of the high spots of this meeting, to my mind, and something that has been entirely different from anything we have ever had, was the instructive lecture of Dr. Darlington at our luncheon the other day. That thing must have impressed many of us, especially those of us who have reached the age of forty and perhaps a little over; because the good Doctor told us that we had better watch our step. We can all profit by his advice and his admonitions.

Another phase of this meeting was the lecture we had from Mr. Sperry this morning about rail fissures. How many times have you ever had that explained to you as intelligently and as thoroughly as it was done here this morning?

Another thing, have you ever seen a trainmaster on this platform or any other platform at any of our meetings that went so fully and so thoroughly into accident prevention at a terminal as did our friend from the New York Central at

Toledo, this morning? I wish that we might have more terminal trainmasters like that in the part of the country where I come from.

If I might be permitted to offer one bit of criticism about the meeting, I hope it will be accepted as constructive and with the idea that we might profit by these things at future sessions. It seems to me that with so many other sessions going on, and I refer particularly to the Public Speaking Lectures of Professor Hardy, it is thoroughly impracticable to expect our members to attend a meeting at 8:30 which lasts an hour, to be here at the opening of our sessions at nine o'clock. I, therefore, recommend to the incoming administration that our program in the future be so arranged that all of us, so much in need of instruction in public speaking, may have an opportunity of attending those lectures and at the same time have an opportunity for absorbing all that is good in our own session.

We all are not Isaiah Hales, or Tom Carrows or Duff Phillips, who were born orators. Most of us have to make orators out of ourselves if we ever hope to become one. I don't mean to contend oratory is so essential in connection with safety work, but I do say that the man who is properly trained in presenting the subject of safety to the employees on our railroads has a much better chance of success, and why not take advantage of this opportunity of becoming more proficient?

One other thing that has impressed me at this meeting has been the absence of prepared papers and copies available for us to take home with us. I know from experiences, after ten years of connection with this Section, that there are many people who come to these meetings, oftentimes for their first visit and all of them like to take something back home in their pockets because our minds are not big enough to hold it all. And I recommend to the incoming administrations that they undertake to instruct those who are to present papers at future meetings, have copies for everyone in attendance. I am sure that will meet with the popular approval of everyone.

Now, we come to that part of our program where our good friend, Mr. Cott, steps down in the ranks and I know he is going to enjoy a rest from his labors. I am sure all of you will be glad to give a vote of thanks to Mr. Cott for his wonderful services and to the other officers. That has been done by resolutions but I want to see a little more demonstration of just how we feel about the services they have rendered and I would entertain a motion for a rising vote of thanks to Mr. Cott, Mr. Long and Mr. Larson, for their services during the past year.

(Motion made and carried.)

Mr. Cott, you have been duly thanked. I am now going to ask our new secretary if he will come to the platform and take his seat—Mr. Smullen. It seems our new secretary is among those absent. I will now present to you our incoming vice-chairman. The vice-chairman has been elevated to this position from the secretaryship. I think this gentleman is thoroughly entitled to his promotion because of his ability and because of service rendered to the Section, and I now have great pleasure in presenting to you Mr. C. F. Larson of the Missouri Pacific Railroad, St. Louis.

MR. LARSON: Thank you.

MR. SCOTT: I will now ask our new chairman if he will be good enough to come to the platform.

It is my great pleasure, Mr. Long, to present you with this gavel, and with this gavel the responsibility of looking after the welfare of this Section during the coming year; and I am sure that I express the thought and feeling of every member of this Section that that duty will be well performed.

MR. LONG: My friends, I don't know just what Mr. Cott meant by this sobering process and I am wondering if that is one of the reasons why you conferred this honor upon me yesterday. I have never felt I needed it but perhaps I do.

I want to say to you that I deeply appreciate the honor which you have conferred

upon me and I fully realize its responsibilities, and, realizing them, am a bit fearful. But, I will promise you that I will do the best I can to carry on during the coming year and in that carrying on I need the help of every one of you and I hope you will give it to me as freely and in as large a measure as you have given it to the previous officers of this Section.

MR. SCOTT: I think the members would like to hear from our new vice-chairman.

C. F. LARSON (Missouri Pacific R. R., St. Louis, Mo.): Gentlemen of the Steam Railroad Section: As the new chairman has said, I very deeply appreciate the honor that has been conferred upon me from the time that I came into the Section until this time. This is only the third Session of the Congress that I have attended.

At the second Congress, or meeting of this Section, I was chairman of the Program Committee and last year I was made the secretary of your Section. I do not know and will never know why these honors have been heaped upon me, on almost an infant among the men with whom I have so gladly associated.

I shall do everything I can to further the interest and to help the chairman. It was said of him that he is the only living chairman who has worked during the entire year of his office. I hope to follow that example and if the incoming secretary was here, and I don't know why he is not here to be installed with us—I want to offer him my deepest sympathy for the job he has gotten into. In my last *News Letter* which some of you did not get before you came here, I suggested that an associate editor of the *News Letter* be appointed to lift the burden from the secretary's shoulders in trying to prepare, without much assistance from the body of the Section, a letter that would be of interest. I then suggested that I would want the appointment of the associate editor to help him carry that burden. So, Mr. Chairman, I want to be of the greatest assistance to you in anything that I can, to lift the burden from you; and on the other hand, standing between the chairman and the secretary, it is my great desire to be of the greatest assistance possible to the secretary during the year that I am in between the two.

I thank you one and all for the honors you have given me. I don't know why they were but may God help me and give me the strength to carry on the greater work that I know we can be engaged in.

CHAIRMAN LONG: I thank you for the offer of assistance, Mr. Larson, and if what Mr. Cott said was true of the working vice-chairman—and I have never doubted his veracity—I assure you there will be another working vice-chairman for the coming year.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Taxicab and Fleet Owners Section

New Section Officers

- General Chairman*—H. L. CUMMINGS, Yellow Cab Company of Va., Richmond, Va.
Vice-Chairman (Bus Fleets)—RICHARD W. MEADE, The People's Motorbus Company of St. Louis, St. Louis, Mo.
Vice-Chairman (Delivery Fleets)—J. E. DOBBS, Detroit City Service Company, Detroit, Mich.
Vice-Chairman (Taxicab Fleets)—J. G. WILLIAMS, National Association of Taxicab Owners, Chicago, Ill.
Secretary and News Letter Editor—A. J. RUSSELL, JR., *The Taxi Weekly*, New York City.
Membership Committee Chairman—DALE HARMAN, Yellow Cab Company, Kansas City, Mo.
Poster and Slide Committee Chairman—CARL C. CLEMENTS, Sheffield Farms Company, Inc., New York City.
Program and Statistics Committee Chairman—W. O. HINCKLEY, The Peoples Gas Light & Coke Company, Chicago, Ill.
Publicity Committee Chairman—A. E. LUNDSTEADT, Bowman Dairy Company, Chicago, Ill.
Engineering Committee Chairman—S. J. STEINMANN, Indemnity Insurance Company of North America, Philadelphia, Pa.
Executive Committee: THE OFFICERS AND
ROBERT CLAIR, Liberty Mutual Insurance Co., Boston, Mass.
W. W. CLOUD, Yellow Cab Company, Baltimore, Md.
MARCUS A. DOW, Vander Poel, Pausner and Jefferson, Inc., New York City.
T. A. HORROCKS, Minnesota Truck Owners Association, St. Paul, Minn.
HENRY J. MINEUR, J. M. Horton Ice Cream Company, Inc., New York City.
A. F. WAITE, The Green Cab Company, Cleveland, Ohio.
RICHARD J. WALL, Yellow Cab Company, Toledo, Ohio.

Retiring Officers

- Chairman*, J. ROBERT CLAIR, Liberty Mutual Insurance Company, Boston, Mass.;
Vice-Chairman, HARVEY D. WOOD, Yellow Cab Company, Chicago, Ill.; *Secretary*, J. E. DOBBS, Detroit City Service Company, Detroit, Mich.; *Membership Committee Chairman*, J. G. WILLIAMS, National Association of Taxicab Owners, Chicago, Ill.; *Publicity Committee Chairman*, S. J. STEINMANN, Indemnity Insurance Company of North America, Philadelphia, Pa.; *Statistics Committee Chair-*

man, A. E. LUNDSTEADT, Bowman Dairy Company, Chicago, Ill.; *Program Committee Chairman*, W. O. HINCKLEY, The Peoples Gas Light and Coke Company, Chicago, Ill.; *Engineering Committee Chairman*, THOMAS B. HOWE, Aetna Life Insurance Company, Cleveland, Ohio; *News Letter Editor*, R. E. PLIMPTON, Bus Transportation, Chicago, Ill. *Executive Committee*: THE OFFICERS AND MARCUS A. DOW, Vander Poel, Pausner and Jefferson, Inc., New York City; DALE HARMAN, Yellow Cab Company, Kansas City, Mo.

October 2, 1928

ROBERT CLAIR, Chairman

Safety Engineer, Liberty Mutual Insurance Company, Boston

The first session of the Taxicab and Fleet Owners Section at the Seventeenth Annual Safety Congress was called to order at 10:30 o'clock by the chairman, Robert Clair, Highway Safety Engineer, Liberty Mutual Insurance Company, Boston, Mass.

CHAIRMAN CLAIR: It is with a great deal of pleasure that I welcome you to the first meeting of this section and to the Seventeenth Annual Safety Congress of the National Safety Council. I want to say a few words of thanks, first to the members of the staff of the National Safety Council for the wonderful help and cooperation they have given us during the past year and for assisting us in taking care of the many details in connection with the work of the section. I also want to thank those members of the section who, when they have been called upon for various assignments or ideas, have responded so generously. I want to welcome here especially the representatives of those fleets of commercial vehicles who are our guests this morning and who have participated in the great New York safety driving contest.

Our nominating committee for next year's officers will report at tomorrow's session.

We are indeed fortunate this morning to have with us our opening speaker, who has done some remarkable work during the past months in supervising the tremendous amount of detail involved in operating this Interfleet Contest, Mr. W. J. L. Banham, Traffic Manager of the Otis Elevator Company, has been acting as chairman of the Commercial Vehicle Committee of the New York Safety Committee.

The Inter-Fleet Contest as an Aid to Safety

By W. J. L. BANHAM

Chairman, Commercial Vehicle Committee of the New York Safety Committee, and President of the New York Board of Trade and Transportation

We who have been responsible for the conduct of the first Commercial Vehicle Safety Contest in what is known as the New York Metropolitan area feel very much elated with the impressive results.

Not only was the contest successful in achieving what the committee hoped for—greater skill in driving and greater safety on the highways—but in the number of contestants. We understand there were 10 times as many in this as in any vehicle safety contest ever staged.

With the great number of vehicle accidents that occur on the congested streets of this area we know we had an opportunity to improve conditions, and we have done this. We have every reason to believe that the good work we have begun will be continued by the participating companies and their employees even if there

is a contest—for it is to their own benefit to decrease the accident total. We started out knowing that 10,823 accidents occurred on New York City streets in 1927, in which motor trucks figured and from these accidents 376 persons came to a premature death. The figures for the first six months of 1928 showed that motor trucks figured in 4,876 New York street accidents and these brought death to 165 persons and sadness to many homes. There was plenty of room for improvement and anything accomplished would be helpful to the community.

So we began a campaign of education backed up by a good organization. This organization plus the education, turned the tide and the results of this three months contest will, we are sure have a decided effect on the 1928 motor vehicle accident statistics of New York City and vicinity.

Through speakers at meetings of the drivers of fleets, and conferences with owners of these fleets of vehicles we got our message over, we stimulated a desire in the drivers to drive with greater care, to give thoughts to the rights of others, to observe the laws and to prevent accidents. There was no let up in the campaign for improvement and our records show that the further the contest went, the fewer were the accidents. The standing of the concerns caused each to try and improve their standing—just as the clubs do in a baseball league race. Any one can be at the bottom. It takes ambition and will power to get to the top.

We sold the idea of safety in vehicle operation to more than 22,000 drivers and fleet operators and we believe they will remain sold—for they are aware now of the benefits that accrue to them through being more careful. If the contest could be continued for an indefinite period or another contest begun, it is our opinion that the accident and death total would be decreased perceptibly in the Metropolitan area. These figures prove this contention—that we are on the right road in accident prevention work on the streets.

The contest began on July 9th and the first report was compiled for the month of July. 450 concerns entered vehicles to the number of 18,565. Of this number 9,947 were motor trucks. These vehicles covered 21,240,000 miles in 3,340,862 working hours and the number of accidents was 1,738. Boiled down this means one accident to every 2,036 working hours or one accident to every 12,220 miles of operation.

The figures for August show that only 13 concerns failed to make report, but the number of contesting vehicles was but little changed, there being 18,561.

These vehicles covered during July and August an estimated mileage of 50,018,466 in 8,336,411 working hours and in that time the number of accidents totaled 3,456. This is an average of one accident for each 2,412 hours of operation or one accident for each 14,470 miles of operation.

The results for August alone show 2,566 hours operated per accident—a 20 per cent improvement over July. The August mileage figure, shows 28,662,082 miles of operation with an average of one accident for each 15,401 miles of operation and improvement over the July figures of 20 per cent.

The figures that I have been able to get for September, however, are a little disturbing. The mileage increased to 14,315 miles per accident, but there was an increase during that time over the month of August of 8½ per cent. That is really the sad part of my report, showing that the job is not done. I want to leave the thought with you that we must continue what we have been doing for the last three months and just because we have had a bad month we cannot quit and go home. One of our very good members told me that his accident record was nearly perfect for the last six months and then he joined the Safety Driving Contest and everything went blooey. It does not mean that he had not been careful, but things went wrong. On the other hand, one of our members ran into good luck and improved his service 55 per cent during the three months of the safety contest. Let us not get discouraged for, like poor relatives, these accidents seem to come along in bunches sometimes.

It was a contest that will go down in history with this Congress—but it is no different than other vehicle contests. Wherever they have been applied, they have been successful, they have reduced the number of accidents, in some cities as much as 50 per cent. There isn't any question as to the value of the vehicle contest as an aid to safety in any city or to the nation. This has been definitely proven. Perfect an organization as we did, and develop simple and understandable rules and you will be successful.

We classified the entrants in 22 groups, according to the lines of business and the character of vehicles operated. Firms reported monthly on forms we furnished them, all accidents that involved their own vehicles. While they were in motion or temporarily stopped in traffic, including all cases of personal injury or property damage, regardless of the amount, or which driver was at fault, or which vehicle was damaged, reports in code showing the standing of the contestants were mailed monthly. These bulletins were posted where the drivers could digest them. The standing of the firms was determined on a basis of the percentage of accidents per vehicle hour. On the report cards the contestants stated the number of vehicles operated, the average number of hours daily these vehicles operated, the number of days operated, the number of hours operated and the number of accidents.

The winner in each group receives a prize of a handsome clock while others with exceptional records receive certificates.

We might add that the Commercial Vehicle Contest also proved a good advertising medium for the Safety Congress as all of the vehicles carried posters and wind shield stickers announcing the competition and the Congress and we were able also to secure some good newspaper notices each time the statistics were tabulated.

Too much time has been spent in talking about accident causes. Also, as to who is responsible for the accident. It does not require any imagination, however, to locate the guilty party. It is always the other fellow.

The prevention of accidents is one that we are all interested in and it was with this in mind your committee labored early and late to prevent accidents rather than to develop their cause. It is very difficult to figure the expense of accidents. Only a small part of it will be found in the premium paid to insurance companies. How about the expense of the truck out of commission? Is the driver an asset when he spends his time in the Courts? How about the boss? His time means money, too. How about your customers? Is it an asset to your company to have it be known that you are continually having accidents and that your customers' goods are damaged from time to time? Is it a good advertisement for your company to have your trucks dash madly down the streets without regard to public safety? I see these trucks personally myself from day to day and the effect it makes upon me is the truck that is so recklessly operated would of necessity be backed up by an unreliable company.

All of these truckmen are salesmen for the Fleet Operators. They are your contact with the public. They reflect on the company whether it be good or bad.

Your committee have officially concluded their task. The job, however, is far from complete. The committee have shown the fleet operators and drivers a way to avoid accidents. In the continuance of this, the problem remains yours. We have blazed the trail for you. It is up to you to carry on.

CHAIRMAN CLAIR: We trust that representatives are here from those fleets which have been successful in winning prizes and trophies in this great Inter Fleet Contest. Mr. Banham has kindly consented to award these prizes. I wish that as he reads each name, the representative here from that organization would come forward and receive the trophy.

MR. BANHAM: I sometimes tell a little inside stuff. First when we decided we

could have prizes the great problem was what should be the prize. We had many suggestions, but sometimes the least part of the problem is the most difficult. I would like to tell a little story about a little place upstate where they wanted to build a church. They devised ways and means and talked it over, and after much trouble they got the money and in time the church was built. Then came the great question as to what color they would paint the church. They had more meetings and more trouble about painting the church than about the whole question of raising the money and getting it built. Finally one man who had sat through all the meetings without saying a word was called on for a suggestion about the color. He said he was neutral on the subject and did not care what color they painted it as long as it was green. Well, our committee decided that they did not care what kind of prizes they had as long as they were clocks, and so we have clocks. Here are the winners:

General Baking Company, Manhattan Plant.

General Baking Company, Jersey City Plant, horse-drawn vehicles.

Sheldon, Foster Company, Laundry Division, horse-drawn vehicles.

O. K. Dairy Company, Milk Division.

Schwartz & Son, Wholesale Jobbers.

National Oil & Supply Company, Gas and Oil Division, trucks.

Harkavy Beverages, Bottlers' Division, trucks.

Imperial Laundry Company.

Long Beach Bus Company, Bus Division.

I understand that the Long Beach Bus Company has made an exceptional record. Let's give them another round of applause.

Stephens Fuel Company, Inc. Coal and Ice Division, trucks.

Sheffield Farms Company, Milk Division, trucks.

Durkee Company, Department Store and Furniture Business.

Public Service Gas and Electric Company, Public Utilities, trucks—electric and gas.

Hyman Express Company, General Trucking Companies.

Knickerbocker Ice Company.

Devere, Harris Company.

Thomas Henry, Inc.

Bayonne News Company.

Nassau County Mosquito Extermination Division.

C. J. Mallett, Inc.

Pioneer Ice Company.

Hygeia Ice Company.

Gordon Farms Company.

In conclusion I wish to express the gratitude of my committee to you fleet operators and to your drivers for the wonderful job you put across. I feel this way about it, however, that what we have done the last three months is not so much, but what we have built into it is our reward. If after we close this session everybody goes home and forgets about safety, that is not a very great reward. I want you gentlemen to feel that your committee has gone about this work in a way we felt would bring results. It has done so. We have shown what can be done if you try. We are all for safety; there is no question about that. It is the eternal keeping at it on the safety measures and trying to prevent accidents that will bring the reward to this committee and to the National Safety Council, the reward they richly deserve. Your job starts where ours leaves off.

GEO. J. HARDY (The Nassau County Mosquito Extermination Commission, Freeport, N. Y.): We have done all we could to brace our men up and I would recommend that we, at least at some future time if not now, have something in the way of a button or a badge that we may bring back to our men rewarding their individual efforts. Without their efforts we could not do anything. We

have 50 or 60 men in our organization and only about 25 cars, two shifts a day and the cars driven by two sets of men, and we sometimes have to shift them about so that another man drives in one man's place. We have begged our men for the sake of the commission and for the sake of themselves to keep this record clean. We have had only two claims against us since 1915, so safety is nothing new to us. I believe if there could be something for these men in the way of just a button or something they would appreciate it. I know the commission would stand for their share of it, pay for the work if necessary. I have a feeling that my men would get so much out of something like that that we would be willing to pay our share.

CHAIRMAN CLAIR: We had a regular speaker to appear this morning, Mr. Richard J. Wall, vice-president Yellow Cab Company of Toledo, Ohio. We have received a telegram saying that he will probably not be able to get here, due to some important organization matters.

We have a wonderful opportunity right at hand this morning because we have men here who have supervised successful safe driving campaigns. I think it would be almost a tragedy were we to let these gentlemen go out of this room without telling us very briefly some of the stunts they have used in putting their successful campaigns across. I have made notes here of the winners of the clocks and I am going to ask each representative of those companies to tell us briefly just one or two thoughts in which we will get a quick picture of the principal stunt or the thing that they have done to make their campaign successful. Now usually our meetings are much smaller than this and the chairman does not need a gavel. I have one but I do not want to use it. I am going to run through this list and I would appreciate it if the various people would give us in a few words the various stunts they have used.

We have the manager of the Manhattan plant, General Baking Company, which won the motor vehicle prize. Mr. Fried.

C. F. FRIED (Manager, General Baking Company, Manhattan Plant, New York): Safety with the General Baking Company is not a spasmodic thing. We have been working on it for years. I do not think we did anything of a particular nature to win this contest, that is, anything more than we are doing right along. One thing we did do. We found that a large number of our accidents occurred on the 59th street bridge. We did make a drive at this point and talked to all our men, asking them to try to eliminate accidents on that bridge. I believe that 20 per cent of our accidents for the last year or two occurred on this bridge.

SAMUEL HYMAN (Hyman's Express Company, New York and Jamaica): We find that by keeping the same men working on the same cars at all times, without changing them from one to the other, we get the least accidents.

J. E. OHLMAN (Imperial Laundry Company, New York): I have to say about the same as Mr. Hyman. It is important to keep the drivers on their regular cars and to urge them to "stop, look and listen."

THOMAS O'CONNOR (Bayonne News Company, Jersey City, N. J.): The Bayonne News Company had so many accidents that the insurance companies refused to handle them. One New York company finally took a chance but doubled our rate. We offered the men a bonus of \$50 a year, gave each man a suit of clothes if he would keep his truck in good condition, and tried in every way to interest the men in safety. We have not had an accident since February.

Public Service Gas and Electric Company, New York: In connection with this contest we made no special effort to make a record. We carried on our regular routine and put in our regular record report. I would say that in connection with the safety end we have a regular safety department that makes periodic visits to the various plants and gives talks to the men. In connection with

automobile equipment we make monthly inspections and keep them in good mechanical condition, so there are no accidents from that source.

HAROLD JACOBSON (General Manager, Long Beach Bus Company, Long Beach, N. Y.): Our campaign was brought about when we had one of our busses crash into a train and fourteen people were severely injured. From that day we put on a vigorous campaign. Rigid maintenance of busses from the mechanical standpoint was insisted on. We have a blackboard at the door of the garage on which we describe any accident occurring to our busses or to any vehicles in our locality. These accidents are carefully dissected, how they happened and how they might have been prevented. We have regular meetings every Saturday morning of all the men we can take off and go over every detail of operation and try to encourage the boys in every way. We have a slogan, "On time, all the time," and also another, "When in doubt, stop."

A. E. VINCENT (Devere, Harris Company, Patterson, N. J.): We have meetings every two weeks. We have a blackboard and we write the names of those having an accident. We rarely have a bad accident.

JAMES J. GANNON (Manager, General Baking Company, Jersey City Plant, horse drawn vehicles, Jersey City, N. J.): We have not made a stunt of safety but have incorporated it in our every day work. We have worked on the idea that the man is the head of the family and as such should be concerned about safety, the safety of his wife and children and of himself. We have worked to make the men feel that it was entirely up to them and that an accident would bring disaster on him and to those near and dear to him. We have tried to make safety synonymous with "Bond Bread," and tell him that if he drives carelessly and in a reckless manner he causes the public to be afraid, and this reflects upon the General Baking Company and will bring the name of Bond Bread into disrepute. I think it was on the basis of an average every day proposition that we were successful; no stunts, nothing out of the ordinary. We do it just as we make our product which is just as well as we can possibly do.

W. M. OLLER (Knickerbocker Ice Company, New York): Safety with the Knickerbocker Ice Company has now become a regular part of our routine. One of our officers devotes about 75 per cent of his time to safety work. We appealed to our men that safety was a by-product of interest in the job and efficiency. We have tried to appeal to them from the humane side by making them realize that the children are in the streets through no fault of the children but because most of them have no other place to go. We owe a duty to these children. We made no special drive in this respect but we tried to make them realize that this was an ordinary part of the job and that we were one hundred per cent for safety.

C. C. CLEMENTS (Sheffield Farms Company, Inc., New York): The only stunt that I can suggest is a continuation of the safety work that has been carried on since a year ago this July. No special stunt was inaugurated for this contest but we do hold safety meetings at least once a month in one of the branches and we have about 30 branches in the metropolitan area. We appeal to the men in the same ways that the other speakers have described this morning, through their families. We do not ask them to save the property of the company but to save their own lives and look out for themselves and their children. We ran two inter-division contests and awarded loving cups to the division which came through with the best percentage. We ran it practically the same as the National Safety Council contest. We had some small stickers made, about 2x1 inches and these were placed on the route book of each man. The sticker says, "Remember, three people were killed in New York each day in 1927. Drive carefully. Sheffield Farms Company Safety First Campaign." We used the letters S. F. C. to bring out the point, Safety First Campaign. I suppose many of you saw last month's

National Safety News in which was a picture of the wagon which we had painted for our work. We took the idea from the Fifth Avenue Bus Company. We painted the wagon white with green lettering using the safety green. The front of the wagon says, "To promote safety." Underneath is the symbol of safety, the spread wings, and the wording, "Always be careful." One side says, "Safety first for health and happiness." We have the slogan of the National Safety Council, "Accidents do not happen without cause." On the back we have, "Help us make New York safe for you and yours." On the top we had a panel reading, "Sheffield Farms Company Safety First Campaign."

C. H. ROLKA (Sheldon, Foster Company, Brooklyn, N. Y.): We have a meeting every Wednesday morning and tell our drivers what we expect of them.

HOWARD JAFFE (Hygeia Ice Company, New York): It has been stated that we did not make any drive at this time but always followed our quest for safety.

CHAIRMAN CLAIR: I have been asked to request that the various members write letters to the National Safety Council stating what you think about a continuation of this Interfleet contest. I want to say, with apologies to our good friends the taxi operators here, that this program has perhaps been a little over-balanced on the commercial vehicle side. I know we have had a number of interesting thoughts brought out and I hope these have given us a number of ideas to take home with us. There are two or three gentlemen I wish to introduce to you who will say a few words. The first is Mr. W. W. Cloud, who is President of the National Association of Taxicab Owners:

W. W. CLOUD (President, Yellow Cab Company, Baltimore, Md.): It is a pleasure to be here this morning in the interest of this industry which I represent. We took the precaution of bringing our publicity representative with us. We are interested in the movement for safety that has developed so rapidly and effectively throughout the country in the last few years. In the cab industry, those of us who have seen the light and try to operate our business as the passenger transportation companies, give a great deal of time and attention to safety. The various methods differ and time does not permit us to go into that, but I can say that marked improvement has been made and that we are heart and soul in everything that goes toward the betterment of safety conditions on the streets and highways. I am very glad to see this relatively large gathering. It is quite an increase over last year and I am sure we all unite in congratulating you on the able administration which you have given us during the past year.

CHAIRMAN CLAIR: Thank you, Mr. Cloud. The work has been a pleasure.

We have with us another man who has done a whole lot of pioneering work in safe vehicle operation, not only with motor trucks but also with teams and wagons, which to some of us presents a very difficult problem. I am going to ask Mr. A. A. Clarke, secretary and treasurer of the General Baking Company, to say a few words. You may have known or heard of Mr. Clarke before from his movement in encouraging driving from the left hand side of the seat in horse drawn vehicles and also for the developing of a new safety wagon.

A. A. CLARKE (Secretary and Treasurer, General Baking Company, New York): Bringing in our field men this morning to take home the prizes to their organizations, I felt I could sit on the side lines. I notice that the chairman asked for but a few remarks so I will just say a few words as to just what we do for safety.

You have heard the gentlemen from two of our plants say that we work on the personal contact basis. We place personal contact first, last and all the time. We have our slogan; we do not say "safety first," we say "safety always." Safety first, last and all the time. The chairman said something about the safety wagon. With our numerous horse drawn vehicles and the rapid turnover of operators of these vehicles, it is necessary for us to use extreme care. We engage a man not only for his ability but for his experience with safety previously. We not only check a man up for his safe driving but for his ability and on top of that we check up

the whole character of his experience and the state records against him. When we have done that, we have started right with the employee. Then we start with the vehicle. We make sure our vehicles are right, that the tools are right. The horses are trained for this particular work and the man is trained for his work. When we send him on the street, he knows all the ordinances and the rules and he has perfect tools to work with. He knows what he should do and what he shouldn't do.

Now for our safety wagons. We have been working on these for a long time. We have blocked off the left hand side of our cab which means that no operator can get off on the highway side of the vehicle. We have a foot brake on every vehicle, a brake with a ratchet on it. We have installed also on these wagons, as you see them around the streets, two uprights. We have found from experience that when horse drawn vehicles are hit in the rear that nine times out of ten the operator is thrown out. With these two uprights, if he can grab them, he will be saved from falling under the horse's hoofs or under the wheels. We have changed the step and placed it so that the man's foot cannot slip between it and the wheel. We have made the step larger. We have put on a storm curtain. We want open vision in every type of weather. We have incorporated all these features on our wagons and all the other safe features we can think of. We require every operator to turn in every night a report of the condition of his wagon that night. That prevents an alibi of any description on the part of the operator.

I want to stress again the personal contact work. To my mind personal contact work is safety work in its most effective form. We stress on the home. We tell those in the home how to live safely. We tell them of the summer perils of swimming, and of other hazards in their living conditions. We tell them about their children, to keep them off the streets. We go into every phase of their personal life. We believe that all the so-called stunts, bulletin boards, contests, etc., are supplementary to personal contact. Once you have gotten the main idea of safety these others are only supplementary details.

CHAIRMAN CLAIR: Thank you, Mr. Clarke. There is one more gentleman here sitting modestly in the corner whom I am sure you will not only like to see but to hear. He is on the program for Thursday morning and I hope everyone can hear his address as he is always very inspiring and always has something worthwhile to say. He has just written a book, which many of us believe is the finest that has been turned out in recent years for furthering the safe driving movement not only among commercial drivers but among the general driving public as well. I want to introduce Mr. Marcus Dow. I would like to tell you all the positions Mr. Dow has held in the past but I will just say that he is a pioneer in this work and a past president of the National Safety Council.

MARCUS DOW (Vander Poel, Pausner and Jefferson, New York): I really did not expect to have to talk twice to this distinguished gathering, as I am on the program Thursday. I am glad to have the opportunity here first of all to thank those who participated in the contest that has been carried on here in the city of New York for the past several years. In my capacity as an officer of the National Safety Council I have been close to a number of these contests. Here in New York we had about ten times as many vehicles as have ever been entered before. I do not know that that is anything particular to brag about, considering the size of the city, and the opportunities for enlistment yet the spirit has really been quite wonderful and the cooperation received from the motor vehicle committee of which Mr. Banham was chairman has been truly excellent.

In listening to the discussion of the various ways to keep up the publicity I was impressed with what Mr. Clarke said about personal contact. I agree with Mr. Clarke that it is one of the most important things that you have to do to keep up the proper amount of interest in safety. If you do not keep the men inspired by personal contact a great deal of your effort is lost. We get out certain safety

posters and bulletins to put over the safety methods. To make them doubly effective we have a plan which calls for the cooperation of the foremen in charge of the drivers, in order to find out whether the drivers read the posters that have been posted a few days before. He would inquire, "What lesson did you get out of it?" If they did not reply properly the foreman would know that they were handing out a lot of bunk and did not see the poster at all. You must keep after these men all the time.

What are the basic predominating causes of these accidents? That is the question I am going to take up Thursday morning and I hope that everybody is here, particularly those interested in this contest in New York. Mr. Banham has asked you to keep up the good work. You have only started this campaign and must carry through by continuous efforts. Safety is a day by day proposition, hour by hour.

You men that have been taking part in this contest and others here from out of town places who are interested in this problem of street safety, I would liken you to a great safety army. I recall that during the recent great war I had the privilege of going out on a special train in the interest of one of the Liberty Loan campaigns. We had with us a young soldier who had just come back from the front. He told the story of their captain who had been shot down by a machine gun at Chateau Thierry. He was mortally wounded, two of his lieutenants bending over him tried to hear his dying words. Lifting his head painfully he said, "Lieutenant, the command is 'Forward,'" and with that he sank back upon the ground and died. Men, you who are a part of this campaign, of this great safety army in peaceful America today, your command is "Forward." Let us all who are privileged to be a part of this magnificent army for greater safety today remember that the command is "Forward." Thank you.

CHAIRMAN CLAIR: To me this meeting has been a very inspiring one. When we come to such gatherings as these we come, not as insurance representatives, not as commercial fleet representatives, not as taxicab company representatives, but as practical men who have a common interest. That one interest, regardless of the specific problems which keep us busy, is the prevention of highway accidents. We are not theorists but we come into these meetings to discuss methods that we have used in our various lines. Our associates, even though they are working in different fields, may carry something away with them—something to assist them in their particular problems. That is the spirit of these meetings. We all have something to give and we all have something to learn.

This first meeting has been, as I said, very inspiring to me and I trust that all of you are going to take away some new inspirations and ideas. I know I could keep you here for the next hour listening to worth-while remarks from a number of other gentlemen here this morning. I am not going to call on anybody else but I do not want anyone to feel that he has been deliberately overlooked. It is now quarter of twelve and we can well afford to spend ten or fifteen minutes in further discussion. We would be glad to hear from anyone else present who has anything in the way of a new wrinkle that has helped him in putting this message across to the men behind the wheel who are the direct subjects of all our efforts.

GEO. J. HARDY (Secretary, Nassau County Mosquito Extermination Commission, Freeport, N. Y.): The thing that has appealed to me is the movement of the taxicab people. Let us take off our hats to their wonderful control and great amount of courtesy that the taxicab drivers show to us who are pedestrians.

A. E. LEVINE (President, Yellow Cab Company, Cleveland, Ohio): We operators in Cleveland are very fortunate to have as Commissioner of Licenses a man who is greatly interested in safety and the prevention of accidents. We have a plan down there which has been very successful and in my own operations we have cut our personal injury accidents 51½ per cent in the last six months, compared to the same period last year.

MR. ZUKOR (Commissioner of Licenses, Cleveland, Ohio): I did not come here for the purpose of talking, I came to learn. But if I can be helpful because of my public service over a number of years I will give you a brief outline of what I have attempted to do. As Mr. Levine said, our experience on the streets of Cleveland was terrible. When I first came into office they were insured for \$120 a year covering five, ten and one. Prior to March first we had the good news that our insurance rates would be \$750. Something had to be done. We all had the same problems, competitors who were bitter, and I took it upon myself to get these gentlemen to agree on some sort of campaign.

I tried to put the fear of God into the driver and I think I have done that. The police department cooperates with our department. We do the licensing and the checking up of the drivers. Each driver has a card. The employer must make out a card and send it to the police department for each driver. Every accident must be reported to the police department, and by the operator. As soon as a man has two or more accidents his card is forwarded to my office with a report. The man is notified and there is an attempt to suspend or revoke his license. The hearings are open to representatives of the police department and to the interested companies. The man is given an opportunity to make a defense or explain his actions. His employer is there to hear what is said. He is given an opportunity to say anything he wants to before his employees. If the man is found negligent and careless or of anything improper in the way of lack of courtesy or in his method of driving, we suspend his license for a period of one to thirty days or revoke his license. I can say from experience that this method has met with a lot of success. I thank you.

DALE HARMAN (Vice-President and Manager, Yellow Cab Company, Kansas City, Mo.): I am booked for a talk a little farther along on the program but in view of the fact that these gentlemen have given up their time to come and listen I would like to tell you of a little thing brought about in our organization. I do not want to take credit for the idea because it was second hand. We inaugurated the "Milk Bottle Safety Club." I don't know why they call it that but that was the name given to me and we used it. I was going away on a little trip at the time that I started this. We had already done everything we could think of and had tried everything we had heard of. We do everything in our city to help our local safety council that we can possibly do. The president of our company is one of the head officers of the safety council. I am on the fleet owners' section. We have our own safety man that takes our drivers to all the safety meetings where we can get in and get recognition. This milk bottle safety club was started April 1, 1927. I got every man to stand up and pledge that we would go through with the proposition. I said, "Now, there will be some trouble with this and a lot of little things the boys will not like but I want you to promise that you will start it and carry it on while I am away." I had the one sole thought that it would reduce our liabilities during my absence for that is a matter I personally have to watch.

When I got back after about three months I found that they had been able to stick it out. Every man was required to put five cents in a milk bottle for each call. For every nickel the men put in the company put in a nickel. It made a fund of about \$750 a month, and it was divided among the men according to teams, with a captain for each team. I picked the captains and each captain could pick his men by lot. One team was winning all the time. There was strife in there and the men fought to win their nickels and fifteen cents more with each one. I am going to tell you honestly and conscientiously that it reduced our accidents almost to none in traveling six million miles a year in an area that is comparatively just as congested as your city. Our district is not as large but in the downtown district it is just as congested and we have not as many automatic signals and other helps to control traffic.

I have been asked to give a little history of this milk bottle safety club. One firm calls it the ice box safety club and another calls it the refrigerator. If you can get strife between the men, get them watching the talley bulletin for how many accidents and how much money is in the fund, you can get the men to prevent accidents. We have been able to get our men to report the smallest kind of accidents to their own cars or somebody else's. He does it because some of the captains of the other teams will report it if he does not. This was originated in Richmond, Virginia. If you can get something with that sort of strife and something where they win a little money you will be surprised how they will want to get on a team that wins, especially if there is a bad boy on their own team.

In reply to a question about labor: We advertise for men and they respond very readily and all of them have to go through our schooling. There is one man in my organization who is very rigid. He takes them through hazardous points of the city and shows them what he wants done at that point, how to slow up and not try to hurry. We have a thorough training school. The men are very much surprised when they realize that they must spend at least five days and some of them seven or eight days in school. They cannot pass until this man O.K's. them. We give them a very rigid talk and show them what the safety idea and the prevention of accidents means to the company and to them and their families.

CHAIRMAN CLAIR: The meeting seems to be getting more interesting all the time but it is now twelve o'clock. Mr. Dobbs of the Detroit Cities Service Company could tell you that all Mr. Harman has said about the milk bottle club is true. He tells me that this has practically done away with his accident problem.

MR. HARMAN: I would like to introduce the man who inaugurated this milk bottle safety campaign, Mr. Cummings.

H. L. CUMMINGS (Yellow Cab Co., Richmond, Virginia): Mr. Harman very graciously gave me the credit for this, but it was not myself but one of our drivers. About two years ago Mr. Cummings, our manager, started a campaign on suggestions for a safety campaign. He wanted all the boys to write a short article on what they thought would be interesting in the way of a safety campaign. One of our boys suggested that we start a "safety jit contest." We held a little meeting and asked him to tell us what he meant. He suggested that every man should put up a nickel when he got his manifest (job sheet). It really amounts now to every man buying his manifest for a nickel. In Richmond nickels do not come quite as easy as they do up here in New York and the man is going to think a little about how to get his nickel back.

For awhile the contest ran along in an ordinary sort of way with no special work behind it. We had a milk bottle sitting on the counter and the men would drop in a nickel and go to work. It was my duty to take out the nickels at the end of the month and to divide them between the various teams. After awhile we began to notice that accidents were decreasing. For awhile we thought it was the articles we were writing and the talks we were making but we found out that it was really the "safety jit contest" that was causing the decrease. We set aside a certain fund each month to pay for the petty accidents, the kind that will eat you up in time. Out of this fund we pay for the petty accidents. If drivers are caught speeding on the streets they are fined two dollars which goes into the safety jit. It has to be split to a hair's breadth to satisfy those boys and if it is one nickel out of the way I am going to catch it.

CHAIRMAN CLAIR: Are there any other remarks?

J. P. MALLOY (General Accident Insurance Company, New York): I want to say a word in connection with the selection of drivers. We went over about 2,500 claims to find out that the driver did not thoroughly understand the essentials of accident prevention. That is, he was lacking in experience. If he is young we must expect him to learn from his accidents. But in every case it shows his experience was insufficient. He was not educated enough as to what to do. We

formed a questionnaire which we distributed. We confined the questions to what we thought were very essential for us to know. We gave this questionnaire to our assured asking them to give it to the drivers, and then return it to us.

When we checked up we found that the driver never worked for companies he claimed to have worked for. Where he worked for two months he claimed it was longer. We sometimes found that they were fired for reckless driving. Very few put down any accidents. We asked for two personal references. We have run across lots of drivers that have improper vision and even had one man with a glass eye. Some of them have bad feet; some of them cannot think properly, are very dull witted; their intelligence is limited. If the people knew how dull and ignorant some of them were they would take steps to prevent such careless selection of drivers. In the department stores some of them break in helpers and promote them. The promotion system is much the best. It is most important to look up a man's record before you put him on the list.

CHAIRMAN CLAIR: I wish to repeat the invitation to everybody here to attend the meetings on Wednesday and Thursday. We have good reason to be pleased with the success of this meeting and I want to promise you that we have a fine array of talent during the next two days.

ADJOURNMENT

October 3, 1928

ROBERT CLAIR, Chairman
Safety Engineer, Liberty Mutual Insurance Company, Boston

The second session was called to order at ten o'clock by Chairman Clair.

CHAIRMAN CLAIR: We have as our first speaker this morning a man who is president of the National Association of Taxicab Owners, Mr. W. W. Cloud. It is a great pleasure for us to have Mr. Cloud with us. He is a man with many varied interests, a man whose interest in safety is keen and he is going to talk to us this morning on "Standardized Cab Companies' Relation to Public Safety."

W. W. CLOUD (Yellow Cab Company, Baltimore, Md.): Ladies and Gentlemen, the subject which has been assigned to me is one in which I am deeply interested. It is a very important subject and it is more or less of a serious nature. Personally I would like to talk to you about cab companies, about the cab industry, about the romances, and I might say, here and there—the tragedies of the cab industry. There is no industry that has grown as rapidly, particularly one that is so close to the public, or in the public eye as much, as the cab industry. Any industry that has grown as rapidly as that industry in the past fifteen or twenty years naturally excites interest and when we excite interest we invite observation; and when we invite observation we open ourselves to criticism; and when we are subject to criticism we begin to appreciate how much there is to be done that has been left undone.

I mention this simply incidentally because from my contact with this industry, which now measures about twenty years—twenty years the third of next March—I realize and appreciate both the personal and the official contact with the men identified with this industry and that they have really sincerely and honestly striven to build this industry along sound, substantial and permanent lines. I know that they feel their own obligations and responsibilities. I know that they are striving sincerely to live up to the obligations that have been imposed upon them.

Now we recognize the two great schools of transportation and in mentioning only two I classify the street railways and the steam roads on the one side and the motor passenger transportation industry on the other. The development or the permanency of the motor passenger transportation industry is inevitable. We cannot regulate or legislate it out of existence. It is here to stay and I am glad to state, and I say this from official contact with several organizations that have been very close to both of these major industries in the past few years, that a much better spirit of understanding, a much better spirit of cooperation, and a great part of what I might say was friction—not friction exactly but feeling adverse to harmony which developed and was developing in a way that would not be helpful to the public safety—has been smoothed out. We now kiss each other on both cheeks and we can lay our problems before each other and at least we have the respect and feel the confidence of one another, and more harmonious conduct of the industries.

I simply touch on this because it is vital to the public safety. These major forces (and that is a better word than industries probably) are the two great forces that come into immediate contact with the public and they are largely responsible for the safety of the public. They have no right, nor can they on the basis of fair play or sportsmanship, pass the buck or try to smoke screen or to do otherwise than assume their full responsibility in the premises. I have viewed with some degree of apprehension and purposely have avoided controversial debates which could only result in misunderstanding or lack of cooperative feeling. Safety, in the last analysis, is primarily and fundamentally the development of safety work, which has for its great objective the safeguarding of life and limb. As I said

before I view with some degree of apprehension, considerable at times, the growing tendency to commercialize safety. Now time does not permit me to go into detail and probably this is not the place, but I have sounded this note, or have tried to sound it, that in our National Safety Council meetings and in our local Safety Council meetings that is one thing we must guard against. We must remember that the main purpose and the fundamental interest is the safeguarding of life and limb and that is the serious and important responsibility which we must assume. I did not mean, Mr. Chairman, to get into a prologue but I had it in my system and I thought best to get it out.

Standardized Cab Companies' Relation to Public Safety

By W. W. CLOUD

President, National Association of Taxicab Owners, and President Yellow Cab Company of Baltimore

The relation of the standardized cab companies to public safety is very close. In many ways they are closer to the problem than any other class of people. This is due to the fact that they have to see both sides of the question. First of all, they see it from the standpoint of the general public because their cabs are going day and night into the thickest of the traffic in the city streets; therefore they know the dangers from reckless drivers, and from improper attention to the traffic rules. Then, as passenger carriers, they have the responsibility to taking care of their passengers, and this makes them more interested in the question of public safety than is usual in a company doing business in the ordinary city.

The National Association of Taxicab Owners has membership representation in many of our cities, and is an association of standardized service. There is no financial connection between the companies but the standards of service as maintained in the association gives the public a fair opinion of just what they may expect from these companies all over the United States.

This association, in its relations to the question of public safety, has realized that to a great extent the question of public safety insofar as automotive vehicles are concerned is tied up with the question of the men who operate the machines, and for this reason we have standardized the drivers so that the public safety is protected in this way:—

A man to secure employment with a standardized cab company must first of all produce proof of a good character. This is to prevent the employment of the careless, and those who have no ideals as to honor, or right and wrong. By securing a proof of the good character of a man who is to drive a cab, the company then is as sure as is humanly possible that the man will take his work seriously; that he will deal fairly with the public, and with his company; that he will feel that he has an obligation to the public and refuse to take chances which might endanger the lives of the public.

A man who is careful, diligent, honest, and sober will naturally be safer to trust with a car in the public streets than one who does not come up to these qualifications, and then in addition to this the very fact that a man has these qualities will make him careful of any accident due to carelessness or through his own fault which would mar his record.

Therefore I consider the fact that the standardized cab companies do require character reference as a step in the direction of public safety which in the aggregate means much to the public. The standardized cab companies have a force of morally clean men, men who are careful of the public safety, and careful of their own records, and this combination makes them safe men to trust on the streets of the city with cabs.

Then too, there are some people who are physically unable to drive a car safely. Either through nerves, or some organic trouble they are unable to keep cool, well balanced, and able to reason in case of an emergency. Such men as these should not be permitted to endanger themselves, and the public by driving cabs or automobiles through the busy traffic of a city street.

There are others who due to their mental qualifications are unable to judge wisely in an emergency, to keep their head when a decision which involves lives must be made on the spur of the moment, and who are not capable of making the best choice under given conditions where that choice involves safety of the public. They would be a menace to those who came in contact with them.

These two classes of men are not permitted to drive the cars in standardized cab companies' service.

Through rigorous physical and mental examinations the ones who are unfit are weeded out, and only those who are able to meet the exacting requirements are allowed to drive the cabs of these cab companies.

By doing this the public safety is protected, and there is no danger of cars being driven over the city streets by mental or physical weaklings who would be unable to make the necessary decisions, or who lack strength to carry them out when a question of safety is involved.

There is one other class that the standardized cab companies are always careful to keep out from behind the wheel of their cabs in the interest of public safety, and that is the person with defective vision.

A person may have a small defect of vision, but with the speed which carries a person along with the steam of traffic a very slight defect in vision may in the end involve a very serious accident, and for this reason the person with a defective vision should never be trusted at the wheel of a cab.

I am firmly of the opinion that in the interest of public safety each city should have a school for those who desire to drive cabs, that they should not only be thoroughly trained in the traffic rules of that particular city, but that they should also be compelled to work under traffic conditions and those who did not show ability to harmonize their driving with the traffic rules which governs the traffic in which they move should be released. This would be a rather strict test, but after all when you come to check up the value of safety, unselfishly from the public standpoint, and selfishly from the standpoint of the cab companies it is none too strict.

The relations of the standardized cab companies with public safety in a general way in my opinion reflects good credit on the men who in connection with their business are endeavoring in every way possible to make the streets of our cities safer for all who have occasion to use them.

This relation is reflected by the membership which various members of our organization hold in Chambers of Commerce, Traffic Clubs, and other moves of a civic nature. In this relation with the public they are well qualified, and have done a great service, in furthering the usefulness of the local branches of the National Safety Council.

They have carried on local campaigns which has emphasized safety, and made the word safety stand out in each section of the country. This place of leadership should be held by the standardized cab companies, and they should continue this activity in every place in which they are located to the end that they make public safety on the streets and roads a slogan which everyone will heed, and help to carry out. By doing this they will be helping the public, helping themselves, and fulfilling a public duty which they are best qualified of all organizations to fill.

The fact that the standardized cabs are found all over the country, and operated under standardized service rules makes our relations with the question of public safety general and applicable to every section of the country. This places upon us a trust which we must if we are to live up to the standards of our code of

ethics keep a trust of emphasizing safety at every opportunity, and of practicing it in season and out of season.

In our relations with the public as carriers of passengers, we voluntarily assume an obligation for the safety of the life and limbs of such passengers, and in taking up this obligation we can in justice to ourselves and the public do nothing less than make every effort that lies within our power to carry out the obligation and deliver each and every passenger at their destination promptly, without injury to themselves, and without injury to anyone else. Safety of our passengers is an obligation which we assume, and which gives us a relation with public safety which keeps it constantly in our minds.

This particular phase of our relation with public safety makes us much more mindful of the matter than even the public carriers, because the railroads in their operation run over rails, they do not have to look out for the other fellow because whoever gets on their tracks does so at their own peril. More mindful than the interurban bus service which for long stretches will run over roads that are not crowded, while all of our business is transacted in the city streets, where the traffic is heavy, and where we have no right of way which will give us an excuse for overlooking the other fellows' failure to live up to the rules of traffic, or will excuse us from complying with the rules of safety for the public to the fullest extent.

A Sincere Interest in Public Safety

Complying with the necessary safeguards for the public ourselves, we also are interested in public safety on account of our desire for the public to accord us the same protection which we accord to them. There is no place in the streets of a city for the careless, the reckless, or the drunken driver. The standardized cab companies do not have such drivers, and they are interested to the fullest extent in seeing that such drivers are not allowed on the streets, to hazard the lives of the general public, the cab companies employees, and the passengers who expect to be carried promptly, and safely from point to point.

For this reason we believe that in the interest of the public safety that the rules of the road should be made applicable to all. That they should be so arranged as to facilitate traffic so far as is consistent with safety, and that all concerned should be required to live up to them strictly.

In the interest of public safety we provide only the most skillful drivers. The beginner, the careless, the reckless and the road hog have no place in the driving staff of a standardized cab service. These drivers are not protected by us if they do not comply with the necessary traffic and safety rules, we not only refuse to protect them, but actually penalize them ourselves. This makes every driver feel that we must use his best efforts to comply with all traffic laws, and regulations; that he must comply with the rules for safety. And in addition to penalizing them when we find them violating traffic and safety rules, we reward them for good work. Therefore there is no encouragement for the driver who does not feel that his driving is a trust, and those who take their work in the spirit in which they should are rewarded in proportion to the safety involved in their driving.

We are constantly at work inventing methods of interesting our drivers in safety work. Safety work has a recognized part in the training of all of our drivers, and in our whole scheme of operations. We are in season and out of season seeking new and effective safety ideas, and when we find one we use it. Therefore there is a consistent improvement in the standards which we set up for our operation. New ideas and plans which are of proven merit are used in the place of those that are no longer effective, and the whole organization is keyed up to the standard of better and more effective work along lines which makes the safety of the public of paramount importance to the operators, and the drivers of standardized cab service.

When our National Conventions are held the question of safety always has an important part in our program. In this way the plans which have been proven effective are discussed, studied, and where they are found practicable and more useful than those which have been used they are applied.

In this way up to the minute plans of the men who are making a study of the question of safety on the ground are applied by the others who have the same problems, and who work to the same end, doing immeasurable benefit to the standardized cab companies, their employees, and the general public along safety lines.

The question of safe driving is a subject of constant study. With the present traffic situation it is necessary that every man who drives a cab be up to the highest point of efficiency, and for this reason there is a steady and a consistent study of the problem of safe driving. These results are available to anyone who wishes to have them, and the investigation in this field is thorough, effective and conclusive. This field alone is a unique contribution to the problem of public safety, and one that should be utilized more and more as the years go by.

In the heart of the city traffic, on the streets where speed is permitted, and through the by-ways of the city, moves the standardized cab companies' drivers. In daylight, in darkness, in the fair warm days of summer, and in the sleet and snow of a winter day, our drivers carry the greatest number of motor riding passengers. They are the safest drivers that are found on the streets and highways. They have fewer accidents than any other class of drivers. These facts prove conclusively that Standardized Cab Companies relation to public safety is something that is real. An obligation which is sincerely recognized, and an obligation which is assumed to the fullest extent by the responsible companies in this group.

The Highest Obligation

The safe guarding of the lives and limbs of the passengers, and the public is the highest obligation which rests upon them. The slogan is appearing all over the country now, and will through the school year of "play safe with the children." Which means in its final analysis to play safe with the public. To properly safeguard them and to see that they are not injured by careless or reckless driving. The total of lives lost through this class of driving is more and more bringing the question of who should be permitted to drive an automobile into the minds of the public.

To turn loose an immature person, one that is not qualified, and who has no thought for the safety of others, with a high powered automobile on the streets of the city, is to virtually give them the power of life and death over those on the streets. The Standardized Cab Companies realize this and for this reason their drivers are people who are qualified, who take their obligations seriously, and who feel that to fail to live up to the obligation entailed would be unworthy of a public carrier, regardless of its character.

The Standardized Cab Companies in their National Association in their code of ethics in dealing with the questions which involve public safety have two sections which are well worth the attention of any or all people who are responsible for the sending out of drivers of cabs or other motor vehicles through the streets of the cities.

The first of these sections deals with the duty of the owners to the employees:—

"We will consistently endeavor to elevate the moral character and the financial condition of the men employed by us. We will interest ourselves in their welfare and elect their earnest cooperation in our common endeavors, knowing that misunderstandings between employer and employee too often provoke those disagreements disastrous to both."

As contented and satisfied employees may be expected to render the best service, this is a step that is well worth while in the direction of public safety. No man harassed by troubles of any kind can give his best to his work. Therefore anything which will make for contentment will make for safety.

The other section in the code of ethics which is well worthy of emulation deals with the duty to the public. There are three sections under this particular heading, but the section which I wish especially to mention is the one dealing with safety:

"We will see to it that our driver is courteous to everyone, to the passenger in the vehicle, to the pedestrian on the streets and to the other driver. We will see to it, above all things that he drives his own vehicle safely."

If a driver drives his own car safely he cuts the danger of accident in half, and the insistence of the standardized cab companies that their drivers drive their own cabs, safely will, as is proven by accident reports, cut down the accidents to a great extent.

The work which has been done in the past is a great work, and shall continue to grow and spread. Today we have the same problems of public safety, which can only be met by constant attention, by diligent training, and by keeping up the standards and the morale of the drivers.

Companies Are Leaders in Safety Effort

In the forefront of the battle for safety the standardized cab companies have always been found. The leadership which has fallen on them by virtue of their position has been assumed and is being carried on. The standards required for drivers is higher today than it was five years ago, it will continue to grow higher and higher until the misfit will be weeded out of the field entirely, and the men who drive cabs not only for the standardized cab companies but also for other organizations will be found to measure up to the standards which the standardized cab companies as pioneers in the field have set up for themselves, and through pressure of demands for public safety, others will adopt as the standards which should be followed.

Leadership involves obligation. We have achieved leadership in this particular field by force of our work which we have done and are still doing. This lays on us the obligation of continuing to point the way to public safety measures and means, which others will be glad to follow on account of their sheer merit.

And while the obligation may be heavy, I am sure that the reward for the work done in training, research, investigation, and precept and example, will be commensurate with the duty which is involved and the responsibility which is laid upon us.

Let us therefore carry with us at all times the feeling that public carriers have a public trust, and that public safety is as much a part of our work, and our responsibility, as is the carrying of passengers. As we do this our field of activity will constantly broaden, and our rewards will be greater in proportion to the way we work, and keep up the work which we are doing so well now along the lines of public safety.

CHAIRMAN CLAIR: I am glad that Mr. Cloud, in his opening remarks, referred to that very unhappy fact of the commercialization of safety. I think his remarks were well chosen and I am sure we all know of instances where the safety movement, generally and specifically, has been substantially hurt by selfish commercialization. I think the key note he struck there was very much in order.

There is one particular item of business that should come up at this time. It is concerned with the nomination and election of officers for the coming year. Our nominating committee is composed of Mr. Dale Harman, Mr. J. G. Williams and Mr. J. E. Dobbs. They have completed a very carefully thought out slate. Mr. Harman has asked me to read this list for him.

Report of the Nominating Committee

Chairman, H. L. CUMMINGS, Manager, Yellow Cab Company, Richmond, Va.
Vice-Chairman for Delivery Fleets, J. E. DOBBS, Detroit City Service Company, Detroit, Mich.
Vice-Chairman for Bus Fleets, R. W. MEADE, President and General Manager, Peoples Motor Bus Company, St. Louis, Mo.
Vice-Chairman Delivery Fleets, J. E. DOBBS, Detroit City Service Co., Detroit, Mich.
Vice-Chairman for Taxicab Fleets, MR. J. G. WILLIAMS, Secretary National Association of Taxicab Owners, Chicago, Ill.
Secretary and News Letter Editor, MR. A. J. RUSSELL, JR., Managing Editor of "The Taxi Weekly," New York City.
Chairman Membership Committee, DALE HARMAN, Yellow Cab Company, Kansas City, Mo.
Chairman Poster and Slide Committee, C. C. CLEMENTS, Safety Division, Sheffield Farms Co., Inc., New York City.
Chairman Publicity, A. E. LUNDSTEADT, Bowman Dairy Company, Chicago, Ill.
Chairman Program and Statistics Committee, MR. W. O. HINCKLEY, The Peoples Gas Light and Coke Company, Chicago, Ill.
Chairman Engineering Committee, MR. S. J. STEINMANN, Indemnity Insurance Company of North America, Philadelphia, Pa.

Executive Committee,

ROBERT CLAIR, Liberty Mutual Insurance Co., Boston, Mass.
 W. W. CLOUD, President, Yellow Cab Co., Baltimore, Md.
 MARCUS A. DOW, Vander Poel, Pausner & Jefferson, Inc., New York City.
 T. A. HORRÖCKS, Minnesota Truck Owners Ass'n, St. Paul, Minn.
 H. J. MINEUR, J. M. Horton Ice Cream Co., New York City.
 R. J. WALL, Vice-Pres., Yellow Cab Co., Toledo, Ohio.
 A. F. WAITE, Green Cab Co., Cleveland, Ohio.

MR. WAITE (Green Cab Company, Toledo, Ohio): I move that the nominations be closed and that the secretary cast a unanimous ballot for these officers.

(The motion was seconded and carried.)

CHAIRMAN CLAIR: I just want a few more minutes to make a little explanation and apology. It may be that in the next half hour I shall have to leave for the reason that I agreed to read a paper before the Food Section at the Pennsylvania. I am going to ask Mr. J. G. Williams if he will take the chair and finish the meeting.

We will now proceed with the next speaker on the program, Mr. H. A. Inness-Brown, editor of the *Taxi Weekly*, New York.

How the Press Can Help to Prevent Street Traffic Accidents

By H. A. INNESS-BROWN
 Editor, Taxi Weekly, Inc., New York City

I do not think it is necessary for me to sell you on the subject of street traffic accident prevention. Any of you who have consulted your books within the last year will admit that it is costing you enough money for you to be interested without my trying to interest you further. I take it that you men, in coming to this meeting today, are looking for a practical means of street accident prevention. The most direct means which have been pointed out by anybody who has ever had anything to do with safety work is education. I am to do my little bit here this morning by telling you something of what I think the press might do to help in this education.

Certainly the press is the best arm that education has. We learn to read and write in school, we go to college and learn higher mathematics (which we afterward forget) but our everyday lives are more or less governed by what we read in the newspaper. If we can enlist the daily press in our fight, that will insure us victory.

The daily press is a rather human institution. Most of you have probably come in contact with it. I have never yet gone to the daily newspapers and asked for a legitimate favor that I have not been able to walk out with it tucked under my arm. It is a human institution and it is ready to aid in the saving of life. I think this organization should go home with the idea of making friends with your newspapers.

Taxicab men know particularly that it is necessary for the newspapers to understand the point of view of the operators. Commercial fleet operators should know the same thing. They know that many erroneous reports of accidents or fights on the street are printed merely because they represent news. It is also necessary that they represent true news. I think that unless the managing editor of a daily newspaper has that called to his attention he is likely to slight the taxicab operators. Certainly that has been true in our City of New York, and during the last three years we have succeeded in bringing about a different viewpoint. They look upon us now as being reasonably decent, not crooks and gun men. That has been the work of my little paper and has been more or less successful.

I made a survey in preparation for this little talk of the daily newspapers throughout the country. I wrote to over 150 and received replies from approximately 100 of them. I was surprised to find that this matter of street accident prevention was not as well received throughout the country as we thought. I was surprised to find that only eight papers out of 100 had a definite policy in reference to street traffic accident prevention. In other words, 92 per cent entirely ignored street traffic accident prevention.

I do not want you to think that I mean that newspapers are ignoring safety measures. They are cooperating with safety things but not cooperating to help prevent street accidents, which we are interested in because they cost us money as well as trouble. They all print news of accidents, but they do not print educational news which is necessary to reduce street traffic accidents.

About the only way that I can approach this problem is to outline what I would do if I were the editor of a daily newspaper. I can speak with some experience, both as to national papers and local papers. I would never let the paper go to press without some safety story tucked away in it and that story would always try to teach a lesson. We have tried to cooperate with the National Safety Council and have received their literature. You can always find a safety story, so in recommending a program I would recommend that. I am speaking from my heart telling the things I would be willing to do if I had a paper under my control.

I would print all the news truthfully. Probably you have at times asked a newspaper to keep out the report of a certain accident. I think that policy is unwise because generally when that happens you get a garbled report and it is better to have the true report even if you think it is going to hurt you somewhat. I do not believe that the commercial fleets are bothered as much with this sort of thing as the taxicab men, but taxicab men are rather proud of their accident records and they do not want to have a story of an accident on the front page blaming the company.

I believe, in view of the fact that we are fighting accidents, that it is better to allow the newspapers to print a true statement of what has occurred. I would see that every accident that occurred in my city was printed in my newspaper and I would try to give at the end in bold faced type the reason for that accident. I do not believe that would bother your liability very much. I do not think you

would have any difficulty about that and I think you should go ahead and tell the truth about your accidents.

I would print each month a map of my city with the accidents which occurred during the month clearly outlined on the map. Not only would I have the map in my paper but have a large blackboard outside of the newspaper office and when accidents occur they should be shown on the proper streets. I believe I could justify the use of the space because it would meet with the good will of my readers and increase my circulation. That map should be printed large enough so everybody could read it and have an analysis of all accidents. I believe that would pay in dollars and cents to a newspaper publisher.

As a third thing I would see that the traffic laws are obeyed. Unfortunately in many of our cities the newspapers are in politics and sometimes ignore the traffic laws. If you wish to prevent street traffic accidents you must see that the traffic laws are obeyed because it is generally in violation of those laws that the accidents occur. Every year, especially just before the opening of school I should cooperate with the taxicab companies and commercial fleet owners and the automobile associations in running a campaign of education for school children. The Automobile Association of New York ran a campaign and cut the accidents from something like 103 down to 45.

The next thing that I would do would be to mark with a blood red cross all the streets and every place where a fatal accident occurred. I do not know whether you have had the experience that I had. When a boy I saw a great splotch where a man had been killed and I could not pass that place for years without remembering it. Whether it is uncomfortable or not we should have that mark always before us. I think I would encourage that in my paper. I believe that would be a policy that would pay, as far as saving life was concerned.

I would cooperate with the National Safety Council by printing the news about it and encouraging the people to belong. When you join an organization that is fighting against wrong you are going in the right direction.

I would print traffic laws on the first page of my paper. Do not think that this paper is going to be all devoted to safety work, but some of it is, and I believe it is important enough even for a metropolitan paper to have. The *New York Sun* ran a series of courtesy slogans that was extremely popular. It also ran a slogan about making bets on horses. I would say not to disobey traffic signals or something of that kind.

I would make a fight against the ambulance chaser. That is a thing that I really should talk about here today. I am a good soldier so I followed orders and talked about these other things. I am not so well qualified to speak what I would do as an editor of a daily paper as I am qualified to speak about the ambulance chaser. I believe the ambulance chaser is doing more to harm safety work than any other thing. They work in the dark. They encourage rules against safety and they are looking always for people who have been in accidents. They go to the trouble of making you pay money to protect yourself against them. If it were not for the ambulance chasers you would find that the safety work would go ahead a great deal faster. You would be able to have the publicity that you should have on all accidents. But now the company wants to keep it quiet because the company knows that the ambulance chaser will not be far away.

In New York we have made a fight against the ambulance chaser. The *New York World* and the *Brooklyn Eagle* led in that fight and we have succeeded in curbing to a great extent the work of the ambulance chaser so much so that your mutual insurance companies which were practically bankrupt a year ago are preparing to pay dividends and this has been done by not paying small claims to ambulance chasers. One man filed 250 cases in two and one half months. Another man 1,500 cases in something over a year. He must have been a pretty good

lawyer. I believe it is the duty of every paper throughout the country to try to fight the ambulance chaser and have active campaigns against them.

The last thing I would do if I published a paper would be to back up the code of the Hoover Committee. It has been carefully prepared and I believe it is ideal for taxicabs and fleet operators as well as the general motoring public. I would see that this code was advocated in my paper. I would have a study made to see where the local ordinances conflict with the Hoover code. I would bring the pressure of public opinion in order to have the local laws comply with the model traffic code suggested by the Hoover Committee.

Gentlemen, these are some of the things I would do if I were the editor of a big metropolitan newspaper. I am not the editor of that kind of a paper so it will mean little or nothing unless you carry back these ideas for your own local papers. I do not see any reason why you cannot suggest such a program to your local papers. I believe it would be well received and that you will find that they will be willing to cooperate with you in putting it over.

The last thing I should like to say is that if these meetings are going to amount to anything some good must go out of them. Therefore if you have come merely to listen without any idea of acting on the suggestions, my suggestion is not to come again. I believe you must work actually for safety to follow out the precepts of the meeting.

CHAIRMAN CLAIR: I hope that the editors of some of our local papers will have these matters brought to their attention. I was talking a few weeks ago with one of the boys in my organization who had just come from a visit to St. Louis. I said to him, "Never having been in that city before, what do you think of St. Louis?" He said, "I'll tell you how I feel about it, especially in relation to the traffic situation. St. Louis is a congested area situated between parking spaces." I think we are very fortunate this morning in having the next speaker with us. He is a man who has been actively engaged in the business of transportation. He has done much pioneer work, especially in matters pertaining to safe bus operation. It gives me great pleasure to introduce Mr. R. W. Meade.

Safe Bus Operation

By R. W. MEADE

President, The Peoples Motorbus Company, St. Louis, Mo.

When, a little more than twenty-one years ago, the gasoline motorbus was introduced in New York as a new medium of public transportation, there was very active discussion among street railway men (of whom I had been one until shortly before that time) as to whether the bad accident record accumulated at that period by the street car—both cable and electric—would not be greatly outdone by the motorbus.

Here was an independent, self-contained mechanically-propelled unit plying for gain through the city's most congested streets, not even confined to tracks and free to run amok if the driver so willed—potentially a powerful engine of destruction. The record in London during the pioneering period, during which three large companies were vying with each other in rapidity of expansion to serve the most profitable routes, had been so bad that the motorbus was regarded at that period as the most dangerous vehicle engaged in street traffic. With such a record in London where the regulation of traffic was considered well nigh perfect, what would it be in New York?

I am glad to say that the outcome was most gratifying. Far from piling up a record of costly collisions with vehicles or pedestrians, accidents of a serious character were comparatively rare, and the pedestrian accidents were almost com-

pletely confined to cases of drunkenness or gross heedlessness on the part of the victim, who usually walked into the side of the bus after the front of the vehicle had passed. Our few fatalities were nearly all of that character. In the first ten years of operation during which our buses ran more than 25 million miles and carried nearly 100 million passengers there was but one fatal accident to a passenger and three cases of serious injury, while accidents involving persons other than passengers totalled 16 fatalities and 24 cases of serious injury. This comparatively favorable record was reflected in a monetary way in the fact that the amount we set up on our books as a reserve against injury and damage claims amounted to more than three times the actual calls on us during the decade. At the end of that period we had a reserve of nearly a quarter of a million dollars unexpended.

These results proved that, given proper organization and supervision in a city with adequate police traffic regulation, the motorbus when compared with the street car makes a highly favorable showing from the point of view of safety, both of its passengers and of others.

Inasmuch as the experience gained and the methods pursued in New York have been largely followed in the organization and operation of bus service in other cities, an outline of some of the basic factors involved in the operation may be of interest.

1. *Standard Rules.* In the very beginning the standard rules of the American Electric Railway Association for city street car operation were taken as the basis for the rules for the operation of motorbuses. Thus the underlying principles that had been found valuable in street car operation were applied to the motorbus so far as practicable. One rule which has probably done as much as anything in saving life and property has been that which requires a full stop before crossing any street railway line. I have heard bus operators scoff at this rule as causing unnecessary waste of time but I am firmly convinced that the additional time involved (which is, of course, considerable) has been richly repaid in immunity from the most dangerous type of collisions to which the bus is subject.

2. *Tried System of Discipline Employed.* In the enforcement of the rules, the methods developed in the steam and electric railway fields, under which a cumulative record of every man is kept and can be reviewed, were employed and have proved their value.

3. *Training and Promotion.* The practice of employing every man first as a conductor, where we have a chance to observe his general habits and reactions before he is permitted to drive a bus, with all the responsibility this entails, has been of the highest importance. The street railways generally keep the two positions on a parity as to pay so that there is no advantage in transfer from one to the other. We have always maintained a differential pay rate in favor of the driver, and this has proved a strong incentive to the man working on the rear end to give meritorious service and win promotion to the position of greater responsibility and remuneration. We have also found that the man who has served on the rear end when promoted to driver shows a greater sympathy with his team mate, and this makes for greater safety. Nothing is more important to safety than the character and thoroughness of the training the prospective driver receives. Only the best men can be safely entrusted with that important duty, and on the principles and practices absorbed by the new driver during this process his success in safe and economical handling of his vehicle will largely depend. Moreover, the right kind of man in this position will discover and eliminate men with slow reactions or other dangerous tendencies that might be overlooked by the average driver detailed to such training.

One of the important details of the training process is a systematic follow-up during the first month of service to observe the progress of new men. This frequently uncovers lapses from accepted practice through the tendency of some

men when they get "on their own" to "express themselves" in ways that do not conduce to the safety or comfort of their passengers.

4. *Physical Examination of Crews.* The physical examination of men employed as drivers and conductors of motorbuses is of the highest importance. While the term "physical" is employed, our examinations have always gone beyond the literal interpretation of that word, our physicians being particularly alert to eliminate men with mental or psychopathic tendencies that would render them unfit for this exacting service.

5. *Incentive to Longevity in Service.* Our experience shows that, in general, the longer a man remains in our service, the better he is, and this applies in the matter of safety as well as other characteristics of his work. Therefore it is not only simple justice but good policy from the economic viewpoint to increase his pay according to his length of service, and this has always been a feature of our policy. It is the best substitute we have been able to devise for bonuses for meritorious service, the successful administration of which is almost always attended with drawbacks and complications.

6. *Mechanical Excellence of Equipment.* Nothing but the very best equipment obtainable, regardless of its cost, has ever been good enough for our use. In the beginning we were obliged to import all our bus chassis, paying 45 per cent duty, freight and packing, but until our American manufacturers were able to produce vehicles and their component parts of equal excellence, the heavier cost was well repaid in the freedom from failures to which the American product of those days was all too subject. Absolute safety can only be assured by using vehicles competently designed for the service they are intended to perform and built conscientiously of material capable of withstanding the arduous duty and heavy strains imposed in public service. In our infancy we were fortunate in having the experience of London to guide us, where, under the relentless eye and hand of Scotland Yard the character of motorbuses permitted to ply on the streets of London was never permitted to fall below the high standards prescribed by the Police Commissioner's engineering advisers. By adopting these standards as our own we avoided the pitfalls into which so many other enterprises of this type were falling in that day, living their short and hectic lives in happy disregard of the danger signals, and disappearing as suddenly as they arose.

7. *Mechanical Inspection and Repair.* Possessed of equipment capable of withstanding the arduous service to which it is subjected, the next requisite is to keep it continuously in the best of condition. Here again the experience of London was of the greatest value. The system employed by the London General Omnibus Company and adopted by us has been aptly termed "mechanical prophylaxis"—in other words, anticipation and prevention of trouble instead of waiting for it to occur. This consists of a periodical inspection and overhaul of every vehicle based on the performance of a certain mileage, varying from 2,000 miles up, and regardless of the vehicle's apparent condition at the time. During this process, which is performed on the scheduled day between 7 a. m. and 4:30 p. m., every part of the vehicle is subjected to a rigid inspection, all wear is taken up, and weak, worn, or defective parts replaced. On the completion of this overhaul the vehicle is ready for another tour of 2,000 or 2,500 miles with reasonable certainty of immunity from mechanical failure, while, from the standpoint of public service and economy of operation, the loss of service is reduced to a minimum, the vehicles undergoing this overhaul all being available for service during the evening peak load on the day of overhaul.

In addition to the foregoing, every vehicle is subjected to an annual overhaul, equivalent to a rebuilding, during which every element in it is brought up to the latest standard. Under the combined program accidents due to mechanical failures are reduced to a minimum. Brakes, steerings and elements in the transmission

line, failures in which are likely to cause accidents, are always given special attention.

8. *Means to Prevent Skidding.* Slippery pavements and skidding accidents are two of the worst dangers of bus operation, and this refers not only to the bus itself but to all other vehicles on the street. After providing vehicles that by excellence of design are reasonably free from skidding tendencies, careful training of drivers in methods of handling their vehicles on slippery pavements is the first requisite. The third line of defense is to so treat the pavement at critical points as to minimize the skidding of any vehicle no matter how driven.

Early in our New York experience we found the mechanical gravel-spreader an important adjunct to our service, because the City had not learned at that time the value of rendering such a service. The same device has proved valuable if not absolutely essential in other cities where extensive bus services are operated and has demonstrated its value to, and appreciation by all vehicular traffic in large numbers of motor vehicles, both passenger and trucks, that are attracted to the gravelled bus routes in slippery weather.

On one particularly dangerous stretch of pavement on an important route in St. Louis we prevailed on the City to permit us to give the descending grades an experimental permanent non-skid treatment, and this has demonstrated its value in the two years or more since it was laid. If our cities would treat all their pavements on descending grades in this or an equivalent manner it would eliminate many preventable accidents.

9. *Safety Organizations.* With equipment of the best design, material and construction, maintained in the best condition; with rules based on wide experience and with an expert organization and approved methods for enforcing them; with thoroughly trained and supervised drivers and conductors, it is further necessary to keep the idea of safety prominently and constantly before the entire organization and to secure the cooperation of the rank and file in maintaining it if accidents are to be kept down to a minimum. For this purpose a wide variety of expedients may be employed in the form of financial bonuses, prizes, contests, etc., but the basis for any of them and the most effective, year in and year out, is some form of safety organization. This can vary widely in its make up and functions so long as it provides for the free and active participation with the supervisory and executive forces of the rank and file, that being the essential characteristic without which it would not differ materially from or properly supplement the operating organization.

10. *Records and Statistics.* It is of course important to keep complete records of accidents and to classify them, the most important objective of such records and statistics being to diagnose the direct and underlying causes, and thereby be able to apply preventive remedies. I have often felt that the ability to make readily at any time such special classifications as are only possible by means of some selective mechanical system would be exceedingly helpful in this direction, and on a large system might easily repay the rather high expense involved.

The bus is inherently a safer medium of transportation than the street car. In the accident statistics of the electric railway there is one important item almost entirely omitted, but which from the public viewpoint is really chargeable to that system of transportation. I refer to the heavy toll of fatalities and injuries taken every year of electric railway passengers going to or from the place of boarding and alighting, sometimes while actually standing in so-called safety zones or crossing the lanes of rapidly moving traffic. All too frequently there are races between passengers running from the curb to the loading place of an approaching street car and a flock of automobiles striving to get by the loading zone before the street car comes to a stop and blocks them until it again gets under way. In my opinion, the provision requiring all vehicular traffic to come to a stop while a

street car is loading or unloading regardless of the width of the lane between the tracks and the curb is a most unwise and unnecessary one because of the strong tendency it has to cause just such wild races as mentioned above and others of equal danger in attempting to beat the car to its next stop. The alternative provision under which vehicular traffic is permitted to continue to move but at a moderate speed and at a distance of eight feet from the street car is in my opinion a far safer one. It is unfortunate that the full stop provision has been incorporated in the Hoover Model Code of Street and Highway Laws. Objection is sometimes made to the eight-foot rule on the ground that it is difficult of enforcement. There is no reason why it should be if an eight-foot zone were *painted* at every car stop, and this is the least that the railway could do for the safety of its passengers. A few arrests and convictions of the motorists that endanger human life by driving recklessly past loading zones would soon break up the practice.

All this emphasizes the great superiority of the bus from the standpoint of safety in its ability to take and leave its passengers at the curb—the only true safety zone—and also the fact that in this process it permits all other vehicular traffic to pass freely by, eliminating the wild driving so common along every street car line when motorists are contending with this prime obstruction of our thoroughfares.

No one can deprecate more than I the callous indifference of a motorist who will endanger the life or limb of a street railway passenger going to or from his car, and I feel that the penalty for such reckless disregard of safety should be severe, but that is no reason why a vehicle that is inherently super-obstructive should be artificially made more so to the serious detriment of all other vehicular traffic.

Recently I returned from the Annual Convention of the American Electric Railway Association where the principal subject under discussion was Modernization. Much was said of the importance of the street railways controlling and utilizing the motorbus, but not one speaker even suggested the possibility of the only step that would really modernize a system of city transportation, namely; the removal of all rails, poles, wires and other obstructions, the repaving of the roadways with a smooth, homogeneous pavement, and the substitution of motorbus for street cars.

Speaker after speaker reiterated the dogmatic statements that there is no substitute for the street car as the prime method of mass transportation and that the bus can not handle passengers as cheaply as the rail car. I strongly disagree with both those statements and my proof is readily available in the service of the London General Omnibus Company in London, which handles more passengers than any street railway system in the world, at fares approximately the same as those of the London County Council Tramways, and earns a handsome profit, while the tramways run at a considerable loss. The fact is that there is nothing done today by the street car that can not be better done by the double-decked motorbus.

The substitution of the bus for the rail car would give fluidity and expedition to *all* vehicular traffic instead of expediting the public transportation in street cars at the price of obstruction of all other vehicles. But beyond that—and this is the reason I mention the subject of modernization—it would be a great forward step in the direction of public safety, substituting for the archaic system under which passengers must twice in a journey risk the hazard of crossing streams of vehicular traffic for one in which they are taken and left at the curb. The city that first eliminates this serious hazard by substituting a modern bus system for its fixed rail system will not only make history in the solution of the troublesome traffic problem but will make an important contribution to humanitarian effort in the saving of human life and limb by lessening the great unnecessary toll of street railway passenger casualties that is the penalty of adhering to an outworn system.

J. G. WILLIAMS, Acting Chairman: Is there any street railway man present? If there is we would like to hear what he has to say in reply to Mr. Meade. We do not seem to have any. We are very grateful to Mr. Meade for this splendid paper on bus safety. Who has something to say about it? At a meeting of this sort when set papers are given it is very fine to listen to them but the things that get driven home in our minds are usually provoked by the discussion and we would like very much for you to take this meeting in hand and say what you have to say. A lot of you have come all the way to New York full of this safety idea and we would like to have your ideas, the more unconventional the better, and the newer and less talked about the better, because they develop into something really worth while.

L. E. MACBRAYNE (General Manager, Massachusetts Safety Council): I want to stress one point in selling your motor transportation to the public. About a year ago one of our busses had a rather nasty accident and this immediately created a sales resistance to the operation of our busses in the city traffic. It happened that on the same day the New England Transportation Company covered 25,000 miles in the operation of its busses without an accident—equivalent to running around the world. We staged a big dinner with the Chamber of Commerce and among the exhibits we had posters indicating that, "We drove around the world yesterday without injuring anybody." We really have a very low accident record from being organized much along the lines you have indicated. When you have made the reduction in your accidents you have a good field for publicity and it is sometimes most difficult to obtain the publicity needed for your operation.

E. W. MARSH (Traffic Engineer, City of Pittsburgh, Pa.): I would like to say a word, as one of the members of the Hoover Committee, about the model traffic ordinance. I feel that one phase should be amplified a little bit. That relates to the provision of the ordinance concerning stopping vehicles when the street car is loading or unloading. This subject was discussed and considered very thoroughly and carefully by the committee, of which the present chairman is a member. I believe that all points of views were carefully considered. It is true that the final result of prohibiting or recommending the prohibition of passing a street car when it is loading, regardless of the width of the highway at that point, provided, however, that if a safety zone has been created the vehicle may pass at a cautious speed, is a wise one. I believe that although the eight feet of clearance which has been used in Massachusetts and in other places has some merit that it also involves a decided hazard. What may be eight feet to you may be six feet to somebody else.

The point behind the solution as set up by the Committee is that we believe that through these means we will foster, where they can be well placed, a type of safety zone that will give safety. That, of course, is perhaps a little out of the line of thought of you gentlemen if you believe that the bus will immediately supersede the street car. Most of us working in traffic, but not in any one branch of it, cannot see that this is going to take place soon. We do have to face the problem of getting the people safely to and from the street car. Do you not believe that if the law adopts this recommendation it will bring about greater safety because when the roadway is wide enough it will cause them to make a really safe zone.

Your chairman said that if anyone had anything different to bring up that it would be welcome. I am not so sure that what I am going to say now will be. I would like to have your thoughts and constructive criticism on this subject. I belong to several committees in different parts of the country who are working on our traffic problems. We had a meeting in Chicago with the Engineering Committee of the National Safety Council and considered certain problems we should like to direct attention to. The membership of the committee is trying

to put engineering analysis on the traffic problem in the cities. One of the subjects which received the most attention was the subject of taxicabs and their regulation. I would like to bring to this group the question of what you people are doing to help the communities to take care of safety in the question of licensing operators, etc. I would also like to bring up the point which seems to me to be a great opportunity to the group you represent. I think it is generally true that there tends to be controversy between the people who are trying to take care of general traffic conditions and the taxicab people, possibly the bus people too. My thought is that if the people who represent the leading thought in the taxicab game could formulate principles for safety and regulation, they will forestall undesirable regulation which cities find they have to adopt.

Let me illustrate, taking the case in Pittsburgh, where at the present time, after attempting to secure some results by working with the taxicab companies unofficially, we have finally introduced an ordinance which comes up for a hearing today, which may be considered very drastic by the taxi people. If the taxicab people will study in a broad-minded way the problems which are bothering the city traffic officials and cooperate with those officials, it may in the end result in better conditions both to the city and the taxicab companies, as against a too hasty adoption of measures which may be considered by the cab companies very drastic and may lead to lots of unnecessary controversy. The licensing and regulation of taxicabs, proper insurance protection, etc., are some of the points that have to be considered. I would like to leave those subjects with you gentlemen and ask that through your organizations and your contacts you give some constructive consideration to these subjects in the coming year, to the end that we may cooperate and arrive at a reasonable solution of some of these problems.

ACTING CHAIRMAN WILLIAMS: In the City of Chicago, we have 300,000 registered private vehicles. The fleets of commercial vehicles are not the ones that are congesting the streets. We have about 3,000,000 people and that is one vehicle for ten people. Private vehicles that make the trip down town and back usually accommodate one patron or at most two. So then the 300,000 private vehicles might possibly accommodate 600,000 persons in their trips down town and back during the day. Then you have 2,400,000 people who have no vehicles at all and they pay for and ride in taxicabs and other public vehicles. Are you going to take the vehicles away from the 600,000 who ride in private motors or from the 2,400,000 who ride in public vehicles? Are you going to put them off the streets so that the other 300,000 can run their machines?

Of course you are not. You are going to regulate the streets so that the greatest number of people can have a vehicle to ride in. When you come to regulating vehicles you must regulate the private vehicles off the street, because they represent one-tenth of the population. Your vehicle that accommodates one or two persons occupies just as much space as a taxicab, or perhaps more space because they are longer. A taxicab during the day will accommodate 15 to 20 people and your private vehicle accommodates one or two. That will have to give place to the vehicle that carries most. Then when you come to regulate vehicles that 50 or 100 people can ride in you have still another problem. That is what Mr. McClintock has found in his survey in Chicago. He found out who rode in the private vehicles and who rode in the taxicabs and they restricted the private vehicles and allowed the taxicabs to go back and forth because they belong to whoever wants to buy a ride. That seems to be our angle of the problem.

MR. MARSH: That is not quite the angle I had in mind and indeed I agree with the remark made to a considerable extent. There are a number of problems of the taxicab driver licensing, protection to the public, regulation and insurance, which are questions that have not been met in a good many places though they have in some. There are also the principles which should govern the location of taxicab stands which, to my mind, would be exceedingly valuable. It is for

that sort of thing I am speaking rather than anything about allowing private vehicles to park in the streets and excluding the taxicabs, or anything of that sort. Anybody who has any sense will realize that the taxicab has a distinct function in public transportation and wants to take care of it. Some of these problems concerning the relation of the taxi to the city traffic to my mind have never been given that joint broad-minded, progressive, cooperative attention which would probably bring valuable results.

A. J. BAXTER (Minneapolis, Minn.): I am not connected with the taxicab companies. In a way I would like to cover the point the gentleman spoke about. I was chairman of the street traffic committee in Minneapolis for a number of years. We have attended several of these conferences and we are interested in public safety. For the past year our committee has taken up the matter of regulation of taxicabs. When we first called in the representatives of the various taxicab companies, there was a situation which was not at all satisfactory. There were no taxi stands designated although we had tried to designate them by giving the police department authority to designate cab stands but the police paid no attention to them. At the last session of the legislature we had an amendment giving the city the right to establish taxicab stands. That gave the City Council authority to establish them.

As soon as the law was passed, we went about establishing taxi stands. We have a few independent owners and drivers and about 500,000 population. There are 54 square miles of congested streets like many of the eastern cities. The taxicab owners thought, "Is that new City Hall gang going to raise hell with us now?" When we talked it over, they realized that we were hoping to bring order out of chaos that had been existing up to that time. We asked the taxi owners to suggest to us where they wanted the districts located and the number of cabs at the various stands. They suggested about 50 stands and how many do you think we cut out? Only three, and then we differed with them as to the number of cabs in some instances. Only in four or five instances we cut down the number from three cab stands to two cab stands and from five to four. We got along very well.

There was a bad situation right in the center of town where the hotels and theatres are. The business men continually complained about taxicabs, double parking, etc., and after we created the cab stands the business men in that highly congested district were much pleased. They worked with us on the proposition and we have had very little complaint about our taxicab situation there now as far as parking is concerned. I have talked with a number of drivers and independent owners and have asked them how it works out. One of them said, "Before, when we were busy, we were not interested in any cab stand but when we were not busy and looking for a place to light, we would have to run around for blocks. Now we always have a place to park the car."

Another thing we have been doing that is being tried in several cities, San Francisco, I think, is to allow taxicabs to stand at hydrants marked taxicab stands. Under no consideration can the driver leave his car when parking at a hydrant. If he is going to leave his cab he must drive away from the hydrant on account of the menace of fire breaking out in the region. So far, we have not had any trouble and have been working on that since last spring. They generally get into those stations when work is slack and generally have the very best taxi stands because they are used when business is very quiet. What is agitating us now is this. The newspapers have taken the matter up and I would like to get some opinion to bring back home. That is regarding insurance, whether the taxicab companies should have mutual insurance or be bonded with some insurance company, the rates paid, etc. . . .

ACTING CHAIRMAN WILLIAMS: We have not very much time and I think we had better stick to the subject in hand and you can bring up this insurance matter later.

MR. MARSH: I feel that my first remarks are perhaps too general. I would like to suggest subjects for consideration, to outline more specifically what I mean. Should there be special licensing of taxicab operators and what should the rules be? Should there be special taxicab insurance and what type of regulation?

Taxicab Stands: Under that subject is it better to have common stands where all cabs may come in or independent stands as a few cities have, used by one cab company. Where should stands best be located to meet the taxicab demands and still help the traffic officials. What regulations should govern the stands and what should be the maximum? If they should have stands, should they be permitted to stand elsewhere? Should taxicab stands be permitted on no-parking streets where you exclude other vehicles, and so use what may be considered a subsidy to the taxicab companies. Is the future going to bring off-street stands in the congested districts? Can taxicab companies better govern the number of cars which are out during a period as regulated to the demand at that time? This is related to the serious problem of cruising which is a difficulty to every taxicab operator and to those of us who are trying to handle traffic conditions. How can the problem of cruising be traced more specifically than at present?

DALE HARMAN (Vice Pres. and Mgr., Yellow Cab Company, Kansas City, Mo.): I feel as a worker in this association that your questions should be put to the National Association of Taxicab Owners, who have representatives in more than one hundred important cities in the United States and Canada. I can count a dozen or fifteen members here and I am trying to defend all of them. I know Mr. Cloud and Mr. Cummings are working in their respective cities and Mr. Walter Laird of the Yellow Cab Company of Pittsburgh is one of the greatest workers for safety. I feel that we should defend these people. We have ordinances in every city in the country. Some of them need revision and I do not know of any of us hindering efforts of the Safety Council or the police department in trying to regulate traffic.

MR. MARSH: Every city has traffic ordinances but in view of getting better traffic conditions, it has been deemed wise to get people together or their representatives to devise a standard code to improve conditions. My appeal is that your industry by getting the best thought in it together can cooperate with the committee, I believe more thoroughly than it has done in answer to some of these questions. Please do not get me wrong; I do not want to say that Walter Laird is not a good safety man for he is. The future is going to require some further steps along these lines and my thought is that here are problems that may be answered satisfactorily now which are going to come up in increased numbers in the future.

W. W. CLOUD (Pres. Yellow Cab Company, Baltimore, Md.): Does not what you have just said apply to every character of transportation, street cars, busses, railroads, etc.? Now, under the deliberations and conferences of the Hoover Committee, there has been a great effort to get these interests all working together in the interest of better traffic conditions in the cities. You have made some very important and enlightening suggestions there. I do not resent them at all. We always welcome anything that will better the conditions, but in the making of specific recommendations throughout the United States, the conditions are so very different that it has been hard to standardize or to formulate principles that we could recommend as representing a certain industry that would have been applicable to the entire country. Following what Mr. Harman has just said, I feel that in a matter as important as this that does not apply to a particular industry as well, we would probably make progress with that if it

was submitted to the authorized representatives of that industry who would have cooperation of the engineering experience and then see how close their findings would match those of the Hoover code. I think we could reach a point where we would agree and make progress in the end.

ACTING CHAIRMAN WILLIAMS: Along the line of regulation and safety endeavor, we have Mr. Zukor from Cleveland, and I want to ask him to say a few words about what he is doing for accident prevention there.

L. C. ZUKOR (License Commissioner, City of Cleveland, Ohio.): As I sat here it was rather amusing to note that we all seem to have the same problems. First, the question of licensing the driver: I do not claim to have the solution, but we have gone a long ways in acquiring some degree of success in selecting the type of man that will best serve the owners and the community as well.

I shall give you an outline of the method of procedure we use. Each man is obliged to fill out an application on which he answers questions pertaining to himself, his last employer, the period of time employed, etc., and for the past five years, his residence. On the inside there are two vouchers, who should have known the applicant for at least one year. These are sworn to before a notary public. He must submit to physical examination before a doctor. That is part of the application. He sends in four pictures of himself, front view. The applications are received by us. We are separate from the police department, but they make an investigation and one of my inspectors goes into the community and finds out where the fellow lives and what his habits are. Sometimes, we find that his address is fictitious or that he is a dead beat. His police record is verified. He is brought into the office and his finger prints taken.

I recall that when this was first inaugurated, it caused a lot of strife and objection. Men do not like to have an identification as rigid as the finger print, but you can take it from me that we have only a limited number of cases where we need to use the finger print and fortunately, it is just as needful for the protection of the innocent as to secure conviction of the guilty ones. I am going to try to make this brief and may leave out some points of interest to you. I know you are anxious to get away.

The question of compulsory insurance: Every cab in the City of Cleveland metered or non-metered, must carry insurance, five, ten and one. There is an alternative whereby a regularly constituted company may give bonds in sufficient amounts according to number of cars they operate. For those of you that might carry this idea home and try to promulgate that, bear in mind that the bonding features are not always what you expect them to be. It is not all gold that glitters. The operators put up the collateral and it is tied up for so long a period that you could grow old and die and your posterity would never collect. The laws of various states control that.

The subject of mutual companies: There may be insurance men here, and I am not going to mince words, but I will say that your mutual companies are no bigger than their power of collection. I will not except that. The ordinance is so constructed that the final say rests with me, subject to the law department. I would warn any insured to be mighty careful before they accept a mutual policy.

The next question that comes up is, "What can you do to maintain a sensible standard of rates when it comes to the charges for insurance?" That is a great bugaboo. Our experience has shown that about the first of January, our rate was \$575 per cab or approximately a little over two dollars a day. In order to offset this to some extent, we started a round table discussion and got all our competing operators to come, nothing official, but a sort of get-together meeting and we all agreed that there was some solution to be had. We inaugurated a system whereby each company assumes that the operator must make a return to the traffic division of his number and by whom he is employed. This is done for

every accident, no matter how trivial, it must be reported. This is in addition to reports made by the police department.

The record is kept and if a chauffeur is transferred, the new employer must report him. As soon as a man has two chargeable accidents,—I mean accidents that could be prevented—on the testimony of witnesses and your investigators (and the police department will assist you), the man is notified of a suspension of his license. This is sometimes put into immediate effect. He is given an opportunity to be heard before representatives of the traffic division, the police and each of the companies. They are permitted to hear the cases. If you have a lot of floaters in your city, there is where you will see them. The man is given an opportunity to make a defense. If he has a bad record (I saw one fellow the other day with seven accidents since the first of March), we take his license away and do away with him. Only four of these accidents were chargeable, but any time a man has a rear end collision, he is out of luck. If a man is a potential accident maker, careless, wilfully disobedient of orders, then he loses his license.

One company told me that in one month their experience was improved 55 per cent. It is worth trying.

Now as to a method of supervising your public stands: We have eliminated them on the highways during the rush hours, but you must serve the patrons of your hotels. You must accommodate the public whenever you can. We do not permit cruising and a special detail of motorcycle police enforce this regulation.

ADJOURNMENT

October 4, 1928

ROBERT CLAIR, Chairman**Safety Engineer, Liberty Mutual Insurance Company, Boston**

The Third session of the Taxicab and Fleet Owners Section was called to order at nine-thirty o'clock by the chairman, Robert Clair, Highway Safety Engineer, Liberty Mutual Insurance Company, Boston, Mass.

CHAIRMAN CLAIR: The meeting will please come to order, gentlemen.

The first speaker whom we have on our program this morning, is one from whom I am sure we will get a great deal of inspiration, as we always do.

It gives me great pleasure to introduce Mr. Marcus Dow, author of "Stay Alive," and an ex-president of the National Safety Council.

Little Things That Cause Big Accidents

By MARCUS A. DOW

Vander Poel, Pausner & Jefferson, Inc., New York City

Of course, I have been engaged in safety work for a great many years, and have had a long and quite varied experience in all phases of accident prevention work. And the more I see of accidents and their causes, the more I become convinced that it is the little things that go to make up the majority of accidents, big and little.

The great trouble with the average mind, that is, the mind of the average person who drives a truck or automobile, in regard to accidents is that they think only of the bigger things which cause accidents. For instance, if we pick up a newspaper and read about a train wreck where a score of lives have been lost, why, we are somewhat impressed. We read where the engineer was asleep on the job, that he ran by a red signal, that the safety of a hundred souls had been placed in his care. Black headlines stare us in the face! It is a terrible thing. Federal and state railroad investigations are immediately begun, and for a few moments, at least, the public mind is impressed with the single act of negligence that brought on death and disaster.

Or again, an automobile, perhaps in the dead of night, traveling at a high rate of speed, mounts the curb and plunges into a tree. The driver and the other occupants of the car are instantly killed. A bottle of gin in the wreckage tells the story: "The driver was drunk." It gets front page space in the newspapers, and the public mind sees the picture of an untold number of drunken drivers careening along the highways and we fix upon them the responsibility for a large proportion of the deaths and injuries occurring on the highways.

Or again, some traffic court magistrate adopts a laudable policy against speeders, and we get the impression from that publicity that the speed maniac is responsible for a great deal of the accidents we have today.

Now, I do not want you to get the wrong impression. I am not offering any excuse whatever for the drunken driver or the habitual speed maniac. I go on record to say that any automobile or other vehicle in the hands of a drunken driver is a potential death car, and any motor vehicle in the hands of a reckless speed maniac is a deadly weapon.

But what I would like to impress upon you and bring to your attention, is the fact that these major violations, serious as they are, cause only a small proportion of the total number of accidents occurring on our streets and highways today.

A man stepped out of his house in a small western town, on a dry, clear, sunshiny day. There was no rain or no wind, nothing whatever to interfere with his actions or to get his goat. This man had two good eyes. His hearing was O. K. He was not crazy or bughouse. As a matter of fact, his physical and mental construction, you might say, was Grade A. So he did not have an alibi to cover what he did, and I will leave it to you whether he did or not.

Well, he got up on the seat of his automobile parked in front of his house, started the engine, threw it into reverse, and backed up. Well, he slammed into another car parked three feet behind him with such force as to start it rolling downhill. Now this second car ran smack into a baby carriage being wheeled across the street by a 12 year old girl, and tipped it over. There was a six months old infant riding in the go-cart, and it landed on the pavement on the top of its head.

You all know that kids of that age have a soft spot on the top of the head, very tender, and the blow killed that little mite deadlier than a door nail.

Now, the man that backed up his car and slammed into the car behind him was not speeding. He was not even drunk, although you would think he must have been cockeyed the way he handled his car; but he backed up without looking behind him to see what the conditions were. He backed up quickly and suddenly with a jerk, stepping on the gas too hard, and he broke not a fender, but a mother's heart.

Remember the little things! Because some of the things that to you may seem of the least importance, are oftentimes the cause of serious injury or death.

I picked up a copy of the *New York Times* only a short time ago, and down in an obscure corner of the inside page, I read a paragraph that told about a fatal injury to a man who, while cranking his own car, was killed by a man backing into him without any warning, and without the driver looking where he was going. I can count on my fingers a half dozen injuries of that kind that have come to my attention, from carelessly backing up.

So I say to you it is the little things that really go to make up the great majority of these deaths and injuries that occur on the streets and highways today.

Another case that comes to my particular attention and recollection at this time is one that occurred out in Chicago not so very many months ago, where the driver of a huge truck was bowling along one of the streets of that city and in front of him was a small car of the type commonly known as a "Tin Lizzy." This car in front of him came to a standstill on account of another car cutting out in front of him, and the driver of this huge truck plowed into the rear end of this little automobile crushing it like an egg shell.

There were two women riding in the rear seat of that little car, and one of them gave out a piercing scream that indicated she was badly hurt. They took her to one of those places where they have white iron beds, and nurses with white uniforms pass quietly about, and there they performed a serious operation on this woman, and there she closed her eyes with a final spasm of pain and suffering, and died.

Now, the guy that ran into the rear end of that car thought he had a tough break, he thought he should have gotten off with just a dented bumper, as happens nine cases out of ten in an accident of that kind. But it only goes to show that you can never tell how serious any one of these little accidents may turn out to be. This guy thought there must have been a jinx or hoodoo following him about, some black cat that brought him bad luck, that a woman should have had to be killed in a little accident of that kind. Whereas, as a matter of fact, that black cat or jinx or hoodoo, or whatever you want to call it, was right underneath the little brown cap he was wearing. It was his own careless, indifferent method of following so closely behind the car in front of him that he did not have a

safe braking distance, so that he could come to a quick stop which caused that accident.

Remember the little things in the educational campaign among your drivers! Because it is the little things that go to make up in the long run the greatest proportion of deaths and injuries on the streets and highways.

I remember when I was a kid in school we used to hear the story told of a boy over in that little country known for its windmills and wooden shoes, Holland, where much of the land is below water level, and where we find miles and miles of dikes built to protect the countryside from flood and the ensuing disaster.

According to this story, this little boy one day was walking along the top of one of these dikes, and like all little boys he was very observant. He noticed that on the landward side of the dike there was a little, thin stream of water trickling down the side of the dike; and his interest being aroused he made a closer inspection and found that there was a small hole in the dike through which the water was seeping.

Well, the thought flashed through his mind that the little hole might enlarge, that the little stream of water might make the hole larger, and that, the dike being old, it might possibly give way and the surrounding country might be flooded and scores of homes wiped out and many persons lose their lives.

So, according to the story, he stuck his finger into the opening and stopped the flow of water; he held it there through the long and dreary hours of night, until finally the next day help came. He had saved the dike and the surrounding country from flood.

Now, that was only a little thing, that thin stream of water dripping down the side of the dike. But in the mind of this young boy it foretold the possibility of disaster. That lad, realizing as he did the important relationship between the little thing and possibility of serious accident and disaster, was a real, honest-to-God safety man. Now it is that spirit, that idea, the realization that the little things do cause big accidents, that needs to be instilled into the hearts and minds of the people who drive automobiles on the streets and highways of our country today.

In order to bring about anything near the possibility of solving this great problem of highway safety, we must always bear in mind that it is often the little things that lead up to the big accident and disaster.

Referring again to my experiences and some accident cases that have come to my attention, I recall the case where the driver of a small electric delivery vehicle was bowling along a certain highway in a certain town at the high and terrific speed of about eight miles an hour. His mind was not upon his job. As the teacher used to say in the old days, when I went to school and some kid was thinking about baseball or a dance that he was going to that night, "Johnny, you are wool-gathering." Well, this guy was wool-gathering, he was not thinking of what he was doing, and he didn't have his eyes on the road in front of him. And at the speed of eight miles an hour the front wheels of his little delivery truck hit a bump, and the steering wheel was jerked out of his hands, his truck careened over to one side and collided with a moving van alongside the curb, and the front end of his vehicle was crushed in like an egg shell and crushed his right leg with it.

They took this young chap to a hospital and to save his life they had to cut his leg off above the knee. Going at a speed of eight miles an hour! Only a little thing, not having his eyes upon the road in front of him and his mind upon the job of driving, but it cost this lad his leg.

Remember the little things! Because it is some of these things that to you may seem inconsequential and trivial that really go to make up the majority of

the accidents resulting in death and injury that occur upon the highways and streets each year.

Another case in point I recall very vividly: About last Christmas time, a few days before Christmas, a guy who drove a truck for a certain concern out in a large western town parked his vehicle out in front of the store and went in to make a delivery. He came out and got up on the seat, started his vehicle, and pulled out into the line of traffic. He was collided with by a six-ton truck going hell bent for election, coming behind him, demolishing the front end of his vehicle. When they took this guy out of the wreckage he was unconscious; and when they took him off the stretcher at the hospital a half hour later, he was dead. And, instead of the bunch of toys they expected for Christmas, his two little kids and his wife had a funeral on their hands. Instead of candles on their Christmas tree they had to put them around their daddy's coffin. And all for what reason? Because this guy didn't take the precaution of looking behind him to see what was coming, before pulling out into line of traffic. Why does Dame Nature give a guy a swivel neck so that he could turn his head on it, if he doesn't look behind him once in a while to protect himself from dangers from the rear in making a turn into traffic?

Only a little thing, but in conducting your safety campaigns endeavor to train the employees to think of the little things, the little acts of carelessness and neglect that in reality, in the long run, go to make up 90 per cent of the toll of death and injury that occurs on the streets and highways.

Remember the little things! Because it is in the long run that these inconsequential, small little things cause the majority of accidents in the operation of trucks and automobiles.

Take our collisions that occur at street intersections. One of the most prolific causes of serious accidents that occur upon the highways today. There is a simple little rule that is enforced in a railroad yard which tells a railroad engineer when operating a steam locomotive in the yard limits, where it is not controlled by block signals or any automatic devices for his control of that train, that he must be prepared to come to a stop within his range of vision. How many automobile drivers ever stop to think of a simple little rule of that kind in the operation of their automobile?

If one of the men employed by you is driving a truck along the street or highway and he approaches an intersection, where there is a building, let us say, on the right hand corner, on the near side of the street facing him, and it stands ten feet back from the curbstone, and his vehicle is four feet out in the highway: That gives that guy as he approaches that intersection a range of vision of only 14 feet. Therefore, to be upon the side of positive safety and protect himself from the possibility of death or injury, he will approach that intersection prepared to come to a stop within a distance of shortly more than, well, surely not much over 14 feet.

But how many automobile drivers ever take that precaution, that simple little precaution of safety!

Remember the little things in the training of your men! Bring out to them by forceful, constant lessons these little things, these little acts, of precautionary things that they should do to protect themselves and others from death or injury. "Stop, Look and Listen!" That is a simple rule. It is a little thing, a rule that is easy to learn, easy to master, its observance takes only a second's time. Yet failure to observe it becomes a colossal act of neglect—a tremendous chance—a dangerous sort of chance-taking.

And what is taking a chance? The answer is, it is a form of gambling. If a man who is a gambler goes to the racetrack and bets on a horse to win the race, all he does is to put up a few dollars as a stake. He takes the chance of some

horse that he picks out will win the race, and if he is a good guesser and is lucky enough, perhaps he will gain a few dollars. That is gambling.

On the other hand, if your drivers, any one of them, approach a grade crossing, and they fail to slow down and shift into low gear to prevent the possibility of stalling, and look both ways and listen carefully for the trains, if they fail to do that they put up their lives as the stake, and they take the chance that no train or engine will happen to come along and strike them. And if no train hits him the driver will win, and gain what? Nothing more than a few seconds of time. And in that gamble for time his life, human life, is the stake.

Remember the little things in the training of your men, because after all it is the little things that go to make up the great majority in this toll of death and injury upon our streets and highways each year.

The pity of it, when some careless driver dead from the ears up runs over an innocent child in the street! The pity of it!

The pity of what? That any one isolated case causes injury or death to a child? No, not entirely. But the pity of it that the concern who employed him had not taken the precaution to train that driver to bear the little things in mind that might result in death or injury, due to the careless operation of his truck or automobile.

Remember the little things! Remember the little things!!

Now, how can you help this situation, in developing your campaign along these lines? First, by keeping a very careful record and analysis of your accident experiences, classifying every single accident that occurs in the operation of your fleet of vehicles as to its specific cause, so that at the end of six months or a year you will be able to ascertain by perusal of your accident records how many back-up accidents there were, how many rear end collisions, how many collisions at street intersections, how many on account of hitting bad spots in the street and losing control of the car, how many of this and that and the other thing; and you have something to show and train the employees and educate them, to teach them how to avoid accidents by remembering the little things that went to make up this toll of accidents that are indicated in your tally sheets of your actual experiences.

Way back in my early days, I remember the little story that ran something like this: You will all remember it.

For want of a nail the shoe was lost,
For want of a shoe the horse was lost,
For want of a horse the rider was lost,
For want of a rider the kingdom was lost."

Because an important message was not delivered to those defending the kingdom.

And in these days of the operation of millions of automobiles upon the streets and highways, each year a great army of human beings are lost, destroyed, crushed, maimed, for want of a little care and education and training to impress upon their minds the necessity of remembering the little things that cause accidents.

So let us not neglect in our educational campaign this training of the mind of the motor truck driver to remember the little things. I think that is a duty that every operator of a commercial fleet has to perform, not only for the benefit of his own concern, not only from the economic standpoint of the operation of his own business, but in helping to solve the great national humanitarian problem.

I remember the story told of a young doughboy who lost his life on one of those bloody battlefields of France. After the smoke and din of the battle ceased, and the ambulance men were searching the field for the dead and wounded, they came across this young American boy, who lay there with his face upturned, still in death. And in the pocket of that boy's coat they found a little slip of paper upon which in his own handwriting was written this sublime pledge:

"I shall enter this fight cheerfully and will do my utmost, as if the entire success of this campaign rested upon myself alone."

That was the American spirit, every man desiring to do the best he could, without thought of greater compensation than the knowledge that he did the best he could.

In these days of peace, without the incentive of flag-waving, and the blowing of trumpets, brass bands, and the patriotic fervor, we ought to take stock of ourselves and determine whether or not we are still giving our utmost in whatever form of human service it falls within our opportunity to render. And aside from this economic aspect, which is so important to all of us, aside from the saving of a few dollars, aside from the creating of good will among the public which is so necessary in the operation of our business, we ought to take stock of ourselves and find out whether we are still giving our utmost in a great humanitarian life-saving effort.

By teaching our employees, the drivers of our trucks and vehicles, the ways of avoiding these accidents, and pointing out the many little things that go to create this great toll of death and injury, we will help to solve the national problem and promote the great humanitarian movement; and after all, that is a great and noble effort.

CHAIRMAN CLAIR: I wish to thank Mr. Dow on behalf of those present for the inspiring talk he has given us. I am sure his words will give us new courage and enthusiasm.

We have tried during the last year, in the various matters which we undertook to further the interests of this section, to really accomplish something. I feel that it is a real, sincere tribute this morning to have such a fine gathering here. And I am sure those of us who have worked for the building up of this program, and those many details leading up to it, can feel well repaid. Whatever we have accomplished this year must be carried on.

Yesterday this section elected a slate of officers to carry on the activities of this section during the coming year. The new chairman whom you elected yesterday is here this morning, and I think it is very appropriate at this time that I should introduce him to you and ask him to say a few words.

So it gives me great pleasure to introduce Mr. H. L. Cummings, manager of the Yellow Cab Company, Richmond, Virginia, who is to be your Chairman for next year. Mr. Cummings.

H. L. CUMMINGS (Manager, Yellow Cab Company, Richmond, Va.): Mr. Chairman and gentlemen, I have always felt that Dale Harman was one of the most enthusiastic of safety workers, and as much interested in safety work as any man that I know in the country. But from what he put over on you here, I am inclined to doubt it.

I received a letter from Dale last Friday telling me the Nominating Committee had nominated me as chairman of this section for the coming year. He didn't write to me until the last minute. I tried to get in touch with him, I tried to get him on the long-distance telephone, and I could not. I was very busy at home, it was impossible for me to get here Monday or Tuesday, and not being able to locate him I took the midnight train and decided to come here and get in touch with the Nominating Committee and try to get them to put some man in here capable of handling this job. I got here yesterday, and when I got here the dirty work had been done.

I appreciate very much the honor conferred upon me, but I do not feel I am as capable of doing the work as some of the others in this section. But I pledge you that I will carry on the work to the best of my ability. And in order that the section shall be carried on successfully, it can not be done by the newly elected officers alone, but each and every man in the section must take an interest in it

and help us carry on the work and enlarge our membership, and create more interest in safety work.

Your presence here is evidence that all of you are vitally interested in the question of prevention of accidents. If you were not, you would not be here. And it is up to you to sell the idea of safety to the other operators of your towns that are not at the present time doing anything to promote the safety and accident prevention work. Get busy with these men and try to get them interested in it and carry on this great work.

I see from the program this morning that Mr. Harman is going to give us a talk that to my mind is the greatest thing, the greatest of any accident prevention message that can be carried, "Respect for the Other Fellow." Teach the drivers courtesy and respect for the other man, and that is going to eliminate your accidents.

If the driver of the truck or taxicab remembers that, to extend courtesy to the pedestrian and to the driver of the other car, the courtesy that is due him, and to the fellow parked behind him, and possibly the jay-walker that steps out in front of his truck or vehicle, and remembers at all times to extend courtesy and have respect for those people, your accidents are going to decrease.

I appreciate very much the honor you have bestowed upon me and I am going to do all I possibly can to help promote the welfare of this section. As I said before, I can not do it alone. The other officers, I know, are all going to do all they can. But we can do very little unless we get the cooperation of you men here.

Now, as your new chairman, I want to see the hands of those who are going to support me and help increase the membership in this section--the ones that will endeavor to secure at least one member in this association.

(There was a showing of many hands.)

CHAIRMAN CLAIR: Mr. Cummings has told you the secret of what will be the future success of this section. Speaking from experience, I can tell you that we most sincerely appreciate the contacts, by correspondence and otherwise, that we have with all you gentlemen who have a common interest at heart.

I might tell those who perhaps have not been interested in this section before, that one of the attractive features of being associated with us is to receive every month what we call the *Section News Letter*. That *News Letter* is edited by our Secretary and News Letter Editor and it contains each month brief articles of interest. Through this letter we introduced to our members last year the now famous nickel a day, or milk bottle, safety club, which by the way Mr. Cummings started down in Richmond. If you have any particular problem in which you are interested, drop our secretary a line and he will place that question in the next *News Letter* and ask for solutions. Replies will be summarized and subsequently published.

This *News Letter* should be a valuable piece of safety literature. Those of you who would like to receive it may do so by requesting the National Safety Council headquarters to place your name on the mailing list. It is a fine thing to keep in touch with matters and you will find it very valuable.

I am glad Mr. Cummings has received such an indication of support. I want to ask you sincerely to help carry the work along and keep in touch with us and keep in touch with Mr. Cummings and the other officers, and the secretary. We must help one another. We must stick together, and by combined effort and exchange of ideas we may make ourselves more efficient in combatting the highway problem in its many forms.

The next speaker on this morning's program will talk on the subject of "The Commercial Truck Driver." This subject will be handled by Mr. Henry J. Mineur, safety director of the J. M. Horton Ice Cream Company, New York City.

HENRY J. MINEUR (Safety Director of the J. M. Horton Ice Cream Company, New York City): I think I should make a few preliminary remarks before reading my paper. To begin with, my name appears on the program as Safety Director of the J. M. Horton Ice Cream Company of New York City. I know that there are here this morning some men connected with the other companies for whom I am also Safety Director, and I want to tell you that I also direct safety work for the Reid Ice Cream Company, the Dairymaid Company and several others.

And my paper has been changed somewhat, that is, the contents of my paper, rather, has been materially changed from its original form. After I received the program I found myself flanked on one side by Mr. Dow and on the other by Mr. Harman, and knowing the inspirational character of Mr. Dow's talks, and knowing that Mr. Harman will present the hard, practical side of the subject on which he is to speak, I had to condense my paper to about one-half. That ought to be rather interesting to you.

The Commercial Truck Driver

By HENRY J. MINEUR

Safety Director, The J. M. Horton Ice Cream Company, Inc., New York City

"The Commercial Truck Driver" is a subject to which we could devote considerable time with little occasion for repetition.

At this time we are concerned with that phase of the subject which is related to the problem of accident prevention and more particularly the measures which are most likely to offer a solution. It is my aim to deal with the practical aspects of the matter and to do so as briefly as consistent.

It is important that we first consider some of the known conditions we are seeking to correct.

In reporting accidents, drivers are prone to make light of the matter and almost without exception they start off by saying they had a little accident. They are always little, but often you will find before their story is completed that someone has been sent to a hospital, some property has been badly damaged or both. They do not seem to view the matter in its broader aspect nor realize its importance.

In most cases the acts leading up to and causing accidents reveal all the earmarks of improper training and utter lack of understanding. For instance, we all know that the practice of what we choose to call road courtesy would eliminate a very large proportion of the vehicle accidents yet the commercial driver goes on without much thought of the other fellow on the road. The road hog is an excellent example of this type. Why he does not readily give way to a vehicle which is about to overtake him is hard to understand. He does not seem to realize that the faster car has a perfect right to pass. This type of driver will make left turns across traffic, pull away from the curb, turn between intersections and overtake other vehicles without giving an adequate signal. When he backs up he will do so as fast as possible. He travels along approaching and crossing intersections in such a manner that he is ill prepared for the unexpected. Notwithstanding all of this when he has an accident the other fellow is always at fault.

He attributes his predicament to bad luck but never bad judgment. He is very much concerned about what other people fail to do and overlooks entirely what he himself could do to prevent an accident.

What is the reason for this attitude? What can be done to correct it?

The fault in my opinion is divided between employer and drivers. The employer or operator may be indifferent to organized safety effort as we understand it but certainly he must have definite written or unwritten rules regarding the conduct of his business. He at least knows or should know his obligations to the com-

munities which he serves. He must know the cost of accidents even though he has no interest from the humane standpoint. He is in a position to set the driver straight on these points at the time of employment.

There is no good reason why the driver of a vehicle should not be held as strictly accountable for accidents as he is for the infraction of other rules and courtesy to the trade. The public have every right to expect that before a driver is permitted to operate a vehicle on the public highways he should be fully instructed as to the necessity and wisdom of safe driving. This should be a condition requisite to employment.

We come to a consideration of the means by which the existing conditions can be remedied.

There are certain phases of the subject which must be more or less apparent to everyone engaged directly or indirectly in working out a solution. We will all recall that in the matter of industrial accidents a vast number is reported each year by a large group of small operators employing variously from one to twenty-five men. We have a very similar condition in the field of commercial truck operators.

I think it is these small operators with whom we are chiefly concerned. Not infrequently we will find our vehicles involved in accidents the direct cause of which is some faulty condition of the vehicle usually owned and operated by an individual or corporation who having only a few trucks, limit the repairs to those essential features which will keep them on the road. They seem to have no thought of their obligations nor fear of the law. They invariably assume a narrow, selfish viewpoint. I think you will agree, however, that this procedure is costing such individuals or corporations many thousands of dollars every year. We are therefore anxious to know the agencies through which these operators can be dealt with effectively.

There is no doubt that the easiest and least harsh method would produce the most beneficial results. A limited form of membership in the National Safety Council through which they can obtain a continuous flow of safety literature and suggestions coupled with the work of a local council would be very helpful.

There is no sound reason why the smaller operator cannot adopt in a limited way the methods employed by the large operators. Their problems are identical and as a matter of fact the smaller operator is in the better position of the two to solve it. It means that operator himself, his assistant or other person in a similar position of authority will act in lieu of a safety agent.

Unlike the small operator we find the large operator as in the case of the large industries well organized with definite plans for solving their problem, primarily because they have seen the economic soundness of keeping their equipment in the best possible condition and insisting upon its careful operation. It is perhaps fitting at this time to state that these so called large operators were not entirely sold on the monetary considerations alone. In many cases they were convinced that the experiment was worth while, if for no other reason than for the humane considerations which must be the natural outgrowth of such an undertaking. Of course, we realize that there are some who have been forced into the safety field because of ever increasing insurance and truck maintenance costs. It is gratifying however that the number in this group is limited to a very small percentage of those who have organized permanently for safety. We will all agree that there are some operators of commercial truck vehicles who have been and always will be indifferent to the matter of organized accident prevention work.

It has always been the policy of some of the operators to maintain a large inspection and repair force with the view of keeping the equipment rolling. This inspection and repair force has now become recognized as the first essential part of every safety organization.

I have gone into this detail merely to point out that before any organized safety effort can be started amongst the commercial truck drivers the owners of such trucks should first get their own house in order by placing all of their mobile equipment in perfectly safe running order. He is then in a position to make demands upon the drivers which they can be reasonably expected to fulfill.

What then are the plans of the large operator who has been able to obtain satisfactory results. These are both numerous and varied. In this respect I will state as briefly as possible the plans and procedure of the companies with whom I am associated.

We start off on the theory that each vehicle is mechanically perfect before we ask a driver to operate it on the public highways. We then hand the driver a set of printed instructions relating to its safe operation and proper maintenance. These instructions are limited to a single page of printed matter clearly written so that every man can readily understand them. At the bottom of the page there is a perforated sheet upon which the driver signs his name as an acknowledgment when the instructions are given to him. In the instructions we find the following: "Should the brakes, steering or other equipment effecting the safe operation of your vehicle get out of order while you are driving, stop—and phone the garage for instructions."

With this set up the matter of placing responsibility for accidents becomes comparatively easy, because we have definite control over two important factors in practically all accidents, namely, mechanical defects and failure to observe instructions. A third factor to be controlled is the driver himself. This covers the many problems with which he is confronted in the course of the day, that are too numerous to mention. Were we to stop here there is little likelihood that we would get any permanently good results. We therefore have a committee appointed by the president of the company, the personnel of which consists of vice-president, general superintendent, superintendent of motor department and the safety director. The committee meets once each week and the accidents reported during the previous week are reviewed.

Whenever it is found the driver involved has failed to carry out instructions or in some other way contributed to the accident he is penalized. Penalties range from a one day suspension to actual discharge. The man's previous record is taken into account in all cases.

After each meeting a notice of the committee's findings in each case on a form provided for that purpose, is sent to each driver who has reported an accident. This is done whether a penalty is imposed or not and whenever the circumstances warrant the notice contains a detail of how the accident could have been prevented with specific reference to the actions of the driver which were not consistent with the safe operation of his vehicle. These notices sometime contain a warning that the report of a future accident will result in more drastic action.

Supplementary to the system of penalties we have adopted a plan of awards for safe driving and the proper care of the company's equipment. Under this plan each driver is entitled to a maximum of five dollars per month for an excellent accident and maintenance record. Awards are made every three months and the man's record during that time is considered. The plan is flexible to the degree that a driver may qualify for an award in any one of three classes, namely, A, B and C. Drivers who are rated A will receive the maximum for the quarter, B ten dollars for the quarter and C five dollars for the quarter. If any one is further interested in the other details of this plan they will be gladly submitted upon request.

The educational work carried on in our organization consists of regular meetings of the drivers at which the safety director discusses the causes of accidents within the industry. Specially prepared bulletins based upon our own experience

are used in connection with those furnished by the National Safety Council. Finally, safety messages are printed on the pay envelopes.

We have found that these methods have entirely changed the complexion of our accident situation. It is rarely that we have a report wherein excuses are given for causes or where the driver claims a mechanical defect was responsible. Our men know that we are only concerned with the answer to the question, "Could the accident be prevented by our own driver?" They know we do not care what the other fellow failed to do and their reports are made accordingly.

In other words there is no attempt to justify the occurrence of an avoidable accident by placing the responsibility on the other fellow. Moreover, misrepresentation is dealt with as severely as the case of an accident caused by gross carelessness.

We feel that we have the solution to our own problem and this is clearly indicated by the results of the last three years.

I have not gone into the matter of personal injuries to the drivers or certain phases of the safety problems which affects teams operation alone.

In conclusion I would state that standardized methods of accident prevention are just as important as the traffic rules and regulations published by the State and City authorities. In case the small operators cannot be reached through the usual channels then we must depend largely upon the City and State agencies to develop and carry out the plan. There should be State Police inspection of all motor vehicles and a check up on the drivers at intervals and without prior notice that such inspection is to take place. Whenever it is found that an automobile is not in condition to insure its safe operation on the highways a definite penalty should be imposed upon the owner of such vehicle. There should be continued efforts to standardize State and City traffic regulations and the traffic police should be augmented to the degree necessary to enforce them. Lack of enforcement is perhaps one of the greatest indirect causes of accidents because it fosters contempt for the laws and regulations of the road. The traffic laws are different from the others laws which are disregarded to the extent that they are popular with the large majority of vehicle drivers.

You will readily appreciate the contents of this paper is based upon my own experience, observations and opinions. I make this statement to emphasize the idea that the greatest good results from the discussion rather than the contents of the paper itself. I sincerely hope that there will be free discussion of the entire subject. I thank you.

CHAIRMAN CLAIR: I wish to thank Mr. Mineur for his very fine handling of the topic assigned him. About the matter of discussion—we seem to find it more advantageous, in conducting these programs, if we dispense with the discussion until after the final speaker has given his paper.

With such a fine gathering as this, I know a good many of you have questions which you want to ask, and I hope you will not hesitate to do so. The speakers are prepared to answer you on the subjects they have handled. And we would also like suggestions as to ways and means of carrying on next year so that you will help us to be of the most value. Following the next paper we will open the meeting for discussion of any of the subjects you want to bring up.

It is always a pleasure to introduce Dale Harman. He is a great friend of the section, always has been, and has given generously of his time and effort to the furtherance of our interests. Mr. Harman is an ex-chairman of this section and served last year as your chairman of the Nominating Committee.

DALE HARMAN (Vice-President and Manager, Yellow Cab Company, Kansas City, Mo.): I would like, first, to comment a little about our section, in view of the fact that our present chairman, Mr. Clair, mentioned the fact that I was an ex-officer.

I want to congratulate you and work up a little enthusiasm for my friend Cummings over here. I want to compliment you for the wonderful attendance you have here, and for the growth of this work. I believe it is something to be able to say that we do more work with respect to traffic safety than any other section. Of course, we should, because we are in the cab and fleet owners section.

Mr. Cummings (I will have to reply to him on the floor) wondered why we elected him as chairman for the next year, but he forgot to tell you that down in Richmond, Virginia, he and the cab owners have won a trophy just recently for operating more miles with less accidents than anybody in that community.

And I think, if he can bring that about in his home town, that he ought to steer you through the year to a howling success, and I know he will.

Now, I have been assigned to talk on "Respect for the Other Fellow"; I am not much of a writer or orator, but I will try to give you just a few of the things that come to my mind on the selfishness of the automobile driver. I feel that that ought to be the name of my little story, more than "Respect for the Other Fellow."

Respect for the Other Fellow

By **DALE HARMAN**

Vice-President and Manager, Yellow Cab Company, Kansas City, Mo.

When your worthy chairman, Mr. Clair, asked me to become chairman of the Nominating Committee, I naturally felt highly honored as most of you know I have endeavored to the best of my ability to render as much assistance and cooperation as was possible to the Taxicab and Fleet Owners Section of the National Safety Council. But with the aforesaid honor, Mr. Clair also asked if I would write an article for presentation to this convention using as a subject, the caption "Respect for the Other Fellow."

Having served the public for many years as an employee of one of our large railroad systems, I can well remember how the employees of that railroad treated the public—in a don't-give-a-damn manner. On leaving the service of the railroad and getting into public life, where patronage and continued patronage meant a volume of business, I was much surprised at the difference in my own attitude in "Respecting the Other Fellow" in my endeavor to secure his patronage, and he favored with his continued patronage as well as good will. I am free to confess that meeting the public with a smile and indulging in a little conversation pertaining to weather, business conditions, etc., or whatever else I thought the prospective patron might be interested in, other than the direct business contact, was one of the best assets or paying investments that could be indulged in. At the same time I learned many years ago that it was a pleasure and made the world seem brighter than the old atmosphere that others, with myself, had been living in and dealing out to the public.

On entering into the Taxicab industry, I became connected with the same at a time when that link in the transportation field was just changing from the old horse cab to the motor driven cab, and as you are all aware, the horse cars had been manned by good fellows, but usually lacking in education, etiquette and were oftentimes men who were crippled in some manner which incapacitated them for doing manual labor, and their education had been neglected to such an extent that they could do nothing else. As a result we had a hard time in those days finding men who understood the driving and care of an automobile, and the shop foreman or superintendent of drivers of our respective companies were called on to render assistance in educating the men to handle automobiles. We found in employing men that the young men were much more adept in learning and much more willing to accept the positions than men of some twenty-five to forty years of age. We soon also learned that the young men were more inclined to drive fast

which was detrimental to the best interests of the operator as well as dangerous and hazardous for the patron, all of which thoroughly convinced me and the various heads of the departments that we must lend our efforts toward hiring men who were a little more matured, and as a result, many years ago we made it a rule to employ no one but a married man, twenty-five years of age or more. In our effort to have them familiar with the streets of our city, only men that had been residing in our city for a period of two years or more were taken into the service.

Then the growth of the automobile commenced. You are all aware of the phenomenal growth it has made, as well as the growth of the taxicab industry and the number of cars used in delivery by our Fleet Owners. I know that each and everyone within my hearing will agree with me, that when there is an accident both of the drivers concerned are always right. Being in direct charge of the payment of claims for either property damage or personal injury, I have for many years made it a point to personally attend the scene of the accidents. When it was impossible for me to do so I had my employees secure all the information possible as well as take pictures when same could be secured before either of the vehicles were moved. In attending the scene of accidents I endeavored to the best of my ability to "Respect the Other Fellow" acting as a judge between the two interested drivers of automobiles at fault, in a fair and unbiased manner. If you will pardon me for quoting myself, after our industry began to grow and we had as many as seventy-five to one hundred cabs on the street, I was, on several occasions called into our local courts in the capacity of assisting our judges in determining which of the two drivers in any particular case was responsible for the accident. This demonstrated to me quite clearly that "Respect for the Other Fellow" was bearing fruit, and that if the policy that we were striving for among our own employees in the handling of claims, which you know is one of the most important duties of our National Safety Council today, was bearing fruit, it would bear equally as good results if the cab drivers in daily traffic would remember the subject of this article and have "Respect for the Other Fellow."

We have, in our city, inaugurated the automatic lights at many of the important street intersections and naturally they are bringing good results, but how often all of you have seen the man driving a car, and waiting for the light to change, who would be on the outside and make a left turn in front of all other traffic, without regard to the other drivers who were going straight forward. Whereas, if he had had any thought for his fellow man or the density of traffic and a tendency to lend a hand toward avoiding congestion, he would have pulled to the inside or near the direction in which he was going to turn, before arriving at the intersection where possibly one or two blocks away he knew that on reaching that intersection he would be stopped by the red light of the automatic signal.

Again, in traffic where there are two, three or four lines of traffic going in the same direction, how often all of us have seen a driver who, in order to gain one or two lengths of his car would turn over to the other line of traffic when there was an opening and by the time he was straightened out in that line of traffic, would see an opening back in the line of traffic he had just left, and would again cross traffic in order to again gain a car or two length without regard to how many drivers he was discommoding and causing to slow up or practically drive their cars and watch his. This is the element of driver who has no "Respect for the Other Fellow" and should receive some education or read some articles such as appear in numerous periodicals pertaining to safety.

Only recently we received a copy of a weekly newspaper printed in a small country town west of Kansas City wherein a resident of this small village had been in our city and in crossing a street intersection in our town business section which naturally is congested, a cab driver drove up to the path of pedestrians, stopped his cab, and motioned to the man from the small town to cross the street. Naturally the cab driver did not know the man and neither did the man know the

cab driver, but he did go home to the small town and tell his story to the editor of the weekly paper. The editor who wrote up the article gave it a place on the front page, and on receipt of a copy, we in our organization were able to locate the driver and appraise him of the fact that he had "Respect for the Other Fellow" in assisting a man to get across a crowded street, who was not familiar with the heavy traffic of the city. We make mention of this instance to again show the result and benefits derived from "Respect for the Other Fellow."

Ofttimes in driving down the street in an automobile, you have seen water standing on the pavement as a result of rain, low places in the pavement or having settled there after the streets were flooded and the drivers of automobiles could have driven slowly through the water or even to the side of it with only a slight turn of the wheel, but on the contrary no, they drive through the water pell-mell without any regard to the other fellow, and ofttimes throw water over a nice clean car or all over a pedestrian who has no opportunity to protect himself. This to me is one of the most careless and uncalled for habits that our automobilists indulge in.

In our School of Instruction for Drivers we use many ways and means of demonstrating most clearly and in a simple manner, what ideas and thoughts we have pertaining to safe, sane and courteous driving of automobiles. I can recall many instances where I have personally demonstrated to new men what we would like to have them do in a case where two cars are driving side by side and are reaching a safety zone, bridge, viaduct or some other narrow portion of the street where the cars will be required to go single file. We have asked our drivers to try and catch the eye of the other man driving the car beside him, motion him ahead with a smile, and at the same time to slacken the speed of his own car and let the other fellow go through the narrow portion of the street first. This has been done in many, many instances, and I can conscientiously advise all of you that we hear of instances of this kind in the daily operation of our cabs in our city, almost as frequently as we do the day or two following a good substantial newspaper advertisement, all of which is further demonstration that "Respect for the Other Fellow" when practiced is usually recognized.

I feel that in attempting to give any new ideas to you members of the Taxicab and Fleet Owners Section, I have a difficult problem, as the caption "Respect for the Other Fellow" is so closely allied with the word "Courtesy" which has been dwelt on so very often, especially in our previous annual meeting. And yet either of the subjects play a most important part in the ever increasing traffic problem. Under the head of "Courtesy" I can well recall a very dear friend of mine who used to be steward on a dining car leaving Kansas City for Chicago every evening at 6 p. m., who as soon as the train left the station, would come through the sleeping cars and address different passengers by name and ask them what time they would prefer to have their dinner, and he would arrange to have them cared for at a time that suited their pleasure most. In fact, this man practiced this method to such an extent that people wondered how he secured the names of the different passengers, when he was unknown to them and they unknown to him. One day I asked him how he secured the information that enabled him to call the passengers by name and he informed me he had made it a point to look over the sleeping car diagrams just before they were turned over to the conductor, and in fact went so far as to make a little diagram showing who had purchased each berth. His object in so doing was that people always felt better if addressed as Mr. Jones or Mrs. Smith as the case might be, and this instance is mentioned by me at this time to demonstrate how far this man went to show his "Respect to the Other Fellow." I am pleased to inform you that I later found this man's mother was the author of one of the best books that was ever written in this country, dealing with "Courtesy." He was courtesy and politeness personified in his every day dealings with the public. This is an experience that came to my attention

from actual life, and to me it is one of the best demonstrations of the result of "Respect for the Other Fellow," in every stage of life.

CHAIRMAN CLAIR: I am sure we are all very thankful to Mr. Harman for his very excellent handling of the important subject of his paper.

MR. CLOUD: Before we enter into a discussion which I am sure will be interesting and illuminating, I would like on behalf of all present to move for a resolution of thanks and appreciation to Mr. Robert Clair, chairman, who has so effectively and successfully conducted, not only the proceedings of this convention, but the work throughout the year, and I would therefore call now for a rising vote of thanks.

(The entire meeting rose in thanks to Mr. Robert Clair.)

CHAIRMAN CLAIR: I am sure I appreciate your kindness very deeply—both the kind words of Mr. Cloud and your vote of thanks. I wish to say that whatever I have done I have been repaid many times by the pleasure it has given me to be in contact with such a fine crowd of men. I am sure anything I have done has given me a whole lot of pleasure.

The meeting is now open for discussion of any of the papers that have been read or any matters you see fit to talk about.

MR. SONNTAG (Travellers' Insurance Company): Yesterday we listened to an address by Mr. Brown, editor of the *Taxi Weekly*. In a portion of that address he referred to a character well-known in New York, the ambulance chaser. I believe that every man in either organization of the fleet owners is familiar with the various practices of this type known as the ambulance chaser. Now, I feel that this is an excellent time for us to extend our thanks and appreciation by applause or by any other method the chair may suggest to the Appellate Division and the Bar Association for the able and efficient investigation recently conducted, which has succeeded in materially reducing the activities of the ambulance chasers in New York.

CHAIRMAN CLAIR: I suggest as a means of handling this matter that this meeting go on record by passing a motion to have such a vote of appreciation be sent to the proper authorities through official channels of the Council. Will somebody please make that motion?

(The motion was made and unanimously carried.)

CHAIRMAN CLAIR: Any further discussion, gentlemen?

D. A. DREW (R. H. Macy & Company, New York): I would like to ask Mr. Dale Harman if he would go a little more into detail with regard to the instruction, how he trains the driver, and so forth.

MR. HARMAN: I do not feel that this body of men at this time and place, Mr. Chairman, have got the time to go into it and do justice to it. This is a big matter, gentlemen. The employing and the training of men to take automobiles out on the streets and highways, it seems to me, is just as great a problem in Kansas City, say, as it is in New York. Our traffic distribution is over a radius of twenty blocks square, and yours in New York is perhaps miles square, and Chicago has many square miles of traffic, and so has Philadelphia, and so on.

But in training the drivers in our own school, I write what I want the driver trained in, and at the present time I have twenty-nine different questions, or things for them to be trained in. I take these rules myself and send them one at a time around to the superintendent and to the night superintendent and the safety director, and sometimes to the assistant manager—who fights the ambulance chaser and runs down accidents and claims—and so put it up to them. I ask for improvements on these rules, and in that way I get the ideas of five, six or seven, or even ten men; I get their opinions as to what sort of rules are proper, and do not need remodeling and revamping, and in that way we try to keep up to date.

And we give them the benefit of changes in the traffic rules on a blackboard. That also is an important feature. That is of great help.

I might say, in reference to safety work that we are a small company that holds a rather small membership in the National Safety Council, but I feel it has done a great deal toward the prevention of accidents.

We get five posters a month; and we have a large recreation room in our place, and we have taken these posters and framed them, and the walls are pretty high around the room, and when new men are taken in, our instructor takes a pointer and points out what each of these safety posters means; and we keep changing them over as new ones come in. I think that alone is worth many times what it costs any of us to get into the National Safety Council.

But when it comes to the training of a driver, I think there are so many angles to it, that it is impossible at this time to go into full details. It is constant handling, constant giving of instructions, and following up the instructions every day. Do it collectively if you can, in so far as you are able, and if that doesn't bring results, go into it individually with each individual man.

CHAIRMAN CLAIR: I would like to refer the last speaker, who made the inquiry about the selection and training of drivers, that the proceedings of each Congress are published annually by the National Safety Council. Every paper read here and at every other meeting during this Congress is published about January 1st by the National Safety Council.

Now, those volumes are all on file and may be obtained. You may buy a copy for a certain fee. You will find in it both the discussion and the papers read in the last two or three years, and some of them are very valuable papers. You will find much information in these Proceedings concerning the selection and training of drivers.

FRANK OPTENBROM (Inspector): Regarding the so-called road hog Mr. Mineur touched upon in his paper, don't you gentlemen generally find that in most of the cases of trucks, the larger trucks especially, that a number of drivers do not give you the right of way, due to the fact that the noise prevents them from hearing your signal; and I have also found that unless the law generally compels the vehicles to be so equipped, that the employers or the owners will not put on mirrors voluntarily.

Now I have more or less tested out this thought or theory, you might call it, from New Orleans to Providence, because I was making that territory for some insurance companies; and during that entire trip I made particular note to approach truck drivers who really would not give you a chance to get by them, and invariably (I have the percentages and the figures) the men were justified in a sense, because they really did not know you were back of them, and could not see you. Due to the construction of the vehicle, they could not see you because they did not have the proper mirror on the truck.

I would like to know what is the general opinion, from some of you here as to how it is in other parts of the country. I speak of the country east of the Mississippi. And furthermore, I would like to say that the only state where I have found general equipment used, in the way of mirrors, was in the State of Connecticut, where I found I had no trouble getting by any of the trucks, and conditions were very good in that respect. I would like to know if that is the general rule in other parts of the country.

CHAIRMAN CLAIR: Those questions are very pertinent. At the risk of imposing myself again upon you for a few minutes, you might be interested to know that the motor vehicle laws are available from every state that publishes such a pamphlet. We have collected thirty pamphlets from thirty different states. I remember checking them to see which states require adequate rear mirror vision equipment.

There are twenty-one out of thirty states that specifically demand that commercial vehicles be equipped with a mirror so constructed that the driver is given a clear view to the rear, whether such vehicle is loaded or empty.

The road hog, in the guise of the heavy truck driver, is of course a bad one. We conducted a little survey of that situation in and around Boston on the outlying roads, and this was done by stopping big trucks and talking to the drivers. We asked those fellows, "Why is it that you insist on driving in the middle of the road?" Well, there was a very interesting general reaction obtained. We stopped a big boy driving a six ton Mack. He, as did the majority of others, said, "Sure I stay in the middle of the road, and I'll tell you why. My truck weighs six tons, and if I carry five ton on her, that makes a heavy load. I'm on a delivery schedule. If I continually keep way over to my right of the road, I'm on pins and needles every minute for fear that my right rear wheel will slip off the shoulder of the road and sink into the soft dirt. I sure don't want to get stuck with this load."

I think, gentlemen, that that is a sensible reaction, and that it explains why the big trucks stay in the middle of the road. The only solution may come about by an improved road construction program giving broader highways.

Now, are there any other remarks, or any further discussion?

J. T. MALLOY (General Accident Insurance): We have had quite a few accidents on these large trucks, and particularly those with the tractor unit. The drivers of course were always in the center of the road. The drivers often work very long hours, and sometimes they are replacing another driver who has not shown up and they are getting overtime for it. The driver is probably driving a car that is making a terrible lot of noise, and he is well gassed up with conversation as well as fumes, etc., and he gradually falls asleep; and that is one of the reasons he does not like to stay on the edge of the road.

Only last March we had a horrible accident in New Jersey, when two trucks came together. One truck had a piece of machinery on it, and the impact caused the machinery to plunge forward and crush the driver of the truck. He was killed instantly. The Police out there were unfamiliar with accident investigation work and for a time nobody understood how the accident happened. Finally somebody got on the job that did know and the conclusions were that the driver of that truck was asleep, and the other fellow said to himself, "Well, he isn't going to get out of my way, here is where we meet." And they did.

Now any man interested in fleet operation knows that drivers of these trucks will not get off the road, but they will rather come together. Sometimes they meet a fellow asleep at the wheel, due to long hours, and sometimes perhaps he has had a little hooch, and if he is in an enclosed coop he is apt to get groggy, he goes over.

Then again, lots of drivers tell me that some driver will come along the road with a newspaper on the wheel, reading. The driver of a passenger car or other truck believes he will move over, and if he does not there is a collision.

Also some of the drivers of these trucks look to the side and pay attention to the girls going to work, always looking at something they should not look at. Sometimes they turn their heads right around.

These factors are never brought out in an investigation of an accident, unless witnesses are about that happen to see them.

MR. RUBIN (Constitutional Indemnity Company, Philadelphia, Pa.): I would like to ask Mr. Mineur a question, and before he answers it I will give my reason for asking it.

Mr. Mineur states that invariably if a man continues to have accidents they are finally discharged. A condition has come within my range of vision within the last six or seven months that may or may not help some of you fleet owners. The condition where two men were subject to frequent accidents. When the question

of the frequency of their accidents was taken up with the employer, the employer gave out the fact that these two men were wonderful workers and had been with the firm a long while, and he hated to see them discharged or dismissed from the service.

Now, it happened that one man was suffering from sinus trouble and the other man from something that affected his eyesight, and both of which tended to poison the condition of their bodies, and the faculties of those two men while driving their motor cars were not one hundred per cent.

In talking to these drivers I was informed by the one man that while he had these accidents he was absolutely powerless to in any way avoid them. He knew that he was going to have a crash, and his faculties would not work in such a manner as to enable him to do the necessary things to avoid the accident.

I think that is something that may interest all of you. It is a condition where you have a man that has been working for you for years and some trouble may creep in, and instead of discharging the man and probably getting someone worse, it might be well to make a physical examination. It may be some physical condition that could be overcome.

MR. MINEUR: That is true. And incidentally, I might say that all of our men are examined and we take into account not only their physical defects, but also their home conditions.

MR. RUBIN: The condition did not develop at the time of employment, but it developed after some years.

A VOICE: Mr. Chairman, I think the speaker might be interested to know that a psychological test might have brought that condition out.

CHAIRMAN CLAIR: With respect to this hazard of drivers falling asleep, that is not a problem for the driver, but rather for proper management. It is a crime to send a driver on a long, hard trip and make the working hours so difficult that it is impossible for him to keep awake. I think that is something the driver is powerless to fight against. We have got to have reasonable, sensible delivery schedules. If we are making a big haul it is better to send two drivers than one. In trying to save a day's pay, we are apt to find we have a wrecked truck and ruined cargo and lots of other trouble on our hands.

MR. MINEUR: What I would like to see is something spread upon our minutes to the effect that we are in favor of some active work on the part of the newspapers. They mold public opinion and conduct, and are a force of great good, if they would only interest themselves in it.

CHAIRMAN CLAIR: I know we all realize that, and I am sure the Council is following that carefully, but it is a big matter, and the progress must be made slowly. But I think it is advancing, because the newspapers have been taking more and more notice of that.

MR. BROWN (Atlantic Refining Company, Philadelphia, Pa.): We operate about 150 trucks. We are not compelled by law, but we find through practice that it is best to put two mirrors on the trucks, one on the right and one on the left. Furthermore, our men are instructed that when they are on a road where there is not much room, on the approach of another vehicle they must come to a stop. We feel that the other fellow will notice that, and we are not liable to do any damage.

I would like to ask now what is the best record established in the last two years, a comparative record as to road accidents. I am vitally interested in that, and I feel we have a good record.

CHAIRMAN CLAIR: I don't think we have time to give you any accurate records or statistics. From the library of the Council headquarters you can get some very comprehensive figures as to driving records, set up by inter-plant fleets.

I suggest that rather than ask this meeting that question, you communicate with headquarters. In the meantime I am sure we will all be interested in hearing of your records.

MR. BROWN: I just want to quote what we have done—and we operate about 250 to 300 motor, gasoline vehicles.

We started in with each man and followed very much along the lines of the Horton Ice Cream man, Mr. Mineur. We have critical examinations of all men for six months, say, for eyesight, heart and any other troubles, and in that way we weed out—we don't fire the men who don't come up to standard, and we don't wait until an accident,—but when we find a man is unfit for the work he is then given some other work that he can do without any harm being done to anyone.

In 1926 we had an average of 124 accidents a month and travelled 3,700 miles per accident. That was rotten. In 1928 we travelled 7,805 miles per accident; in other words, an increase of 107 per cent more miles in 1928 than in 1926. I do find that the penalizing of the men should be carried a little further than it is. We penalize some men by giving them a week or a day off. And then we demote them in rank and give them less pay for a period, and say "Well, when you can pull up to be a first rate man you can get that pay again."

And we keep that idea in their minds, if you don't keep up to first rate, we don't want you. And as a fellow said the other day, "You know, Mr. Brown, the men would rather have their arms cut off than to have an accident."

We had one man back into a bicycle that was standing at the curb, and he said that it didn't seem anything to him to penalize him for. We took off 3 cents an hour. We said that if the boy had been there it would possibly have been a death, and he would have been held for manslaughter.

I want to say that we are heart and soul with this accident prevention work on the highways.

CHAIRMAN CLAIR: Thank you very much. I am sure we all have driving records of which we are proud. I am sure we could ask many of these taximen, who would reply in terms of millions of miles. But I am sure these results are all matters of record, properly tabulated, and I think we can all tell of some instance in which our vehicles have operated for some unusual number of miles. I assure you that if you want any comparative figures that they can be obtained from headquarters or through our News Letter.

J. E. DOBBS (Safety Engineer, Detroit Service Company, Detroit, Mich.): Mr. Chairman, we had a serious accident the other day, and our driver says that a new set of hydraulic brakes failed him. I wonder if anyone can tell whether it is possible for them to fail, without the tubing breaking, or something of that kind.

MR. MACADAMS: Speaking of brakes—particularly hydraulic brakes—I am not an authority, but I had them in my own car, and they did fail, for various reasons. It cost me a lot of money for brakes, and when they are not working they are impractical, of course, both from the standpoint of service and that of monetary cost of repairing them.

You say they failed, and you want to know if they can fail without the tubing breaking. I don't know how they can. If they are in good mechanical condition they won't fail. But I have known them to fail due to neglect of the brake band, wherein so much of the brake band is worn that the whole limit of cylinder travel had been reached, so that the band had not taken up. That is one cause of failure to make allowance for vibration in connecting the pipe, and the pipe would loosen up; had they put a couple of loops in it, that would have never happened.

MR. FITZGERALD (Safety Engineer, Liberty Mutual Insurance Co.): Perhaps on the brake question I might be able to give a little information on the failure of hydraulic brakes to work. That is often caused by air in the lines. An air bubble is built up between the piston and the cylinder which prevents the fluid from getting down into the cylinder. But for some reason or other, by the constant working on the pedal and pumping on the dashboard, it is very possible for that pressure to be worked down. How that air gets in there without a weak

connection, is not known. But that is a possible source of failure of hydraulic brakes.

MR. McARTHUR: I may be speaking out of turn, when I go into this little brief of my own, but all along in this discussion of the accidents and the various causes, a great deal of stress was put on the fact that there is a mental condition immediately behind an accident.

Now, here of course we are discussing accidents with regard to taxicabs and trucks and so forth, and it has been my experience in two or three different cities to observe fleet operations, and I will tell you something about where a mental condition exists.

But that is a point that is very seldom touched upon, and gone into, usually with reluctance, because it deals with a sensitive question.

I have questioned a lot of these drivers working for fleet operators, and I just heard a remark a while ago wherein it was brought out that upon hiring the man you investigate his record and that investigation includes home conditions.

Now, when they take a man on, what sort of monetary consideration is he offered, is it such as to make him entirely satisfied with his position? For to say the least, the truck driver's job is not very attractive, after all, and if the monetary condition is there, the mental condition that would otherwise be there is usually erased, and in turn his home condition can be improved.

That man of course is only valuable as a truck driver. If his returns are rather ample for his particular job, I think the mental condition there would be greatly enhanced.

CHAIRMAN CLAIR: I think you have touched on a pretty fundamental problem of the relations between the employer and employee. If we get into this too deeply we will get far afield. Proper selection and proper remuneration are very important points. There is something in the last speaker's remarks. I do not think we can follow that up at this time, but it is a very important point.

In other words, the job must have attractive features to expect the right results from your labor.

E. J. McDERMOTT (Accident Guaranty Corporation): There has been a great deal said here about the taxicab driver and the commercial automobile driver, and I would like to know if any concerns are taking any action if they find a driver is prone to accidents, if they have taken any action toward seeing that he, when he is discharged from their employ, is not hired by another employer for the same type of work.

In accident prevention work I think it would be better that where a man is shown to be incapable of safe operation of a vehicle, that some measures should be taken to see that he is not put on the street with a vehicle where he is liable to cause an accident, death, or damage of some kind.

CHAIRMAN CLAIR: I think Mr. McDermott's idea is well taken. It seems to me Mr. Harman brought out the point, where he investigated the records of the State Highway Department. I think that is the office through which we should get such information. I know that the taxicab companies, and I am positive a great majority of the commercial fleet operators, investigate very thoroughly the past accident records of drivers, before they employ them. As to whether or not a man has been discharged, however, from some accident record while employed with some other operator or owner, it is very difficult to find out. The only solution I see is to make it a community problem in your district and try to build up among the employers some sort of clearing house for such information.

MR. CUMMINGS (Manager, Yellow Cab Company, Richmond, Va.): Coming right back to the Safety Council: We this year in Richmond are starting an inter-fleet contest, the same as the one last year which I was lucky enough to win, and 36 fleets will be entered in this contest. The operators of these fleets have

registered the name of each and every employee with the local Safety Council. That is one thing. And each of these men is given a registration card to carry with him the same as his driving permit. And if I dismiss a man from service for careless or reckless driving, that information goes to the local Safety Council, and is entered upon the records there, and when he goes to the bus company or the department store or somewhere else to get employment, his record is called for from the Safety Council. Now, in those 36 fleets the majority of the commercial drivers are listed. And if a man is dismissed from my employment for careless driving or reckless driving, he can not get a job in any one of these fleets.

Get behind your local Safety Council and they will solve your problems for you.

CHAIRMAN CLAIR: That is a very interesting idea, Mr. Cummings.

MR. HEAFE: In regard to the road hog, I have not heard anything about signalling. It seems to me that both as an act of courtesy and as a means of passing the information that you wish to pass, it is a good thing to do, for oftentimes you find you can see the man in your mirror clearly, and you slow down and he intends to turn right; and he will complain very vociferously if a man should pass him and then turn. If he is going to pass, isn't it a good thing to recommend that he sound his horn that he wishes to go by?

CHAIRMAN CLAIR: That point is well taken, and I am sure most of us who are trying to educate the public and drivers, are in accord that signalling is a rather fundamental safety requisite.

MR. CUNNINGHAM (Syracuse, New York): In Syracuse, New York, last year, through the auspices of the Chamber of Commerce, they formed a safe drivers club. With the cooperation of the insurance companies they enrolled a large number of drivers, and at the meetings held once a month there were speakers and also there were shown safety measures, etc.; and also I might say that we had at those meetings as many as 450 men.

CHAIRMAN CLAIR: Any further discussion, gentlemen?

MR. MINEUR: Just one little question I would like to ask, and that is in regard to the local taxicabs. I do not believe I heard anything from the taxicab operators in the metropolitan area. I wonder if there are any of them here?

CHAIRMAN CLAIR: In regard to any special point, Mr. Mineur?

MR. MINEUR: No. I was just wondering. Here, where we have a fleet of twenty-five or fifty thousand floaters, we have a real taxicab problem.

CHAIRMAN CLAIR: Is there anyone here who can give us a few words about the local situation? In just a few words.

ERNEST H. MILLER (President, Yellow Taxicab Company, New York): I am very sorry that the local taxicab men have been called on almost in vain, but I had to refuse to come here originally because I did not think I would be back in time, and I just returned from Europe last Friday, with but little new information about local taxicab conditions.

So I will give you something to think of that I saw in Europe, and that I think is going to be a matter to be considered, eventually, here. Every year the automobile manufacturer is turning out a longer car, with more horsepower, making it impossible to get as many automobiles in a single block as they could before, and making it harder to stop, because as you all know, putting on horsepower makes it possible of more speed and on the other hand it takes a little more room in which to stop. Without any thought of what it might mean from a safety standpoint or a traffic standpoint.

I think it is time that automobile manufacturers in this country began to do some of the things that they have been forced to do in Europe, largely because of the higher cost of gasoline there. That is to make cars with low horsepower and short, so that they can be handled in traffic and as a consequence, make for safer cab operation and safer car operation entirely.

I don't believe that the average length of automobiles in Europe is much over 115 inches. I know that just before I left there one of the large manufacturers came out with a great deal of pride with a six cylinder car of thirteen horsepower. You can imagine what a difference it would make if the majority of our cars in this country had under twenty horsepower and were made so that they were a little more readily handled in traffic.

That was my main observation abroad. Of course, they have not as many automobiles and not as much traffic, so they can hardly compare with here.

Now to tell you something about the metropolitan area and safety, I should like to tell you that we have done a great deal. I must admit, however, that most of it has been done by the Police Department. It is one thing to preach safety, as we always do; it is another thing to get it in as large an area as we have here and enforce it ourselves.

We have thirty-six street inspectors, who are constantly trying to regulate our own traffic. They are to our mind the greatest factor for safety that we have in Yellow Taxis. But you can readily realize that thirty-six street inspectors spread over this metropolitan area are lost. And so we owe our greatest thanks to the Police Department, who are certainly censors of too much speed and reckless driving here.

In addition to these thirty-six inspectors on the street, we have a morning and night inspection in our garage. The morning and night inspection in the garage will show what may have happened to an automobile in the course of the day. What happens in the course of a day and is closely observed by the management in an individual garage from which the driver drives, is our second greatest deterrent in careless driving. It makes for greater safety, because the driver is forced to bring in a car that looks similar to what he takes out in the morning.

Since I have come here entirely unprepared and since I have not really heard anything that has gone before, I know nothing further to say, unless somebody will ask me a question, and I will be glad to answer them if I can.

CHAIRMAN CLAIR: Any questions, gentlemen? If there are not, perhaps to keep luncheon engagements, we ought to adjourn at this time.

I again want to thank you all for coming here and the interest which you have shown.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Textile Section

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Vice-Chairman—SYDNEY INGHAM, Ludlow Manufacturing Associates, Ludlow, Mass.
Secretary—E. E. PLACE, Employers Liability Assurance Corporation, Boston, Mass.
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Engineering Committee Chairman—G. W. COOK, The Travelers Insurance Co., Hartford, Conn.
Statistics Committee Chairman—JEROME GAUDET, Lorain Manufacturing Company, Pawtucket, R. I.
Program Committee Chairman—ARTHUR S. JOHNSON, American Mutual Liability Insurance Company of Boston, Boston, Mass.

Retiring Officers

Chairman, H. C. WASHBURN, New Bedford, Mass.; *Vice-Chairman*, DR. R. P. KNAPP, Cheney Brothers, South Manchester, Conn.; *Secretary*, D. FRANK LORD, M. J. Whittall Associates, Worcester, Mass.; *Poster and Slide Committee Chairman*, LEONARD HOWARD, Duncan Mills, Greenville, S. C.; *Membership Committee Chairman*, H. W. DONALD, American Mutual Liability Insurance Company, Boston, Mass.; *Publicity Committee Chairman*, ARTHUR BARLOW, Linoleum Division, Armstrong Cork Company, Lancaster, Pa.; *Engineering Committee Chairman*, G. W. COOK, The Travelers Insurance Company, Hartford, Conn.; *Statistics Committee Chairman*, HARVEY SAUL, The United States Finishing Company, Providence, R. I.; *Program Committee Chairman*, ARTHUR S. JOHNSON, American Mutual Liability Insurance Company of Boston, Boston, Mass.

October 2, 1928

H. C. WASHBURN, Chairman
District Manager, Sentinel Fire Equipment Company
New Bedford, Mass.

The first session of the Textile Section of the Seventeenth Annual Safety Congress, was called to order at ten o'clock by the chairman, H. C. Washburn, District Manager, Sentinel Fire Equipment Co., New Bedford, Mass.

CHAIRMAN WASHBURN: Because of the importance of the meeting this morning,

I am not going to call on very many members or committees for reports, but it is particularly fitting that we have a report from the Secretary of the activities during the past year. Mr. Lord.

Report of the Secretary

By D. FRANK LORD

Herewith I submit my report for the Season of 1927-1928:

There have been two meetings of the Executive Committee of the Textile Section held during the year, one at Providence, R. I., on November 2, 1927, in the rooms of the Providence Safety Council, and the other at New Bedford on March 26, 1928, in the rooms of The New Bedford Board of Commerce.

The minutes of both of these meetings are of record.

A meeting was held in Atlanta, Georgia, during the month of April, 1928, in which Mr. W. C. Wroe of the American Mutual Liability Insurance Co. showed great interest and activity. Mr. W. H. Cameron, Managing Director of the N. S. C., was present and spoke at the meeting.

Your Chairman, Secretary and several members of the Textile Section attended the Conference of The Rhode Island Safety Council held at Providence, R. I., on January 17, 1928.

Your Chairman, Secretary and Chairman of Publicity attended the Semi-Annual Conference held at the Commodore in New York City on February 18, 1928.

Your Chairman and Secretary attended the Congress of the Massachusetts Safety Council held at the Statler Hotel in Boston in May, 1928.

During the year a poster contest was held with very good results.

At the beginning of the season I was provided with a list of members of the Textile Section by Mr. W. Dean Keefer, showing a membership of 127 during the year. I have received from the Chicago Office notices of the addition of eight new members and the cancellation of 12 members, leaving a total membership of 123. A loss of four members for the year.

Committee Reports Are Dispensed With

CHAIRMAN WASHBURN: Unless any one present wants to know, in further detail, of the activities during the past year, if there is no objection, we will just waive the reading of other reports. It does seem too bad that more of the members of the textile industry have not become members of the Section. Various reasons have been given why we have failed to receive applications, and in view of the fact that interest seems to be missing among the textile industry as a whole, the Executive Committee this year has attempted to prepare a program somewhat different than those we have held in the past; one, which I think will be of interest to everybody present and which possibly may settle for all time the question of the necessity of safety and of accident reduction efforts throughout the industry as a whole.

The first speaker this morning is a gentleman who comes to us representing a body vitally interested in this question. We, as safety engineers, supervisors, personnel men, etc., are firmly convinced in our own minds that safety and production go hand in hand, and although it is a much mooted question, we certainly do believe that instead of its being a minor problem in the industry it is one of the major ones. I have the honor of presenting to you as the first speaker this morning Mr. Russell T. Fisher, Secretary of the National Association of Cotton Manufacturers, who should be in position to present a very good point of view on this important subject.

Safety in the Cotton Industry

By **RUSSELL T. FISHER**

Secretary, The National Association of Cotton Manufacturers, Boston, Mass.

The textile industry was one of the first, if not the first, to grow from a home industry into a factory industry, and was old when many of the present large industries had not made even a beginning. Our industry was not only one of the pioneers in the development of modern factory methods of production but was also a pioneer in the application of new discoveries and inventions. The steady development of light and power may be traced in the history of the textile industry for the last 125 years. Illuminating gas replaced whale oil and kerosene, and was in turn replaced by electric lights. Arc lights were used as early as 1879, incandescent lamps by 1881, individual motor drive in 1891, and the first mill completely driven by electricity was erected in 1893. Progress in manufacturing methods, adequate buildings, sanitation, accident prevention, etc., has steadily developed, and today the industry compares favorably with the other large industries of the country.

An idea of the size of the industry and its diversity can be obtained from the last census figures for four of the major groups that include the largest part of the industry.

According to the 1925 census of manufacturers, there were 1,659 silk mills, employing 132,509 wage earners; 973 plants in the wool manufacturing group, employing 206,110; 1,638 cotton mills, employing 468,352; 2,078 knit good plants, employing 161,880; or a total of 6,348 plants, employing a total of 968,851 wage earners.

In addition to these major groups there are other minor groups, such as the lace and embroidery manufacturers. The rayon manufacturers are, I believe, at the present time classified as a chemical industry rather than a textile industry.

The approximate size of the industry has been brought out to show why its welfare is of interest to so many people, and to indicate what a tremendous undertaking it would be to arrive at even approximate figures for the industry as a whole on its accident record and results of safety work.

The industry has frequently received widespread publicity of the most unfavorable nature, particularly on its accident record. Some of this is a deliberate misstatement of fact and issued to promote some personal aim. Other unfavorable reports have occasionally been published by responsible parties. Usually these reports are based on incomplete data. Within the past few months the trade papers carried a story based on a report published by the American Engineering Council to the effect that there were too many accidents in cotton mills. An examination of this report shows that the investigators based their conclusions on data from only 41 companies out of a total of over 6,348 in the industry. It is not necessary to emphasize the unfairness and probability of error in judging an industry the size of the textile industry on such a small group.

An indication of the trend of accidents in the industry can be obtained from a study of the basic rates established by the state insurance boards. In Massachusetts, for example, since the first Working Men's Compensation Act was passed in 1912, the benefits provided by law have more than doubled. If there had been no decrease in the accident experiences, it would be reasonable to assume that with the benefits practically doubled since the inception of the law, the rates would be doubled. Actually the rate today is slightly less than the rate first provided in 1912. A reasonable explanation

of this fact is that accidents have decreased at such a rate that the additional cost has been more than offset by the decrease in the number and severity of accidents.

A study of the records of the leading accident insurance companies of the country should indicate the true conditions that prevail in the industry. Through the courtesy of a number of the leading insurance companies the accident records covering the insurance of about 400,000 employees, or about a billion man hours worked, have been examined.

On the basis of these records there are 20.4 accidents per million man hours of exposure, ranging with the different insurance companies from a low of 17.4 accidents to 41.8 accidents per million man hours of exposure. Analyses of accident records of about 375,000 employees show .0418 accidents per employee per year, or 41.8 accidents per 1,000 employees per year. The severity of the accidents figured from the same source of information shows the days lost per employee to be .885 and the days lost per accident as 21.1.

In a paper read by Charles H. Clark before this Council in 1920 he raised the question "as to whether the accident hazards of operative textile machinery were not being unduly emphasized by the casualty insurance companies and by those who are directly responsible for safety work in our textile mills."

At that time sufficient data had not been collected to answer the question. Since then the tabulation of accidents by causes has conclusively shown that the operation of textile machinery causes less than 30 per cent of the lost time accidents in a mill.

The position of the textile industry in relation to accidents was brought out by the analysis that the National Industrial Conference Board made of the National Safety Conference data on accidents. These data have been used before, but are worth glancing through again.

Of the seventeen major industries of the country, the textile industry had the fewest number of accidents causing death, with the exception of the tanning and packing industry, where the information was not complete. In the number of accidents causing temporary disability the textile industry is lowest; in accidents causing permanent disability next to the lowest, public utilities being the only industry with less.

The well established fact that accidents causing temporary disability are the chief concern of the textile industry is further substantiated by this report with 30.33 out of a total of 31.48 accidents in this class. In considering the total number of accidents the textile industry is considerably below any of the other industries, the chemical industry being the nearest, with 43.81 per cent accidents, compared to 31.48 per cent for the textile industry.

Several of the insurance company's officials admit that there has been great progress in safety work in mills in the past several years. They feel that practically everything that can be done to safeguard machinery has been done, and that records show that accidents from mechanical causes are less frequent than in any other industry. They are now urging more educational work to cut down the non-mechanical accidents.

Available accident data from insurance companies has not been in all cases segregated by branches of the textile industry, so that it has been found necessary to discuss safety in the industry as a whole rather than in the cotton textile industry. Accident records, however, from a sufficient number of representative cotton mills have been gathered to accurately show the progress being made in the mills today in safety work.

One insurance company covering over 80,000 employees in cotton mills reports $4\frac{1}{4}$ accidents per 100 employees for a two and one-half year period ending Janu-

ry 1, 1928, and that this figure is one accident per 100 employees less than for the previous two and one-half year period.

Compare this record with $4\frac{1}{2}$ accidents per 100 employees for the wire goods industry, 9 for iron foundries, 7.3 for textile machinery manufacturers, 6.1 for the tanning industry, and 6.3 for the boot and shoe machinery manufacturers, and we find the hazard in a cotton mill greatly under that of other industries.

Another insurance company reports 3.4 lost time accidents per 100 employees per year.

An analysis of 19,661 lost time accidents involving 412,837 days lost showed that 3.8 per cent of these accidents were from mechanical causes, the balance 66.2 per

Accident Frequency, 1926

(Number of accidents per 1,000 workers per year)

Industry	Death	Accidents Causing Permanent Disability	Accidents Causing Temporary Disability	Total Accidents
mining	2.37	1.99	180.40	184.76
Foodworking	.75	3.13	144.97	148.85
Shoemakers and Tanners*.....	.....	1.60	139.70	141.30
Construction	1.43	4.37	132.66	138.46
Quarries	2.04	2.67	132.02	136.73
Paper and Pulp	.42	1.27	86.56	88.25
Not Classified	.83	2.23	82.15	85.21
Metals	.44	2.79	81.86	85.09
Public Utilities	1.40	.57	79.05	81.02
Rubber	.13	1.17	70.86	72.16
Petroleum	.57	2.23	67.36	70.16
Power Press	.16	2.64	55.33	58.13
Food	.17	2.04	54.42	56.63
Automotive	.16	2.72	53.73	56.61
Government	1.11	1.58	53.58	56.27
Chemical	.61	1.72	41.48	43.81
Textile	.09	1.06	30.33	31.48
All Industries	.54	2.22	73.73	76.49

Report covers 16 establishments.

it, were from non-mechanical causes. Of the 33.8 per cent accidents due to mechanical causes, 28.81 per cent were caused in the operation of textile machinery, the balance 4.99 per cent were caused by incidental machinery, such as machine tools and wood work machines.

The same source of information shows that under mechanical causes warping and weaving machinery caused 10.19 per cent of the accidents, spinning, spooling, twisting 7.54 per cent, cards 4.02 per cent, opening and picking machinery 2.86 per cent, combers, slubbers and lapping machines 1.6 per cent, cloth room machines .5 per cent, other textile machines 1.27 per cent.

Under accidents caused from non-mechanical causes over 40 per cent were from falling material and from falls. In studying the accident reports of the insurance companies of the mills it would appear that a very large percentage of the

non-mechanical accidents can only be explained on the ground of carelessness on the part of the employee. In fact many of the accidents result from direct disobedience to instructions. Perhaps the most serious cause of lost time accidents is due to infections, the employee not reporting small cuts, scratches, or bruises when received, and paying no attention until after the infection has occurred.

A few individual cotton mill records are as follows:

Interesting Records of Individual Mills

The Luther Mfg. Co., Fall River, employing 500, went 450 days without a lost time accident, then had one accident, and now has completed another year without an accident, or one accident in 810 days.

The Lorraine Mfg. Co., Pawtucket and Westerly, R. I., has a record of less than two lost time accidents per 100 employees for the last two years.

Firestone Cotton Mills of Fall River employs about 1,000 persons, and did not have a lost time accident in December, 1927, or January, 1928. The average rate for the last six months is 4.7 per 100 employees.

The Artic Plant of B. B. & R. Knight Corp., employing 350, went from December 17 to May 22 without a lost time accident, then had one accident and has had none since. The Natic Plant employing 400 persons, went from March 5 to August 21 with no lost time accidents. The Grant Plant employing 150 persons, had no lost time accidents from November 1 to March 28, and had no accidents in April, May, or June. The Royal Plant had no accidents in January, May, and June. The Centerville Plant no accidents in January, one in February, none in March, four in April, none in May, and one in June.

The Whitman Mills in New Bedford have less than two accidents per 100 employees per year.

The Butler Mills average about two accidents per 100 employees per year.

The New England Southern Mills, employing 400 persons, have been 18 months without a lost time accident.

The Kilburn Mills, employing 1,300 persons, went through January, February, and March without an accident.

To illustrate the type of accident hazard in the cotton mills the record of the Androscoggin Mill in Lewiston is given in some detail. For the year ending July 1, 1928, the mill averaged employing 922 persons and had 7 lost time accidents, resulting in 327 days lost. This is at the rate of .76 accidents per 100 employees per year. There were no accidents from mechanical causes, all seven accidents resulting from non-mechanical causes.

These seven accidents and the time lost were as follows:

Accident Experience—Androscoggin Mill

Cause—1928	Number of Accidents	Days Lost
Falls	1	194
Handling Material	2	44
Striking against objects.....	3	68
Burns	1	21
Total	7	327

That this period was not the exception is shown by the accident summary for the past seven years, where the days lost per employee gradually decreased from 1.02 to 0.35 per employee. The frequency of accidents per 100 employees shows a low average for the seven years.

Accident Summary

Year ending June 30	Frequency accidents per 100 employees	Severity days lost per employee
1920	3.32	1.02
1921	4.73	.75
1922	5.47	.85
1923	4.46	.67
1924	4.66	.73
1925	5.70	.75
1926	3.74	.66
1927	4.28	.73
1928	.76	.35

This example illustrates clearly the problem that confronts the cotton manufacturer. The exposure to machinery hazard has been reduced to a minimum, leaving the possibility of further reduction in accidents almost entirely in the non-mechanical class, where practically all accidents are the result of carelessness, untaken, negligence, or lack of ordinary precaution on the part of the employee. Many excellent papers have been presented at previous meetings of the National Safety Council telling in detail how accident prevention work should be organized and what methods of procedure will bring results, and it would only be repeating to give them here. There are, however, certain fundamentals that are necessary for a successful safety organization.

First—The active head of the company, usually the treasurer in a cotton mill, must be convinced that continuous safety work is essential.

Second—The agent and superintendent must be made to realize that getting results from safety work is a part of their job.

Third—The overseers must be held responsible for any accident occurring in their department.

Fourth—The employee must be educated to an understanding that safety work is primarily for his benefit.

CHAIRMAN WASHBURN: There is little question but what the members here would like to ask Mr. Fisher some questions, but I am going to suggest that you withhold those questions until after we listen to the next speaker, at which time the meeting will be thrown open to discussion, and both speakers; I feel certain, will be very ready to answer any questions the members may want to ask.

We are particularly honored in having with us today, as our second speaker, a gentleman who is in a position to give us, not only data, but his own personal opinion, as to why safety should be conducted in the textile industry as well as in the others. It has been my experience that, with the exception of a few textile plants, most of the textile concerns are very ready to limit their safety work to that recommended by their carrier companies. In my own mind it is very necessary that they go farther than that. Wherever you have the human element to contend with, you are going to have accidents. It is very true that machine accidents have decreased to a marked extent during the past few years, but where you have the human element you are bound to have laxity or disobedience of orders, lack of supervision on the part of those who are in control, things which are bound to create accidents aside from the machinery hazards.

I have had it told me a number of times that as far as the machines are concerned in textile plants, they are less hazardous than those in other industries. To a certain extent that is true, but I think that all the members present will agree with me that the textile industry is a dangerous industry. Although some plants are paying more attention as the years go by to the establishment of safeguards, they are going to continue to have accidents where the human element is concerned.

The next speaker is familiar with records in all industry. The statistics which he has compiled are submitted to him by the different industries. We are particularly honored today in having with us Mr. Ethelbert Stewart, Commissioner of the United States Bureau of Labor Statistics.

Cotton Manufacturing and Safety

By ETHELBERT STEWART

United States Commissioner of Labor Statistics, Washington, D. C.

I think if I had read Mr. Russell T. Fisher's paper on "The Safest Industry" before I accepted the invitation to address this conference I probably would not have accepted. His paper was a most excellent one, and the conclusions at which he arrived are essentially the same as mine. His figures were based upon textiles, covering cotton, wool, and silk, and several other really separate industries.

In the present paper I have attempted so far as possible to segregate cotton spinning and weaving, and wool and worsted manufacture, as distinct from all other industries.

Before going into the real subject of my paper, however, I want to call your attention to the fact that it is at present utterly impossible to arrive at definite statistical facts in relation to accidents. The various States have such different waiting periods that an accident that lasts more than one day is reported in one State, while in many other States an accident is not reported unless it lasts three days, in some States 7 days, and in some States there is even a two-weeks' so-called waiting period.

In the cotton manufacturing industry the accidents are as a rule not serious; the healing period is short and hence many accidents in the industry may not be reported at all.

Even if we accept the Outwater table, which was constructed on the basis of iron and steel, where the accidents as a rule are more serious, we find that the disability in 9.2 per cent of the cases does not last beyond one day after the day of injury; in 25.3 per cent of the cases the disability lasts three days; in 37.1 per cent of the cases, five days; in 46.9 per cent, seven days; in 56.2 per cent, ten days; while in those States that have a two-weeks' waiting period 65.5 per cent of the industrial accidents would not be reported as compensable.

Again, in the cotton manufacturing industry neither North Carolina nor South Carolina furnish any accident reports whatsoever, since they have no workmen's compensation law. This in itself makes any discussion of accidents in the industry resemble playing "Hamlet" with Hamlet left out.

With this prefatory remark that there never can be any satisfactory statistics of accidents until we agree upon the facts and have a uniform set of reports, I am going to proceed to analyze such figures as exist, from a different point of view, and give you the facts as we find them. It is not my intention to read this entire paper, and certainly not to punish you with all the tables, but to hit the high spots and let you read the rest at your leisure.

I agree, therefore, in general terms that the manufacture of cotton goods is a comparatively safe industry; in fact, one of the safest. Whether cotton mills are as safe as the rather scrappy figures indicate depends on the character of the mills that furnish reports. Only partial data are available and nobody knows whether the mills furnishing data are a fair cross section of the industry. From its very nature cotton mill operation ought to be safer than some other industries. It is free from the explosion and the falling roof of the coal mine. It is free from the danger of explosions and breaking cranes of the stone quarry. It is more nearly automatic than the shoe factory and, hence, ought to have a lower accident rate.

Alabama, 1926 and 1927 Combined

Accidents with disability ending in *first two* weeks of disability are *not* included.
The rate is per 1,000,000 man hours)

Industry	Number of establishments	Full year workers	Number of accidents	Frequency rate per million man hours
Textile goods	19	12,270	137	3.72
Woolen and worsted	—	—	—	—
Total	19	12,270	137	3.72
Fertilizers	5	196	3	5.10
Laundry and machine shop	7	3,980	170	14.24
Lumber—sawmills	9	4,493	140	10.39
Slaughtering and meat packing	3	233	5	7.15
Shipbuilding—steel	1	250	24	32.05

Georgia, 1926 and 1927 Combined

Accidents with disability ending in *first* week of disability are *not* included.
The rate is per 1,000,000 man hours)

Industry	Number of establishments	Full year workers	Number of accidents	Frequency rate per million man hours
Textile goods	28	40,564	704	5.79
Woolen and worsted	4	766	34	14.80
Total	32	41,330	738	5.96
Fertilizers	15	1,622	100	20.55
Laundry and machine shop	12	2,504	178	23.70
Furniture	6	1,005	24	7.96
Other	2	771	56	24.21
Lumber—planing	4	399	20	16.70
Lumber—sawmills	3	649	79	40.58
Roleum refining	2	458	13	9.46
Slaughtering and meat packing	2	431	23	17.79
Total	78	49,169	1,431	9.70

Maine, 1926 and 1927 Combined

(All accidents extending beyond day of disability are included.
The rate is per 1,000,000 man hours)

Industry	Number of establishments	Full year workers	Number of accidents	Frequency rate
Textile goods	12	12,201	588	16.06
Woolen and worsted	7	5,291	129	8.13
Total	19	17,492	717	13.66
Laundry and machine shop	4	482	124	85.75
Furniture	2	306	15	16.34
Hardware	2	192	23	39.93
Lumber—planing	2	100	6	20.00
Lumber—sawmills	9	446	65	48.58
Paper and pulp	9	6,642	805	40.40
Total	47	25,660	1,755	22.80

Massachusetts, 1926 and 1927 Combined

(All accidents extending beyond day of disability are included.
The rate is per 1,000,000 man hours)

Industry	Number of establishments	Full year workers	Number of accidents	Frequency rate
Cotton goods	65	50,338	1,599	10.59
Woolen and worsted goods.....	3	4,636	83	5.97
Total.....	68	54,974	1,682	10.14
Automobile tires	7	8,402	275	10.91
Boots and shoes.....	60	24,300	267	3.66
Brick	3	163	14	28.63
Carpets	6	4,247	32	2.51
Electrical machinery	20	17,111	1,152	22.44
Foundry and machine shops.....	41	11,449	557	16.22
Furniture	11	1,341	31	7.71
Leather	30	8,702	464	17.77
Machine tools	28	9,392	203	7.20
Paper and pulp.....	25	11,547	585	16.89
Steam fittings, etc.....	11	3,024	197	21.72
Stoves	5	1,616	127	26.20
Structural ironwork	5	503	35	23.19
Total.....	320	156,771	5,621	11.95
Iron and steel.....	*	14,379	517	11.99
Grand total	*	171,150	6,138	11.95

*Not reported.

The question, therefore, is not, "Is the manufacture of cotton a safe industry?" but rather, "Is it as safe as it can be made? What more can the mill operator do to decrease the hazard of employment, and what more can the employee, on his part, do to decrease the hazard of his employment?"

It is unfortunate that complete statistics are not available for all the lines of industry. We must know what our dangers are and what our losses are in order that we may intelligently improve conditions. Greater attention should be given to statistics concerning the causes of accidents and the rate as applied to occupations. It is not enough to know the rate for the mill as a whole. Greater detail is necessary to aid in eliminating the several kinds of hazards that exist in a cotton mill.

New Hampshire, 1926 and 1927 Combined

(All accidents extending beyond-day of disability are included.
The rate is per 1,000,000 man hours)

Industry	Number of establishments	Full year workers	Number of accidents	Frequency rate
Cotton goods	10	24,864	800	10.73
Woolen and worsted.....	9	3,133	146	15.53
Total.....	19	27,997	946	11.26
Foundry and machine shop.....	6	1,979	133	22.40
Furniture	1	103	19	61.49
Paper and pulp.....	2	732	129	58.74
Total.....	28	30,811	1,227	13.27

New York, 1926 and 1927 Combined

Accidents with disability ending in *first* week of disability are *not* included.
The rate is per 1,000,000 man hours)

Industry	Number of establishments	Full year workers	Number of accidents	Frequency rate
Cotton goods	4	2,903	77	8.84
Woolen and worsted goods	7	2,009	50	8.30
Total	11	4,912	127	8.62
Agricultural implements	9	3,599	130	12.04
Automobiles	35	21,399	859	13.38
Hats and shoes	20	34,916	937	8.95
Clock	28	3,500	273	26.00
Apparel	10	16,138	193	3.99
Chemicals	18	5,881	210	11.90
Metal machinery	21	39,847	1,593	13.33
Utilizers	4	257	17	22.05
Wear	8	2,536	120	15.77
Laundry and machine shops	45	29,836	1,908	21.32
Wear	38	7,537	305	13.49
Ware	2	563	16	9.47
Other	17	3,673	243	22.05
Wear—planing mills	39	6,008	493	27.35
Machine tools	18	2,656	175	21.96
Wear and pulp	38	14,318	1,371	31.92
Petroleum refining	4	2,315	253	36.43
Wear	3	1,488	23	5.15
Building—steel	8	5,377	184	11.41
Wear and enameled ware	5	1,746	155	29.59
Wear fittings	12	3,481	302	28.92
Wear	5	709	47	22.10
Structural ironwork	11	1,437	97	22.50
Total	409	214,129	10,031	15.62

The statistics available are at best but fragmentary. One statement may show accident rate of a cotton mill higher than some other industry, while another statement will show a lower rate for the cotton industry. One statement may show rate lower in the cotton mill than in the woolen mill. Another set of figures show a lower rate in the woolen mill than in the cotton mill. It is quite safe for either of these to quarrel between themselves as to which is the safer, both of them are comparatively safe and the nature of their process is such they ought to be about equally safe. Nor is there any reason for dispute as between the cotton mill and any other factory having only a limited risk. The question is to eliminate all of the risks possible and to educate and discipline employees as well as the employers in the "Safety First" idea.

The Bureau of Labor Statistics each year collects accident data from certain industries having a record of industrial accidents. The data are for representative industries and plants. Such figures are compiled by the bureau.

The figures for some industries are thin in many of the States and reporting conditions vary as between the States; for example, one State may report all accidents causing a loss of time beyond the date of injury, while another State have no record of accidents causing a temporary disability of less than one or possibly two weeks' duration; hence a total of the data for the several States would be something of a hodgepodge.

Pennsylvania, 1927

(All accidents extending beyond day of disability are included.
The rate is per 1,000,000 man hours)

Industry	Establishments	Full year workers	Accidents	Frequency rate
Cotton goods	6	2,246	60	8.90
Woolen goods	19	6,054	191	10.52
Total.....	25	8,300	251	10.08
Agricultural implements	5	500	46	30.70
Automobiles	9	6,806	213	10.43
Automobile tires	7	2,154	140	21.65
Boots and shoes.....	13	3,700	62	5.59
Brick and tile, etc.....	26	6,100	489	26.72
Carpets	15	4,217	144	11.39
Chemicals	7	2,627	106	13.45
Electrical machinery	13	17,877	735	13.70
Fertilizers	4	495	40	26.92
Flour	4	124	1	2.69
Foundry and machine shop.....	92	26,830	2,720	33.79
Furniture	30	3,279	218	22.16
Glass	25	7,156	849	39.55
Hardware	6	2,569	210	27.24
Leather	17	3,943	421	35.59
Lumber—planing mill	6	621	59	31.68
Lumber—sawmills	1	330	165	166.71
Machine tools	6	854	65	25.36
Paper and pulp.....	7	2,769	209	25.16
Petroleum refining	5	4,454	244	18.25
Pottery	2	381	—	—
Shipbuilding—steel	1	1,607	366	75.89
Slaughtering and meat packing.....	9	1,585	145	30.48
Steam fittings, etc.....	14	5,123	564	36.69
Stoves	8	901	61	22.58
Structural ironwork	21	3,856	566	48.92
Total.....	378	119,158	9,089	22.63
Iron and steel.....	*	146,595	7,069	16.07
Grand total.....	*	265,753	16,158	20.27

*Not reported.

In the several tables that follow figures are presented for the industries from which reports were obtained in States where cotton manufacturing is of any material importance. Four States are conspicuous by their absence. North Carolina and South Carolina have no accident statistics. Rhode Island has statistics but by law is prohibited giving out information. The accident records in Connecticut are decentralized; there are four or more districts in the State each having its own records.

Each State is presented by itself as it is assumed that the same degree of completeness will apply to each industry in a State, although it may not apply as between the different States.

Another table has been prepared showing the frequency rate for cotton and for woolen manufacture, and the rate for the industry having the highest rate and the rate for any industries having a rate lower than that of cotton or of woolen.

In the accompanying tables where figures for years are given, it is the sum of the establishments that report each year. For example, 14 establishments reported each of two years, and the total is given as 28. If 12 reported one year and 16 reported another year the total is given as 28.

New Jersey, 1926 and 1927 Combined

(Accidents with disability ending in *first* week of disability are *not* included.
The rate is per 1,000,000 man hours)

Industry	Establishments	Full year workers	Accidents	Frequency rate
Textile goods	8	8,557	57	2.22
Woolen and worsted goods.....	12	8,348	79	3.08
Total.....	20	16,905	136	2.68
Automobiles	8	4,451	198	14.83
Automobile tires	9	3,922	129	10.96
Hats and shoes.....	5	846	10	3.94
Shirts, etc.....	30	5,104	172	11.23
Carpets, rugs	6	1,828	72	13.13
Chemicals	36	6,751	216	10.67
Electrical machinery	30	16,909	348	6.86
Laundry and machine shops.....	40	9,560	673	23.47
Press	12	7,220	131	6.05
Leather	19	4,542	129	9.47
Petroleum refining	4	18,217	329	6.02
Printery	16	5,030	221	14.65
Stamped and enameled ware.....	4	988	41	13.83
Shoes	2	1,266	108	2.84
Machine tools	13	1,151	44	12.74
Machine fittings, etc.....	6	1,750	67	12.76
Structural ironwork	4	226	14	20.65
Total.....	264	106,666	3,038	9.49

Tennessee, 1926 and 1927 Combined

(All accidents with disability extending beyond day of injury are included.
The rate is per 1,000,000 man hours)

Industry	Establishments	Full year workers	Accidents	Frequency rate
Textile goods	6	6,321	250	13.18
Woolen and worsted.....	2	380	21	18.42
Total.....	8	6,701	271	13.48
Agricultural implements	3	442	27	20.36
Automobiles	3	1,853	293	52.71
Chemicals	4	94	—	—
Grinders	8	418	20	15.95
Iron	8	550	40	24.24
Laundry and machine shop.....	5	1,243	78	20.92
Printery	10	1,847	203	36.64
Shoes	2	386	22	19.00
Timber—planing	4	1,165	33	9.44
Timber—sawmills	4	1,923	106	18.37
Paper and pulp.....	2	302	22	24.28
Textile	2	426	13	10.17
Slaughtering and meat packing.....	6	669	72	35.87
Shoes	8	1,805	561	103.60
Total.....	77	19,824	1,761	29.61
Iron and steel.....	*	2,493	149	19.92
Grand total.....	*	22,317	1,910	28.53
Not reported.....				

Texas, 1927

(All accidents with disability extending beyond day of injury are included.
The rate is per 1,000,000 man hours)

Industry	Establishments	Full year workers	Accidents	Frequency rate
Cotton goods	7	1,449	100	23.99
Brick	11	483	98	67.69
Fertilizer	1	117	22	62.68
Flour	5	187	19	33.85
Foundry and machine shops.....	9	1,340	280	69.63
Furniture	4	521	69	41.15
Lumber—planing	3	246	72	97.30
Lumber—sawmills	17	8,538	1,556	68.75
Petroleum refining	5	10,367	1,599	51.41
Slaughtering and meat packing..	7	2,832	271	31.90
Structural iron	3	277	117	140.59
Total.....	72	26,357	4,203	53.83

The National Council on Compensation Insurance of New York City has furnished a table showing experience collected and tabulated by the Council covering five policy years, 1920 to 1924, inclusive. The table is attached. It shows the pay roll insured, the number of losses sustained, and the total cost of such losses. From these figures the computation has been made of the pure premium per \$100 insured. This pure premium is understood to be the amount paid back in losses without account being taken of the cost to companies in getting any business and paying overhead expenses. In mills doing cotton spinning and weaving the pure premium is 81 cents. In mills making cotton yarn and thread the pure premium was 87 cents. In mills spinning and weaving woolen the pure premium was 68

Virginia, 1927

(Accidents with disability of less than 8 days are *not* included.
The rate is per 1,000,000 man hours)

Industry	Establishments	Full year workers	Accidents	Frequency rate
Cotton goods	4	6,173	127	6.85
Woolen and worsted.....	2	435	4	3.06
Total.....	6	6,608	131	6.61
Boots and shoes.....	5	741	17	7.65
Brick	3	257	12	15.57
Chemicals	1	842	61	24.14
Fertilizers	10	759	29	12.73
Flour	2	67	3	2.88
Foundry and machine shops.....	4	929	91	32.66
Furniture	2	599	12	6.68
Leather	1	124	11	29.52
Lumber—planing	2	479	27	18.78
Lumber—sawmills	4	1,380	125	30.18
Paper and pulp.....	2	362	25	23.04
Pottery	1	140	3	7.15
Shipbuilding—steel	1	4,089	120	9.78
Slaughtering and meat packing..	—	—	—	—
Stoves	1	51	6	39.14
Structural iron	2	452	114	84.05
Total.....	47	17,879	787	14.67

Summary of the Various States

From the tables for the several states a summary table is prepared showing the frequency rate for the cotton and woolen industries and the high and low rates reported for any industry reported.

State	Cotton	Wool	Highest	Lower than cotton or wool	Aveg.
Maine ¹	16.06	8.13	Foundries and machine shops 85.75		22.80
New Hampshire ¹	10.73	15.53	Furniture 61.49		13.27
Massachusetts ¹ ..	10.59	5.97	Brick 28.63	Carpets 2.51	11.95
				Boots and shoes 3.66	
New York ²	8.84	8.30	Petroleum refining 36.43	Carpets 3.99	15.62
				Pottery 5.15	
New Jersey ²	2.22	3.08	Foundries and machine shops 23.47		9.49
Pennsylvania ¹ ..	8.90	10.52	Lumber—sawmills 166.71	Pottery 2.69	20.27
				Flour 2.69	
				Boots and shoes 5.59	
Alabama ³	3.72	.....	Shipbuilding—steel 32.05		.....
Georgia ²	5.79	14.80	Lumber—sawmills 40.58		9.70
Illinois ¹	13.18	18.42	Stoves 103.60	Lumber—planing 9.44	28.53
				Pottery 10.17	
Massachusetts ¹ ..	23.00	.....	Structural iron 140.59		53.83
Virginia ⁴	6.85	3.06	Structural iron 84.05	Flour 2.88	14.67

¹All accidents extending beyond day of disability are included. The rate is per 1,000,000 hours.

²Accidents with disability ending in first week of disability are not included. The rate is per 1,000,000 man hours.

³Accidents with disability ending in first two weeks of disability are not included. The rate is per 1,000,000 man hours.

⁴Accidents with disability of less than 8 days are not included. The rate is per 1,000,000 hours.

s, while it was 82 cents in mills making yarn only. There is a considerable difference in wages in the cotton and woolen industries and the experience figures in and of themselves give only definite information concerning accidents. The bureau has available, however, from its own publication the average wage per man in 1920, 1922, and 1924 in cotton and woolen mills and using an average of wages for the three years as a measurement of wages throughout the period, to 1924, some interesting figures are developed.

From these figures the conclusion would be that the woolen industry is less dangerous than the cotton industry. In the statements that follow the figures for spinning or weaving, or woolen spinning or weaving are given, but not the figures for cotton or woolen yarns. The data for mills making yarn only are included because the bureau's wage figures are based on both spinning and weaving.

Cotton Spinning and Weaving

Pay roll insured.....	\$928,401,100
Number of cases.....	22,268
Paid in losses.....	7,558,600
Paid in losses per \$100 insured.....	0.81
Average payment per case.....	339.44
Average cotton mill wages per hour, 1920 to 1924, inclusive.....	0.394
\$100 pay roll pays 253.8 man hours.....	
100 man hours cost pure premium.....	0.31915

Wool Spinning and Weaving

Pay roll insured.....	\$671,471,200
Number of cases.....	11,877
Paid in losses.....	4,584,550
Paid in losses per \$100 insured.....	0.68
Average payment per case.....	386.00
Average woolen mill wages per hour, 1920 to 1924, inclusive.....	0.545
\$100 pay roll pays for 183.5 man hours.....	
100 man hours cost pure premium.....	0.37057

If 100 man hours in woolen mills at a wage of \$0.545 cost \$0.37057 pure premium, then at a wage of \$0.394 the pure premium would be \$0.30016, per 100 hours proving woolen mills less hazardous than cotton because at the same wages the pure premium would be \$0.01899 less per 100 man hours of work.

If the average payment per case in woolen mills at an average hourly wage of \$0.545 is \$386.00, at a wage of \$0.394 the average payment per case would be \$279.05.

This confirms the statement that woolen mills are less hazardous than cotton mills since at the same wage as that paid in cotton mills the average payment per case would be \$60.39 less than the average payment per case in cotton mills.

Cotton Spinning and Weaving—North

Pay roll insured.....	\$711,272,200
Number of cases.....	16,363
Paid in losses.....	5,797,157
Paid in losses per \$100 of insured.....	0.82
Average payment per case.....	354.28
Average wage per hour in 1924.....	0.460
\$100 pay roll pays 217.4 man hours.....	
100 man hours cost pure premium.....	.37718

Cotton Spinning and Weaving—South

Pay roll insured.....	\$204,519,800
Number of cases.....	5,614
Paid in losses.....	1,630,872
Paid in losses per \$100 of insurance.....	0.80
Average payment per case.....	290.50
Average wages per hour, 1924.....	0.285
\$100 pay roll pays 350.9 man hours.....	
100 man hours cost pure premium.....	0.22799

If 100 hours in the southern cotton mills at an hourly wage of \$0.285 costs \$0.22799 pure premium, then at a wage of \$0.460 the pure premium would be \$0.36800 per 100 man hours, proving Southern cotton mills less hazardous than Northern because at the same wages the pure premium would be \$0.0918 less per 100 man hours of work.

If the average payment per case in the Southern cotton mills at a wage of \$0.285 is \$290.50, at a wage of \$0.460 the average payment per case would be \$468.88 or \$114.20 more per case than in the Northern mills.

Analysis of Lost Time from Accidents in the Cotton Spinning and Weaving Industry

Furnished by American Mutual Liability Insurance Company.

Per cent of lost time chargeable to specified causes, based on 19,661 lost time accidents involving 412,837 days lost, with an average of 21.0 days lost per accident.

Mechanical Causes	Per Cent	Non-Mechanical Causes	Per Cent
Warping and weaving machines	10.19	Handling material.....	23.52
Spinning, spooling and twisting	7.54	Falls of persons.....	20.07
Card	4.02	Striking against objects.....	9.46
Opening and picking machines	2.86	Falling material.....	3.58
Elevators and hoists.....	1.89	Hand tools.....	3.09
Combers, slubbers and lapping machines.....	1.60	Plant vehicles.....	2.47
Cloth room machines.....	1.33	Burns	1.33
Incidental machine shop tools.....	.78	Electricity	.54
Incidental woodwork-ing machines.....	.73	Flying objects.....	.50
Power and transmission	.64	Vehicles	.33
Other textile machines.....	1.27	Poisonous substances.....	.28
Other mechanical causes.....	.95	Other non-mechanical causes	1.03
Total mechanical causes.....	33.80	Total non-mechanical causes	66.20
Grand Total			100.00

12.42 per cent of total time lost due to infection cases.

1.60 per cent of total time lost due to eye injuries.

.02 per cent of total time lost due to eye injuries—infection.

.56 per cent of total time lost due to loose-clothing accidents.

The table based on data furnished by the American Mutual Liability Insurance Company shows the per cent of total days lost that are chargeable to the several causes, but these figures must not be interpreted as severity rates in the several classifications, as the amount of exposure in each classification is now known.

The significant thing is that more than 60 per cent of the time lost is due to non-mechanical causes; in other words, were there no accidents in connection with the operation of machinery, there still would be more than 60 per cent as many days lost as are lost now.

Making the operation of machinery perfectly safe would still leave more than 60 per cent of the risk. The textile mill still has much to do to make machinery free from accidents and to make other lines of work entirely safe, and the worker

Analysis of Lost Time from Accidents in the Wool Spinning and Weaving Industry

Furnished by American Mutual Liability Insurance Company.

Per cent of lost time chargeable to specified causes, based on 3,415 lost time accidents involving 82,163 days lost, with an average of 24.1 days lost per accident.

Mechanical Causes	Per Cent	Non-Mechanical Causes	Per Cent
Loom	9.69	Handling material.....	20.89
Card	7.31	Falls of persons.....	19.36
Mule spinning frames and winders.....	4.48	Striking against objects.....	5.95
Scouring, fulling and drying machines.....	3.39	Burns	2.76
Pickers, dusters and openers	2.76	Falling material.....	2.69
Cloth room machines.....	2.24	Hand tools.....	2.34
Elevators and hoists.....	2.17	Plant vehicles.....	2.11
Power and transmission.....	1.48	Poisonous substances.....	1.99
Incidental woodwork-ing machines.....	.92	Vehicles	.84
Drawing and reducing machines	.49	Flying objects.....	.50
Incidental machine shop tools.....	.48	Electricity	.36
Other textile machines.....	2.39	Other non-mechanical causes	1.80
Other mechanical causes.....	.81	Total non-mechanical causes	61.39
Total mechanical causes.....	38.61		
Grand Total.....			100.00

10.12 per cent of total time lost due to infection cases.

1.27 per cent of total time lost due to eye injuries.

.80 per cent of total time lost due to loose-clothing accidents.

has much to do on his own part in making his occupation safe not only in connection with machinery but in other classes of work about the mill.

In a previous table I give Georgia figures as compiled by the Bureau, for the two years 1926 and 1927 combined, showing that accidents in which the disability ended during the first week are not included. In other words the 28 establishments are a combination of two years. The frequency rate as here shown was 5.79. For the purpose of this paper I wired Commissioner Stanley of Georgia requesting him to give me the number of fatal and nonfatal accidents in cotton mills for the entire State of Georgia for each of the years 1926 and 1927, with the number of employees. The result is that there were 4,173 nonfatal and 5 fatal accidents in the cotton mills of that State, a total of 4,178, in 1926. In 1927 there were 3,923 nonfatal and 2 fatal, a total of 3,925. The total nonfatal accidents for the two years were 8,096 while there were a total of 7 fatal, making a grand total of 8,103 for the two-year period. These figures cover 106 mills in 1926 and 112 mills in 1927. The hours of exposure were 392,133,000 man hours.

Here we have what I assume to be complete returns from a southern State, good, bad, and indifferent conditions, and the rate per million man hours, taking the whole cotton manufacturing industry of Georgia, is 20.7. Now here is a complete, and as far as I know, a thorough statement. Georgia it has been said is the most hazardous State in the cotton mill industry in the Union. These figures show that that is not true, for even on the same base it isn't as high as Texas,

id if you reduce Alabama, for instance, from a two weeks' waiting period to the day you would have a very much higher rate. It is not very much higher than that of Maine, and while it does weaken the statement made in this paper that the hazard is less in the South than in the North, that statement really when analyzed comes down to this—that more of the northern States report one-day accidents than those of the southern States. This Georgia statement came in after the paper was practically prepared, and I simply want to show you that even this statement covering all the little and bad plants still leaves the cotton manufacturing industry among the less hazardous.

In closing I want to say one thing—that extended disability due to infection in the cotton manufacturing industry is very great; 12.42 per cent infection in cotton spinning and weaving would indicate that that the cotton industry needs is adequate first-aid treatment for each and every kind of wound or scratch, no matter how small. I wish I were able to give you statistics that would be more acceptable, but I can say is this that your industry as a whole is a low hazard industry with tremendously high infection rate.

CHAIRMAN WASHBURN: Not long since, gentlemen, I was talking with a textile perintendent relative to his accidents based upon statistics that were received from the National Safety Council, and he immediately answered me to the effect that you can make statistics prove anything you want to. Now, to a certain extent that is true; but I think you will agree with me when I say that Mr. Stewart has shown us that the textile industry has a serious fault that should be rectified. The only means we have of knowing just how far the accident question is a major problem in the textile industry is through the reports we get from the individual plants. I regret to have to say that a very minimum number of textile plants are reporting to the National Safety Council everything in connection with their statistics on which they are able to base a fair rate for the entire industry.

Mr. Stewart has brought out the fact that there is serious need of intensive safety effort throughout the industry.

We have about three-quarters of an hour left, gentlemen, and the meeting is going to be thrown open to discussion on both these addresses and I trust that you will not allow the thing to lag, that you will come forward with the questions and statements you wish to make, so that we can have a good peppy meeting.

JOHN A. PERKINS (Harmony Mills, Cohoes, N. Y.): Would it be in order to ask Mr. Stewart if he has ever had a scratch?

MR. STEWART: Not seriously.

MR. PERKINS: I have been in cotton mills forty-eight years. There is more trouble put out about danger around cotton mills than any other industry I know of.

MR. STEWART: But the accidents happen.

MR. PERKINS: Accidents reported: I want to cite a few. I had charge of two mills in Utica some years ago. A man had a very serious case of infection. He said he was a mopper in the mill, a scrubber, and he said he was wringing out a mop, got a sliver in his finger, got infected, had to have a part of the hand removed. Later developed he was an Italian. He got some old railroad ties in the railroad, cutting the wood he got a sliver in his hand, got infected, and his mill had to pay the bill. One man had two ruptures that we paid for. It later developed that both of these were received cranking up an old Ford car. He claimed one of them was received lifting a bag of sugar we never owned, never had a bag of sugar there. The other he claimed he received lifting a box cart of 11 pounds.

In many cases people get injured in their own home, then come into the mill. I tell you that such a day they hurt their hand, scratched their hand, didn't think it amounted to anything and didn't report it. We have to pay the bill. There should be a law in every state in the Union that anybody receiving an injury should report it at once unless he was incapacitated. Every scratch and bruise and injury

should be shown to somebody. A large percentage of our bills are paid to people who are never hurt in the mills.

Speaking of falls, high heels and rubber heels, rubber heels are just as bad and worse; the majority in the mills wear rubber heels. I can go right through this hotel and find more hazards than I can find in our mill, and I guarantee as many will receive injuries as there are getting hurt in the mills. In seventeen years we have had one man lose an arm, few have lost fingers, not a person killed. There has been a score killed from our mills, who were run over by automobiles—very little said about it.

MR. STEWART: I want to say in reply that it is true that one large concern refused to hire Poles and certain other nationalities because of frame-up accidents.

A good many of the so-called personal accidents are not entirely the fault of employers. Bad economic thinking filled this country with ten million people who have not our ideas, and when the compensation law was passed, in very many cases unquestionably they did take advantage of the situation to frame up compensation cases; and even yet the cost of watching the framers-up is probably as much as the difference in the wages you would have to pay if the immigration bars had never been let down.

D. S. BEYER (American Mutual Liability Insurance Company, Boston, Mass.): I have been very much interested in the discussion of the accidents in the textile industry, which I have followed for a number of years and watched with a good bit of interest. The question of the relatively large number of mechanical accidents in the textile industry is perhaps explained, to some extent, by the fact that this industry is more particularly a mechanical industry than any other one that I recall at the present time.

A few years ago we made a study, in connection with our insurance rating work, of the number of machines per employee in different industries, and I think we found from five to ten machines per employee in the textile industry. It is some years since I have seen the figures but I know it was from five to ten, where the average industry has only one, and very many of them less than one machine per employee. That gives a very large mechanical expense and makes a very difficult matter from the standpoint of cost in protecting these machines. Take a fair sized textile plant—you have to spend \$20,000 to \$30,000 for guarding a certain type of machine. Here the economic question is a very serious matter.

I think there has been very excellent progress made in a great many mills—textile mills that we have followed personally for a good many years. One question that I think would be of interest is in connection with Mr. Fisher's discussion. Did that compilation include the boot and shoe industry and show accident frequency?

MR. FISHER: The two tables I mentioned in my report have been printed by the National Safety Council and are here.

MR. BEYER: Is the boot and shoe industry included there?

MR. FISHER: No, it is not.

MR. BEYER: One point in that connection—our experience has been that the boot and shoe, which is another mechanical industry, has a somewhat lower accident frequency; and from the standpoint of industry you will find that this is the case. I think there is a little danger of, perhaps, being too conservative. I think Mr. Fisher has given a very excellent statement of the situation from the textile standpoint. On the other hand, we don't want to exaggerate the facts. It used to be a case of when the baby cried we gave it a dose of soothing syrup. Now, we try to find whether there is a pin sticking it or something that needs to be corrected. I think we have got to face the facts clearly and without any effort to paint them in too rosy hues, because I think that is dangerous.

Also I think that there is a good bit of truth in the point the Commissioner has made in the difficulty of getting comparative statistics that really mean anything

because of the different methods of reporting. I think that such figures should come from the industry itself and I think that as this subject is brought up and more and more mills become interested in it a very splendid thing would be competition in the mills of the different types of industry, so that they would get similarity of reporting and keep their statistics on the same basis, we could then have comparative figures.

I have been in a good many competitions. That is always helpful, as giving a comparison as between one plant and another. The question is not so much the reward given the industry as whether improvement is being made in that industry and whether that particular industry is doing the best it can, or not.

The question of the falls of the workers—it is a difficult thing to control the reporting of minor injuries and little cuts and scratches that occur in mills, but in many plants they have been brought under control by very keen supervision and interest. One plant in Massachusetts recently received a letter from one of the chamber of commerce organizations. It is not in the textile industry but has over two thousand employees. For about four years now they have run with less than one accident per one hundred employees per year. So far this year, the president of that company, which has over two thousand employees, has sent me personally a memorandum every time that they have had a lost time accident in that plant, and so far they have had seven this year.

It is an industry with a great deal of machinery and hazardous work. They were running at a rate of more than ten times their accident rate at present, but on account of the keen personal interest of their manager they have made a very wonderful safety record.

The great thing is, I think, to face the facts and to get the plant that has been backward to come in line and improve its record. Just before I started to the meeting here, I asked one of my boys to pick out about a dozen charts from the textile plants just at random. They are not selected with any particular point in mind. I think they might be of interest in the discussion here as showing certain clues of how the work has been carried on. Of course the record from one plant doesn't mean anything—one swallow doesn't make a Summer—but it was rather interesting when I looked over these while the discussion was going on.

Out of fifteen plants represented in these charts, twelve have submitted below the average figure which was quoted by Mr. Fisher, and incidentally our records check very closely with them. Analysis of mills with 45,000 employees gave an average of five over a three-year period, five accidents per 100 employees per year. That is the way we keep that record. The figures of Mr. Fisher, 20.4 accidents per million man-hours of exposure, when it is reduced to 100 employees per year, it would be 4.9. This includes large plants and small plants. Here's one with 40 employees which went for one complete year without a single lost-time accident, and the average for seven or eight years is about two accidents for 100 employees. That is about one-third of the average which was quoted in those figures.

Here's one of the Southern mills which is rather high; it would need some attention I would say. Here's another plant for one year, one accident per 100 employees. For two years their rate is less than two per 100 employees. Here's another larger plant with 2,000 employees running about two to two and one-half. Here's another one which went two months without a single lost-time accident. Here's another plant that is running about half the record. Here's another that is a little bit over, and so on.

Of the entire group here I should say the average would be below and they were picked out without any selection at all; less than half the record they were about five or six years ago when we started making these studies, and I think there are sufficient figures here to indicate that real progress is being made in the textile industry. I think that the competition is not in the competitive spirit. Repeated

plans to bring in line some of the ones who have been slack have been very helpful.

D. FRANK LORD (Safety Engineer, M. J. Whittall Associates, Worcester, Mass.): It seems to me that the real need of the committee is to get the views of the man who is on the place. Suppose the textile industry is the lowest industry—what of it? What does it amount to? Aren't we going to feel a little bit as if we were smug? Aren't we going to rally just a bit and say, "well, our industry is the safest." Isn't it a false representation? Supposing we are lowest—what of it? We have to get out, as Mr. Perkins said, and clean up our own individual mill.

I would like to ask Mr. Fisher if he thinks it was well to dwell too much on the fact that the textile industry is one of the lowest industries—I don't see how we are going to compare. On the other hand, I would like to ask Mr. Stewart why he says that reports of the textile industry include everything from lip sticks to something else.

MR. STEWART: I do say that your section is composed of so many varying interests that the statistics of your section, as a section, are worthless.

MR. LORD: I suppose your information comes through the Actuarial Department of Insurance Companies.

MR. STEWART: I am talking about the section as your report shows it here.

MR. LORD: For the enlightenment of Mr. Perkins who says the mills are called upon to pay for accidents which a great many times do not occur at the plant, Massachusetts has in its compensation law the words "dire and wilful neglect" and implied the word "misrepresentation." I don't know whether New York does or not. Here's what we do. We have that same thing come before our mill continually. We have a court of inquiry and any accident that is of a doubtful nature is heard before that court of inquiry, which is composed of the workers, the overseer, or a representative from the overseer, and usually I have the pleasure, if it can be called a pleasure. The whole accident is reviewed, the cause, the result and if we find that there is that dire and wilful neglect, that accident is then taken to the Industrial Accident Board. A hearing is given and a great many, many times the Industrial Accident Board upholds the decision of our little court of inquiry.

I think of one case and I have been very active in trying to get the thing across but it hasn't gone yet, but that is a case of hernia. That is a bane to every safety engineer's existence. A man came to me out of my own department—in addition to being safety engineer, I have a department to keep up—a man came to me and says "I have strained myself." "All right, how did you do it?" He told me. I said, "Very good. Now, did you do that here or did you come to the job like that?" He had been working only one week in my department—it was a fair example. I said, "Will you agree to go to the hospital, be operated upon by any surgeon you want to operate on you, and then we will have our surgeon there, and if we find that that sack when it is removed, is an old sack, you don't stand any chance for compensation, and you don't get any doctor's bills. But if we find it a new sack that has come since you worked for us, or if work has aggravated an old sack, then we will pay cheerfully the compensation and the doctor's bills." He wouldn't agree with me, but nevertheless at the time the operation was performed we had our surgeon there and we found the old sack had been in existence for years. He may have been cranking a Ford or not, but that is something the mill has got to take up and solve.

The thing I feel we ought to drive home is that we don't want to spend too much time on statistics. Statistics are a good thing for certain purposes, but like Mr. Perkins, I believe that we can go out, go about our mill and clean up the question of accident hazards. I don't agree with Mr. Stewart in every way with regard to the cluttered up condition of mills in the North. If Mr. Stewart wants to see a real good mill, we will show him we don't have niggers wearing flat

reels and we can show him some good mills up there. It would be a great pleasure to have him come up and inspect our mills.

I want to show you the effective, from my point of view, of what I call these miserable contests. Mr. Beyer spoke of a concern in Worcester. He didn't say it was Worcester, by the way, but he spoke of a concern that got a Chamber of Commerce plaque. I was one of the committee who made the award of that plaque. The plaque was awarded, not on what I considered the statistics and the correct way of awarding a plaque, and I so told the president of that concern and the general manager. It was on the question of frequency of accidents. Many have taken issue with me on the value of frequency versus severity. Do we pay for frequency? No, we pay for severity. If we have one accident that keeps a man out one year, our record is worse than if we had three hundred and sixty-five accidents that keep a man out one day. Where does the value of a contest come, in that case? I can't see it. With all due credit to the concern that got that plaque, they are a wonderful concern and they have got one of the hardest propositions, fellows, you ever saw in your life; they are running motor trucks all around the plant and they have block signals at every turn and those trucks are run on schedule. To my mind that is their biggest hazard. Their machine shop is a wonderful development, and if any of you come to Worcester and look me up I will make a personal matter of it to take you over and show you that mill. I tell you that is where a textile mill could benefit by an examination of that mill.

Now what Mr. Stewart said in regard to these cluttered up conditions is good, and I want to cite a condition in our own mill. We have old buildings. They are from forty to fifty years old and they are not adapted particularly well to the weaving of carpets that meet the trade today. As the business has changed, instead of making a piece of fabric $\frac{3}{4}$ and $\frac{4}{4}$ wide we are called upon to make them $16\frac{1}{4}$ wide. In other words the seamless rug. Now we cannot afford to tear down a perfectly good building, and as a result we have tried to fit the machinery in a building which was not adapted to it. It ruins our cell frames, and I suppose you all know the difference between a cotton and carpet loom—we have to take space for a $4\frac{1}{4}$ loom twelve by twenty because our bobbins are all back of the loom. That leaves us so that we don't have real good aisles. Now our bobbin racks are sometimes in the way and there the question of falls comes in.

Here's the answer. After they have punched the clock that Mr. Stewart speaks of, wanting to get home and get the big potato first, they will run down the stairs. They will run out the doors; they will collide with people. What are you going to do in that case? You can't make them stop—yes, you can in a way. You can make them stop, but I really think that if the men who are employed in the handling of statistics could bring themselves down on to the earth and get around the mills once in a while they would see the difficulties we are up against.

MR. IGNATIUS MACNULTY (Department of Labor, American Woolen Company, Boston, Mass.): Why shouldn't the textile men assembled here feel very proud of the low textile record? Why should we be called smug, because we have established in an industry, perhaps one of the most valuable in the New England States, a safe place for our employees to work? In these days of efficiency and lower costs, what could be more commendable to a man seeking employment or the business itself than the low record shown? Why should you hide your light under a bushel?

Here is a large industry in which are spent hundreds of millions of dollars, its productive value too is high, and its record in sales is high. The percentage of its accidents is extremely low. A large number of its accidents, perhaps more than 90 per cent, are not compensable, particularly in the woolen industry. These gentlemen can speak better about the cotton industry. Out of thirty odd mills I have to go around, there is over one-half that have no compensable accidents, and the safety of the balance of them is hardly a very small achievement. Why shouldn't

we go out of this convention and shout from the housetops that this is one of the safest industries? It is safe for the very man that Mr. Stewart speaks of and this is not a criticism of Mr. Stewart. Isn't it a good thing that these very men we are anxious to protect make it as an industry very active? He carries his interest to his very home and the pride in his industry is very high, high in comparison to a great many other industries. The condition of his mill is a very satisfactory one.

MR. FISHER: The secretary asked me a question I would like to have the opportunity of answering now. I deliberately read from the angle I did for several reasons. I don't know why, but the textile industry and the cotton industry in particular have always been subject to a great deal of adverse comment, probably because we are one of the oldest and people have very good memories, can remember back when the textile industry was pretty backward. At the time we are practically up to date, but people still remember old conditions—before we had electric lights and running water and those things. The public has a very wrong impression. They look on it as about the lowest thing a person can do. I am not speaking of the operators, but the people of the United States as a whole. I believe it is time we came out and began to tell the truth about conditions. I think this is one of the things. Among ourselves we can admit there is a lot still to be done, but that is not to say because the industry is relatively safe it would influence a man cutting down his activities. You are looking at your own particular problem in that case, but I feel instead of emphasizing that to the public we ought to emphasize the fact that the industry as a whole is comparatively safe.

I was very much satisfied to find out how closely Mr. Stewart and I agreed on statistics and I feel a little proud of the figures I presented because at the time I thought that my figures were fragmentary. I cited the principal mills by name because I thought perhaps they would carry my study a little further.

MR. LORD: There is another thing I would like to bring to your attention that contributes to our non-mechanical accidents. There is a relatively large amount of spare time that an employee has to fill each day. We lay out the job so that we keep them as busy as possible, but if that section of the looms is running when it should run, he has five minutes. He does something in that five minutes as a substitute.

I went through a mill this summer—we went up into the spinning room. Before going in the treasurer noted how many men were sitting down. There were twelve workers—ten of them were sitting down. He said they sit that way fifteen or twenty minutes at a time. That is fifteen or twenty minutes that each mule spinner is sitting. That contributes to your non-mechanical accidents. He is looking for something to use that time for.

We went into a room of the mill—there is a big danger sign hanging up. Somebody just scrubbed the floor. There were three spinners starting down the aisle sliding, and they were using the danger sign to stop at. Whether we can eliminate that or not I don't know. We can cut them down, however.

JOHN A. PERKINS (Agent, Harmony Mills, Cohoes, N. Y.): Speaking of accidents among the foreigners: I was at the safety conference at Centreville a number of years ago. The statement was made that 90 per cent of all the accidents was by foreigners who couldn't speak English. I wasn't at the meeting—it was reported to me. I met the party who said it. The chairman of the party called his man down—"You mean to say that 90 per cent of the accidents happen to foreigners who don't speak English?" He stated, "I mean to say that all the accidents among foreigners are these who can't read or write." I said to him, "Do you mean because I can't speak a word of Italian that means that I should put my finger into a machine any time to see what will happen?" I came home and took our accident report for a year. I had it gone over very carefully.

Here's what I found: That the reported accidents among the English speaking,

long the native born, among those who could read and write English, was more than twice what it was among those who could not read and write the English language or could not speak the English language.

ARTHUR BARLOW (Armstrong Cork Co., Linoleum Division, Lancaster, Pa.): In some of the letters I sent out for the Publicity Committee, it was stated that one of the greatest enemies to safety is not the hazard itself but a wrong state of mind. Now, I only argue for the working man—I am a working man myself and I hate like the Devil to hear him run down.

As long as there is a man getting hurt (Fisher says, because he is careless) as long as that condition exists, there is a duty for such men as are gathered around the room. We shall never reach the maximum of safety, although we may in other things we desire; but I don't like anybody to come along and say that it is the workman's fault and get away with it—shifting the responsibility, as it were, to the position that he has as a mill manager or a safety engineer, as some one might have in authority. They should say, "I regret that accident happened, and wonder just how far could I have prevented it?" I think that the National Safety Council has been projecting that thought for all the years of its existence. I happen to be one who has been in the National Safety Council since it first started and I know that thought has been put first and foremost by all those who really have the problem of safety at heart. How shall we get the man to become more careful?

Such protests have been made with regard to machinery that we look upon accidents from a standpoint as negligible and we all think that the crux of the question is education. Now, speaking as the Chairman of the Publicity Committee of the Textile Section, and speaking particularly with the viewpoint of making my predecessor a more valuable man to the Textile Section, I would suggest that every man of you who have got something to say don't save it up for a year but put it to your property secretary or chairman as you call him and let him spread the news around.

To keep in mind the cause of safety, the Textile Industry ranks fourth in the industries of this country, and in my opinion, it is a disgrace to us that we are not better represented in the National Safety Council. Somebody is at fault, and a man here should accept his part of the responsibility for this membership not being greater than it is today.

These men whom I would like to have brought here, wouldn't be the kind of men who are as highly educated as Mr. Stewart and other fellows here. The men I want to see here are the men who are right on the job, the men who are in touch with the careless man, the men who can pat the other man on the shoulder and say "Don't do that, fellow." Let's get the men who can do the work. I would like to see some of these men and foremen picked out by you fellows and bring them here. Don't go and sit on them and blame them for the things that happen when you don't take them along and give them a chance to share the responsibility.

ARTHUR S. JOHNSON (Assistant to Manager, Engineering Dept., Mutual Liability Insurance Company, Boston, Mass.): I have a thought which I would like to put into this meeting. Our company covers such a large number of textiles that we feel deeply interested in their safety problem. I wish to speak for a moment of the individual plant problem, not the industry, on the proposition that the direct cost of accidents, that is, your insurance premium for the workman's compensation coverage, is so large that it represents a tremendous percentage of the net profit. The textile industry just now during this economic upheaval is working on such a low margin of profit that a plant's insurance premium equals the percentage of the net profit, and also the efficient mill which is making a profit is a safe mill and the mill which is down and out is an unsafe mill. I am

not going to prove this by statistics, but I do want to cite three mills and adapt their premium rates to the profit of one of them.

These are specific examples. They are three mills in the same state, making the same product and the mills are the same size. One of them, (a) which I call mediocre is the basis for the comparisons. It earned a net profit in 1927 of \$17,000, very low but true. That firm's adjusted rate showed a .4 per cent charge which is practically manual rate; and on their payroll of \$950,000 they paid a premium of \$7,600 which represents 45 per cent of their net profit. Could they have done better?

Example (b), which I call the good mill is similar in size, product and in the same state, had a 40.3 per cent credit on their premium rate. Applying their condition to the first mill, the premium would have been \$4,500 which represents a saving of \$3,100 or 18 per cent of the net profit. But the mediocre mill might have been worse.

Example (c), has such bad accident experience that its final adjusted rate shows a 75.9 per cent charge. Thus if the first mill had been that bad its premium would have been \$13,400 or a loss of \$5,800 from their net profit, or a diminution of 34 per cent. The difference between the good and bad conditions as measured by their premiums, represent 52 per cent of the mediocre mill's profit.

Now I am not condemning these mills and not using these figures for statistical purposes. I want you to apply the principle to your own mill. What is your premium rate? Is it manual? Is it below manual or is it way above manual? Unless you are convinced that your safety work is so effective that it cannot be improved upon, you must admit that a further reduction in your premium would reflect favorably in your profit. If your present rate is manual, can you improve it to a 40 per cent credit? If you are now carrying a 75 per cent charge you surely can reduce it to manual or better by effective safety work. A natural question is, how much will it cost to do this effective safety work? It happens that in these three mills both their mechanical accidents and mechanical conditions are identical. The cost, frequency, and severity items which show these wide differences are in the non-mechanical accidents, and they are a direct reflection of the efficiency of operation. The efficient mill is the safe mill; the safe mill makes a profit.

MR. PERKINS: The poor mill would not have to spend any money on guards to make it as efficient as the other?

MR. JOHNSON: The mill which has the 75.9 per cent charge, Mr. Perkins, shows a schedule charge on mechanical items of 5 per cent and the mill with 40 per cent credit, 3.8 per cent charge on mechanical items. The good mill had eight accidents and the bad one six on machinery. The conditions are identical and it would not cost a sou for machine guards.

MR. PERKINS: In the same town?

MR. JOHNSON: In the same state.

ETHELBERT STEWART (Commissioner, U. S. Bureau of Labor Statistics, Washington, D. C.): The Bureau of Labor Statistics gets its statistics from the manufacturers and can get them from no other source. We assume that their statements are correct and we believe they are. When they tell us the nature of the injury and the rate of injury among the foreigners, we assume that it is correct. It is very unfortunate and I am very sorry that the question came up and I had to answer it according to our figures.

Now, there is one more thing. Our figures show an enormous rate in the new man, the man who has been in the mill for one month or less, or three months or less, against the old men. Now, those figures are from the manufacturer and your turn-over is one place where you want to look for safety.

ADJOURNMENT

October 3, 1928

H. C. WASHBURN, Chairman
District Manager, Sentinel Fire Equipment Company
New Bedford, Mass.

The second session was called to order at nine-forty o'clock by the chairman, H. C. Washburn.

CHAIRMAN WASHBURN: The first thing is the report of the Nominating Committee and the election of officers.

Following a procedure which was inaugurated within the past two years and which is being followed out generally by most of the sections, they are appointing the Nominating Committee previous to the calling of the sessions. Earlier in the year I appointed on that Nominating Committee Mr. Harvey Saul, past chairman, as chairman of the committee; Mr. Glenn W. Cook of the Travelers Insurance Company, Hartford, Conn.; and Mr. Harold Donald of the American Mutual Life Insurance Company of Boston, present chairman of the Membership Committee. Mr. Saul is here. Will you report, Mr. Saul?

Report of Nominating Committee

HARVEY SAUL (The U. S. Finishing Company, Providence, R. I.): Mr. Chairman, our committee has had two or three meetings, correspondence, and we have been in touch with a number of men. We have the acceptance of the chairman. The other men are not definitely decided on; however, we have them definitely in mind and I would like to propose that our Nominating Committee present here for your consideration the chairman and leave it to the chairman and the Nominating Committee to get the acceptance of the other officers. I would like to know if that meets with your approval.

CHAIRMAN WASHBURN: You have heard the report of the chairman of the committee, is there any objection by the members?

EVERETT F. KING (Safety Engineer, H. A. Hale, Jr., Company, Boston, Mass.): I second that motion.

MR. SAUL: The motion is that we nominate the chairman at this meeting and leave it to the chairman and the Nominating Committee to appoint (I think you might perhaps better call it appoint) the other members of the Executive Committee of the Textile Section.

CHAIRMAN WASHBURN: You have heard the motion, gentlemen, which has been made and seconded relative to the nomination of a chairman. What is your pleasure?

ARTHUR S. JOHNSON (Assistant Manager, Engineering Department, American Mutual Life Insurance Company, Boston, Mass.): Mr. Chairman, it seems to be rather an unusual procedure and I think in the real workings of this Council, the Executive Committee within itself appoints certain committees and committee chairmen. I think that it would be rather unwise for us to take such a rash step as to depart from the regular procedure of calling the Nominating Committee, virtually, a board of directors to elect an Executive Committee. It is just a new idea sprung on us and I think we ought to refer it to the Council and see what the by-law requirements are for the election of officers and the appointment of committee chairman, etc., rather than to vote for the motion before the meeting.

CHAIRMAN WASHBURN: The motion has been made and seconded, gentlemen. All in favor of the motion put before the meeting, please signify by raising their right hand. It seems to be carried.

MR. SAUL: Mr. Chairman, I would like to make this statement which I think

would interest Mr. Johnson. Some of you know who we are to present as chairman. He is not going to be a figurehead, he has never been a figurehead in anything he has been asked to do. It would be very unwise for us to present any man on this Executive Committee who will be a figurehead, though it is much harder to get men on the Executive Board who will work than it is to get men who will lend their names to fill out the slate. We are not going to have a bit of difficulty in lining these up. I, for one, am very much opposed to presenting a slate here without getting the acceptances of the men we want to propose. That is why we are presenting it in this way.

MR. JOHNSON: May I ask you, Mr. Saul, if you have in your own minds a fairly definite slate worked out?

MR. SAUL: We have; yes, sir.

MR. JOHNSON: And you are withholding it because the committee has not accepted as yet, but you have certain individuals in mind?

MR. SAUL: There is one case where the gentleman has been approached and he is willing to accept but feels that he wants to present it to his employer before he gives his definite opinion. Then, there are three or four others who found it absolutely impossible to be at this meeting and whom we haven't been able to see, but we have definitely in mind certain individuals to approach and fill up the slate.

With that out of the way, I take pleasure in presenting for your consideration the nomination of Mr. D. Frank Lord, of the M. J. Whittall Associates, Worcester, Mass., to serve as chairman of this section for the coming year.

CHAIRMAN WASHBURN: Is that all, Mr. Saul? Are there any other nominations? If not, the chairman will entertain a motion.

B. F. GRIFFITH (Supervisor, J. & P. Coats (R. I.), Inc., Pawtucket, R. I.): Mr. Chairman, I make a motion that the secretary cast one ballot for the chairman, Mr. D. Frank Lord.

EVERETT F. KING (Safety Engineer, H. A. Hale, Jr., & Company, Boston, Mass.): I second it.

CHAIRMAN WASHBURN: The motion has been made and seconded that the secretary cast one ballot for and elect Mr. D. Frank Lord as chairman for the coming year.

The Secretary announced to me personally that the ballot has been cast and D. Frank Lord has been elected chairman for the coming year. Any remarks you wish to make, Mr. Lord, as the result of your unanimous election?

MR. LORD: Gentlemen of the Textile Section, I feel greatly honored in being trusted with this position, and I shall do individually what I can to keep the section at its high level; but I can't do it alone. I have to have help, and I am going to take the registration cards of the people who have been at this meeting and the one held yesterday, and I am going to analyze those cards and see where these men come from and then you are going to be called upon to do something in the cause of safety.

You come here and are all interested in safety, in your own plant—of course, it is of prime interest—and you come here and spend money to get ideas. Now, we have got to get new members. That is going to be the slogan for this year—"More Members." We lost four, as you remember from the report that I made yesterday. I want help. I can not do it all alone. The officers and the Executive Committee are far apart but I am going to analyze, as I said, these cards and then call on you for help, aid and assistance with constructive suggestions, and I know that you are all going to cooperate. If we can all pull together, then we can make this section so big that we will have to have the ball room in which to hold our meetings. I thank you for your kindness and I hope that I will be able to give you good service.

CHAIRMAN WASHBURN: Yesterday's session, gentlemen, was designed to bring

at present practices in the textile industry and the need for improvement. I think you will all agree that we had quite a peppy session yesterday morning. Also you will agree with me that it developed that there was, or is, a need for intensive safety work, not only in the industry, but in every individual plant. Granted that that is so.

Today's session will be devoted to the way in which safety work should be conducted. We are going to present a viewpoint from four different angles. You all know that it is almost impossible to get very far with your safety work unless you have the full cooperation of the man at the top of the organization. As our first speaker today, we have a gentleman who has given his sincere cooperation to the safety activities of the plants over which he has supervision. He has never appeared before us, but his name has appeared very prominently in the press in connection with a plan which we hope will go a long way toward settling the textile strike in New Bedford today. I refer to Mr. Leonard P. Frieder, Vice-president, National Spun Silk Company, of New Bedford, Mass.

Safety from the Management's Viewpoint

By LEONARD P. FRIEDER

Vice-President, General Silk Corporation, New Bedford, Mass.

There are four major reasons for conducting safety work. Humane motives dictate the effort to lessen to the greatest possible degree the human and economic suffering which unavoidably follow accidents. The creation of proper psychological conditions in a plant gains the confidence of employees in their surroundings and in the machines upon which they are working. The reputation of the plant in the community and the saving in premiums on accident policies due to safer working conditions—these offer sufficient reasons for conducting safety work. In the textile industry, premiums on accident policies range from approximately one-eighth to seven-eighths of one per cent of the payroll of the employees insured. The factors of employee confidence and public goodwill are of far greater fundamental importance to the individual plant, than the cost of insurance.

The most desirable way to gain in efficiency of production is to create such an environment for the employee that the work itself can be performed almost automatically. To permit mental retardation to the performance of the work will materially slow up the mental and physical motions required. Efficiency of production will increase with the withdrawal of causes of mental retardation, from very small to a very large amount.

An employee who has before him the ever present hazard of slipping on wet floors, coming in contact with a moving belt, or being hit by dangerous machine parts, does his work in a slow and cautious way, resulting in low production efficiency. The operator, on the other hand, who does not have before him these hazards has a free and easy manner which results in quicker motions and higher productive efficiency.

Confidence results in speed; speed results in greater production; and greater production results in lower costs.

The premium cost of an accident policy is a small portion of the total payroll. It is more important to approach the problem of safety from the standpoint of increasing labor efficiency than it is from the standpoint of premium saving. We give as a first consideration the creation of safe operating conditions under which employees may work without hindrance due to psychological barriers. Naturally, we endeavor to make all saving on insurance premiums possible. It is always well to create public goodwill for a factory; to have the employees take pride in their association, and to consider it as their plant. Essential to building the public

goodwill are safe working conditions and a record of freedom from serious accidents.

The creation of proper psychological conditions starts at the entrance gate. It involves the problem of clean yards, clean and well lighted stairways, perfect sanitation, well lighted and well ventilated buildings, and safe machinery.

Lighting is an important item in cost, particularly in those factories arranged to run more than one shift. The day of the old carbon lamp has passed and in its place have come lighting mechanisms which rival the light of the sun and under certain conditions surpass it for factory purposes.

In the design of our factories we prefer to use, wherever possible, the multi-story concrete building, using flat slab construction and totally indirect lighting. Indirect lighting is of course more expensive than direct lighting. The light from large lamps is reflected to a white ceiling as the major reflecting surface; the light is evenly distributed without shadows, throughout the area covered. Indirect lighting, even with the high lighting intensities required for a weave room on night work, approximates in our own case, less than 2 per cent of the payroll. Direct lighting of equal intensity would approximate 1½ per cent of the payroll and ordinary lighting would approximate 1 per cent of the payroll.

Indirect Lighting Speeds Up Production

The cost of installation of direct lighting is less than that of indirect, but the latter is more economical than the former because of its perfect illumination, entirely without shadows. The greatest impediment to speed is thereby eliminated with the old psychological hazards. This cost is insignificant when compared with the real benefits resulting. Several years ago, shortly after starting a spinning room in one of our new buildings, a workman came to me and said, "When you work here, you don't feel you won't see your wife and children the next morning." It is almost self-evident that employee confidence in working conditions which would justify that statement, is a sound economic result to strive for and is worth a great deal to any management.

To carry out the policy of safety work having as a pre-eminent idea the creation of sound hindrance-free working conditions, we naturally have to carry on the work which is common to so many plants—that of safety committees making monthly inspections, inspection reports, and the general checkup of the inspection standards.

We have eliminated to some degree conditions which formerly caused us greater concern, through the maintenance of a hospital staff which examines applicants for work and re-examines employees from time to time. Through the operation of a Personnel Department, which takes care of employment of workers, safety work, social and physical conditions are controlled.

A plant is really never positively safe—nor is any place for that matter—but the creation of operating conditions commercially safe is good business. It cannot be measured in terms of premium savings. It is interwoven with the larger problem of total cost which is fundamentally that of labor.

To carry out the management policy of the Company in regard to safe working conditions, it is necessary to school thoroughly the foreman and supervisory staff into management requirements. Not only is the process of education long, but it is never ending. Most men tend to get careless as they become familiar with their surroundings and to disregard the day-to-day hazards which they see so frequently.

We depend to a large degree upon our foremen to educate the employees in the details of safety, but rely as a major teacher, however, on the example which is set by management in the larger problems and more observable safety factors.

We also rely upon the moving picture machine to illustrate graphically the

ards present in ordinary work and the necessity for watchfulness; also, the ing for small bruises which are likely to occur from time to time and which, promptly attended to, are minimized in effect.

o meet the very competitive conditions of modern industry and the evident ad towards still more competitive conditions in the future, it is necessary that ry aid to increased efficiency be considered. It is our opinion that safe working ditions are a very important factor in the ultimate lowering of costs.

he present tendency is to substitute capital in the form of complex machinery the place of labor. Operatives in most industries are handling more machine is than were handled years ago and there is evidence of a continuing trend in direction.

With more complex machine units per operative, wages tend to increase; for e intelligence is required by the operator to supervise properly and operate additional machinery to the greatest advantage.

he necessity for quick action upon the part of the operator to maintain a high rating efficiency is evident. As labor becomes higher priced and with the onsibility of supervising more machine units, the indirect effect of cost of dents becomes of great moment, for the disabling of one operative makes idle rge amount of fixed capital with delays in again reaching efficient production.

HAIRMAN WASHBURN: Gentlemen, I happen to be familiar with the safety inization of the National Spun Silk Company and I think that I am safe in ng that company is certainly enjoying the fruits of a well oragnized safety inization. We know well that we have to have the full cooperation of every- r down the line, not only the president, the vice-president and the treasurer, also the agent.

he next speaker on the program is a gentleman who has appeared before us iously, a man well known to all of you, who will give the agent's viewpoint on w I Want Safety Work Conducted."

Viewpoint of the Agent on Conducting Safety Work.

By JOHN A. PERKINS

Agent, Harmony Mills, Cohoes, New York

obably the best way to begin my subject is to tell you how our safety or- zation is formed and what we do to protect the life and limb of our employees. uring the 17 years that the present company has owned our mills no person been killed and only one person has suffered the loss of an arm, this being n off at the elbow. We have had quite a few people who have lost fingers arts of fingers. In the case of the man who lost his arm and in every case e people have lost their fingers or parts of them, guards had been removed he injured persons that were put there to safeguard these people against lents.

1913 we put a force of men at guarding machinery and we complied with he requirements laid down by the State Labor Board. We have two men nually attending to safety work—repairing guards, putting on new guards inspecting machinery to see if there are any dangerous places that have not guarded.

hen we hire new employees, if they are unaccustomed to the kind of work we put them on, some one in our employ who is thoroughly acquainted with machinery on which the new hand is to be employed and who speaks the age of the new hand, instructs him fully not only in what he is to do but hat he is not to do, and every dangerous part is pointed out to him and warned against doing those things whereby he would receive injury.

Our safety organization is composed of the safety inspector, who at present is the master mechanic, and a workmen's safety committee composed of four employees—a mill wright, a plumber, an electrician and a guard repair man (employees who cover more of the whole mills each day than any of the other employees), and a general safety committee, composed of the agent, superintendent and assistant superintendent.

The safety inspector makes a weekly inspection of the mills, and makes out a report of his findings, with recommendations, which is filed in his office for inspection by the rating board inspector. He also presides at the monthly meetings of the Workmen's Safety Committee.

This committee meets in the master mechanic's office monthly and presents its recommendations and threshes out any ideas the members have on safety practices, etc. Minutes of the meetings are made out and passed on to the general committee to be approved. The general committee then holds a meeting and the minutes are returned to the safety inspector's office for filing and the recommendations are then carried out. The members of this committee are changed frequently, so they do not get "stale" on the job, and to get new blood in the organization.

Any bad practices noticed by the committee during their trips through the mills, such as horse play, fooling, smoking in the yards or any dangerous condition, is at once reported to the safety inspector who remedies the condition without waiting for the general committee's approval.

The Safety Committee Inspects New Machinery

The safety committee has taken measures to see that new machinery coming into the mills is properly guarded by the manufacturers when installed, to conform to the State laws.

Mass meetings of all the employees in the mills are held semi-annually, at which time safety motion pictures are shown or a chalk talk given.

In addition to the regular members of the safety committee, suggestions are welcome from every person in the mills. It is generally understood throughout the mills that each person in the mills is a safety committee of one to report anything that looks dangerous.

A great many of the accidents that occur in our mills are caused by falls. Notices are posted all over the mills warning people against wearing high heels or crooked heels. Whenever floors are being scrubbed a large sign with letters two inches high is carried along by the scrubbers warning that the floor is wet and to use care to avoid accidents. Each scrubber has a piece of burlap 30 feet long that he drags along the floor as soon as he has finished mopping it. By the time another 30 feet is scrubbed and this burlap dragged along, the floor is sufficiently dried so that there is no danger of slipping on it.

All accident reports are immediately submitted to our safety inspector to see if anything can be done to guard against future accidents of the same kind, and these reports are brought before the safety committee for their suggestions as to how to prevent accidents of the same kind in the future.

CHAIRMAN WASHBURN: No doubt gentlemen you will probably want to ask some questions of the several speakers, and as I stated yesterday, I am going to suggest that you hold all these things until all papers have been given, at which time you can go the limit on your discussion.

Possibly the man who is most interested from a personal point of view is the safety supervisor, and this angle of the question, the viewpoint of the safety engineer, will be presented to you this morning by Mr. D. Frank Lord, the newly elected chairman of the Textile Section.

Viewpoint of the Safety Supervisor on Conducting Safety Work

By D. FRANK LORD

Safety Engineer, M. J. Whittall Associates, Worcester, Mass.

I can say in a very few words that I want safety work conducted so as to show results.

First, by keeping the workers at their work happy and contented and with a clear mind. Second, so as to make the production of the plant as high as consistent with good practices. Third, to establish an experience rating that will tend to the reduction of our insurance premiums.

Then I want the hearty endorsement of the management. I want them to stand back of everything that is done sanely for safety. I want their suggestions and their constructive criticisms. I want the cooperation of the employment department, and its manager. I feel that a medical examination should be made of every new man employed, with record and data as to his condition, in order that he may be selected for the right place and also to avoid putting anybody at work who has an ailment that would be brought out later in the course of his employment. After the man is employed he should be given a talk on safety by the safety engineer; and then turned over to his foreman who should give him a more detailed talk on safety, and then give him a card stating the rules of safety, which he signs. Show to him the hazards that exist in the position he is about to start.

Then I want a good safety engineer. This may be a little delicate for me to talk on as it may be more or less personal, but there are many requirements that I think essential. I may have some of them, and then I may not, but as this is not a personal history, take it for what it's worth. I want a safety engineer that has enthusiasm and assurance of his position in regard to safe and sane methods. A man with the abilities to rectify faults. A man with the tact and ability to establish confidence among the foremen and the workers. A leader but not a driver. A man who can investigate impartially the causes of any accidents and suggest remedies. A man who has the capability of maintaining complete records. One who can go about the plant and locate spots where hazards exist and be able to start the necessary machinery to have them rectified. A man who is able to go about the plant with the Insurance Inspector at the time inspections are being made to establish the rating, and be able to show that all of the hard and fast rules governing guarding might or might not be applicable to the individual plant.

Next I want a safety committee consisting of men who are the leaders in the mill. And I am firmly of the opinion that foremen, overseers and supervisors are the ones to have on this committee. This committee should be changed every year, retaining of course a sufficient number of the old committee so that the work of initiating new members may be easy. Meetings should be held at least twice a month and the meetings should be conducted in a parliamentary and regular manner in order to maintain dignity and harmony. The committee should at all times be willing and ready to consider all suggestions coming from whatever source.

I believe that a suggestion box placed in convenient locations about the mill where any employee can put suggestions is a very good means of creating interest. There must be harmony in the committee and by harmony I do not mean that everybody must agree with everybody else, but under the head of harmony all should be capable of seeing the conditions as the other fellow sees them. I want to emphasize the fact that leaders are desired and that drivers should be discouraged. No workman wants to be driven, but he is willing to be led. A complete record of all the doings of the committee should be sent to the management and to each member of the committee. I have had very little experience with the contest element, and I am not ready at this time to state that I feel that a contest

can be staged with real good results unless existing conditions of the contesting departments are parallel. I believe that the results of safety work, in an individual plant are much better to be broadcasted.

In regard to the first aid department I believe that a totally modern well kept and sufficient first aid department should be maintained in every individual plant. The size and number employed will vary, of course, with the size and number of people employed in the plant. I would want a doctor with the plant for all or part of the time. This doctor should make a medical examination of new employees, care for the accidents as they occur together with redressings and keep in close touch all of the time with accident and health conditions. There should of course be in charge at the first aid room a registered nurse together with such assistants as may be required. She should keep records of all cases that come to her for treatment and submit them to the safety engineer who should be in charge of the entire safety program and he in turn through the administrative office should prepare reports for the state Industrial Accident Board and the insurance company.

I want all men and women employees to be told, and have it thoroughly driven home, that all injuries, no matter how slight, are to be cared for in the first aid room, and I want the first aid department to render the quickest possible treatment of all injuries. I am firmly of the opinion that a well balanced program on the question of Industrial Health should be carried out. No man or woman can render for themselves or for their employers the best work if he or she is not well and healthy. And this to my mind extends into the question of mentality to a very large extent. No person can leave a home in which there is sickness and trouble and come to his job able to render his best, and so to improve this condition I believe that a family health service should be rendered by the plant doctor and nurses.

The Workmen's Inspection Committee should not be too large. I find from personal experience that three men chosen from different departments of the mill can carry out the work of inspection very satisfactorily. These are men who can be spared from the position they occupy without loss to themselves or to the management. They should make notes as they pass about the mill of any place that they find unsafe, and once a month get together with the chairman of the safety committee and the safety engineer and talk over the faults which they have found and the conditions that exist. A report should then be completed and made ready for submitting at the next meeting of the safety committee for action.

Probably one of the best means of spreading safety education is by means of the bulletin board. These bulletin boards should be placed throughout the mill where the workmen are passing. The posters should be placed upon a neat and suitable kind of bulletin board. Nothing so detracts from the dignity of the board or the posters as to be placed in a slovenly and careless manner. Everything in connection with accident prevention should be neat and orderly. Posters should be selected for showing in particular parts of the mill that deal with the work that is carried on in the immediate vicinity. I cannot imagine a bigger farce than to post a bulletin dealing with railroad accidents or an automobile accident in a weave room. These should be retained and I believe that a certain number of the general service posters can be used to good advantage in the main entrance, halls, lobbies and meeting places. Nothing is so stale as an old bulletin poster and I strongly recommend that posters should be changed every week and if you have more than one plant, posters can be used intermittently.

You can post it for a week then take it down and save it for a few months and use it again. The workman wants to know something of the records of results that have been achieved through what may well be called efforts on his part and to that end I believe that a public record bulletin be posted in a conspicuous place in the mill yard giving the number of accidents each day, total for the week, total

for the month, and the total for the past year. Much interest I believe is developed in such a board.

Safety in a plant can be carried on in a practical business like manner and should become as much a part of the daily work as any other department in the institution.

With a successful safety department working safely and consistently the following are some of the results that can be achieved: 1. Increased contentment; 2. increased production; 3. decreased insurance premiums; 4. a full measure of satisfaction.

CHAIRMAN WASHBURN: We have one more speaker, gentlemen. It is my personal opinion and also the opinion of other safety men, as it has been expressed to me in times past, that all too few textile plants employ a safety engineer or supervisor, or do as much organized safety work as they should. A very great percentage of them are said to do just so much work as is brought to their attention by their carrying companies. Therefore, it is very fitting that we get the viewpoint of the insurance companies on this question, and this will be handled by Mr. Glenn W. Cook, the former chairman of the section and also a supervising engineer.

The Viewpoint of the Insurance Company's Engineer

By GLENN W. COOK

Supervising Engineer, Travelers Insurance Co., Hartford, Conn.

I suppose it seems somewhat of a paradox to say, "How do the business people want safety work conducted?" and I am going to try to explain that predicament; but we do want it conducted, and primarily successfully.

I see a number of safety men in the audience who are conducting very successfully safety work in textile plants. I want to agree with all the speakers this morning as to their method and I realize the more I see of safety work conducted, that there is no particular way of conducting it which is the best way. I have opinions of what I consider is good safety work, good methods, and what I think is not so good; what I may say is not so good, you may be following very successfully, and you may have tried what I think is good and find it faulty. For that reason, please accept what I say as merely observations of what I have made of safety, not only in the textile but in other products.

Of course the prime essential of all safety work, successful safety work, in any plant is executive interest, executive participation. That seems rather a foolish statement to make before an organization such as this, you come from plants where there is that executive interest; but I want to tell you that in the textile industry that executive interest is not universal. I was told on one occasion by an agent or manager of a textile mill in an offhand manner, "Well, we don't have accidents in the textile industry," or, "The problem is not sufficient in the textile industry to make it necessary to go to all these meetings you speak of to overcome it." In other words, they have not been sold the problem.

If the manager of a textile plant is merely conducting safety for insurance credits, he is wasting his time; because insurance credits are not a sufficient reason. You heard probably more or less of the publication which we have put forth in the last year or so on "Four to One"—that is, that the insurance cost is only one-fifth of the real cost of an industry. It said, once the manager of any industry gets the idea that safety is an economic problem, just as any other prime one is, we can get the executive interest—we want executive participation. This dele-

gating safety to some subordinate and assuming that he is going to carry it through successfully is all wrong. I have never seen it successful yet. The manager must show interest, face it, must be in on it. That can be carried to the other extreme. The agent can dominate safety in a plant to the extent that the rest of the people in the plant are not entirely frank. Though their ideas are right they are not expressing them.

I will give you a cross experiment which I undertook of slipping and falling accidents. I discussed this with the agent, his safety inspector and one of the supervisors in a shop; the manager or the agent insisted that they were doing everything they possibly could to avoid this slipping, and he described how thoroughly they were handling the subject. When it came to washing floors they put up signs and they only washed a certain space between two frames at a time. Well, we are more or less hard boiled in the insurance game, we safety men, because when we see statistics which state a definite thing we assume there must be a reason; so the engineer went down to the plant and wandered around until he found the man who was washing floors.

It is true he had a sign stuck up against the wall. This man walked along with a bucket of water in his hand and slushed it around two frames. In two or three minutes he came back with another bucket of water and he slushed that between two other frames. Pretty soon he came back again. By the time he got it all up he was past three or four frames. It took him perhaps fifteen minutes to do this. The floor was covered and there were probably ten or fifteen people who had to walk in the water. We discussed this with the overseer and safety inspector; they both knew that, but the agent was so dominating in his safety work that he didn't like to have the men express their ideas. He admitted this was all true and then said, "You realize the type of help we have to employ to do that kind of work; they don't have any brains anyway, etc." But had the safety work in the plant been properly conducted, that condition would have been corrected, it would have been brought out and discussed.

Now, next to executive interest, I would say the most essential thing in safety work in a textile mill or any other mill is foreman's responsibility or overseer's responsibility. Now, I know you don't all agree with that and you don't all carry it out, but the idea is summed up in this: that the overseer should be held accountable for the accidents in his department. A monthly meeting of all overseers in charge, in which all the accidents under each overseer are brought up and discussed should be held. The overseer has to defend himself to the other overseers. Again we don't want domination of management. It is really enough for an overseer to alibi himself when you are holding him responsible for accidents to his department, but if he alibis himself to the other overseers, he has got to be pretty near right because they will certainly bring out his faults.

In various industries today, foreman's responsibility has developed to the point where the foreman or the overseer is practically conducting all the safety work in his department. He doesn't recognize the safety supervisor or safety inspector or safety engineer as somebody with whom he is cooperating. He recognizes the safety engineer as somebody who is assisting him, cooperating with him, in conducting safety work. I believe that once we have the executive persons in a plant at the point where the foremen or overseers have accepted their responsibility, we are accomplishing as much or more than by any other means.

Of course, in every plant we should have somebody personally responsible for safety. That means a safety supervisor or a safety engineer or a safety inspector. There are so many things he can do and should do; this safety work cannot be merely to given to somebody for an hour or two a day or as something to do else besides his regular job. If the plant is of any size at all, it should be his principal job; and it is his independent investigation of accidents, which, together with your overseer's investigation of accidents, will give you some means whereby

you can get results and find out the cause of the accidents. That, gentlemen, is one of the principal jobs we have in industries today, is finding the cause of accidents.

I don't want to go into that too deeply because that will be discussed in the General Safety Engineer's Session, but you have the idea of analyzing accidents to cause. For fear that some of you are not familiar with it, we have developed this idea. In reading over accident statements, you don't get to the primary cause of the accidents. Analyze accidents to cause. If you could get everybody to do that, we would accomplish much more in eliminating accidents.

Now, to the other things. For example, our hospital. I am a firm believer in physical examination. I have seen such good results from it. On the other hand if the physical examination is not properly used by the safety department the reports of the doctor are not properly used, a lot of the efficiency of the physical examination is lost. For example, if men are examined who are not capable of doing heavy work, or men supposedly with hernia, are put on lifting, heavy jobs, all the good done by the physical examination is lost. It is done repeatedly. In other words, the overseer or the foreman should know very thoroughly what is wrong with that man when he puts him on the job, and that is not always done.

Now, I suppose pretty near every safety organization, sooner or later, advises the practice of having safety committees inspect the plant. The only thing I can say about that is that most safety committee inspectors develop into housekeeping inspectors. If the overseer is held responsible, he is held responsible for the safe conditions in his department and if your regular safety inspector is checking up on the plant, I question how much value the time consumed by these safety committees is. I can't say how successful it is in your particular plant, but I will say this—that in a great many instances looking over the reports of these men who have taken over that job and put on a job of inspection through the plant, that the results are not worth the time spent on it. I know that there are successful safety committees. I have seen some very successful safety committees made up of foremen and even workers, and when they have rotated, as I have seen them rotate, the fault generally is that when you start out you pick out four or five very good men and in rotating them you go down the line and pretty soon you have a company which isn't much good. As I said before, most of the stuff they will pick up is housekeeping stuff which should be picked up by some one else.

Now, as to the education of the employees. We tried bulletin boards, we tried slogans, we tried meetings of all the employees, moving pictures, I might name half a dozen more schemes that we tried for the job of educating the employee in safety. I have got the idea that if we go back where we were, back to the supervisor, back to the overseer, and put the job on to him of educating his employees, the value of all this stuff which we use, this propaganda stuff, will not be very great, if he does his job as it should be done. So, I can say this, that in my opinion there are two very definite essentials to all safety work, and we can build everything around those two. One is executive participation, but not domination; and the other is responsibility of the foreman or overseer for safety in his plant.

CHAIRMAN WASHBURN: You have listened to four very good papers, gentlemen, on the subject, "How I Want Safety Work Conducted." Now, the rest of the meeting is going to be thrown open to a discussion of those papers. You are at liberty to ask questions if you see fit. Let us have your viewpoint on this very important subject.

W. N. GOEBERT (Aetna Life Insurance Company, Hartford, Conn.): I understood Mr. Lord to say that he would no more put a railroad crossing sign up over his bulletin board in the weaving room than he would most anything else. Is that right Mr. Lord? All I want to know is just what his objections are based on.

MR. LORD: My idea of bulletin posting is to post in the different departments posters that refer to the work in that particular department and save the posters that refer to any general work for the halls, corridors and places of public meeting. I will give you an incident. In the carpenter's shop that is maintained at our plant, we have some thirty carpenters. One of them has nothing to do but run the band saw, and he was continually removing the guard from the upper part of the band saw. It wasn't very long before the matter was brought to my attention by one of the inspection company, and I saw the opportunity of that man getting a saw blade wound around his neck with perhaps more or less disastrous results. So I took one poster that had a picture of a saw blade wound around a man's neck and I put it directly on that man's saw guard. Sufficient to say it didn't come off. I think that he was educated. The same today with cards, loom pictures and what not—in the work place where the man is actually employed doing certain things, show him by the picture the experience that somebody else had with a machine which is similar to his.

I do believe in the posting of the general utility posters in places of public meeting, but not in the room where a specific piece of work is being done.

MR. GOEBERT: Am I to believe Mr. Lord that you would have a general bulletin board?

MR. LORD: Absolutely no. I would limit that—not a general board. We have 28 buildings and they all have entrances that the men and women go out of. In this hall is a bulletin board which is more or less general. The State requirements of Massachusetts say that five minutes' time must be allowed for the workers to wash up and get ready to leave the plant. Now, some people don't take that five minutes to wash up, and we allow them to leave their machines if they are in good shape, if they want to, but they can't go out of the building until the whistle blows. There are several minutes that can be used to go through these lobbies, which are perhaps as large as this room, and we keep the walls pretty well covered with information on safety, and that is where they get their real safety education.

HARVEY SAUL (Employment Director, The U. S. Finishing Company, Providence, R. I.): I have two questions I would ask Mr. Frieder, and one for Mr. Perkins. One question for Mr. Frieder—"Are you self insured?" and the second question is, "How much do you feel that a company is justified in spending on safety work?" I would like to tell you why I am asking that question at this particular time. Our company has this problem to contend with: We had a very serious accident a short time ago. It is one that will happen once in thirty years, but it happened. Of course, at that time we were willing to spend any amount of money not to have that happen again. We investigated it very thoroughly and we found out that one almost positive way of preventing that from happening again would require an expenditure of \$300 for a machine, and we have quite a large number of machines. We found another way which almost makes it fool-proof for \$15. We were almost tempted to spend the \$15 instead of the \$300. I know it has always been a problem with me just what is a practical amount of money to spend on safety work.

The question I want to ask is, "What leeway is given members of the safety committee which he chooses from the mechanical department?" Are they intended to approach foremen or others who have authority over conditions?

LEONARD P. FRIEDER (Vice-President, National Spun Silk Co., New Bedford, Mass.): First, we are not self-insured. The amount of insurance that we pay is not sufficient to warrant taking the risk ourselves. We have fifteen different plants scattered in several different states. Next, as to the amount of money that you are justified in spending on safety work—that is a condition which you have to analyze in each individual case. The textile industry, at least to our mind, is in such a state of adversity that it is believed that no one is really justified in spending any money unless they can get their money back in a year. The ordinary

firm undertakes it from two to five years, but our policy is that if we can't make a saving in one year we don't do it at all. We maintain a record department where things are brought out, first on the basis of insurance savings—you have to come pretty close to a year's saving on the basis of premium cost. Second, we would receipt whatever the trip of the employee we used on the job cost, the number of machines the employee was running, the amount of work which could be speeded up, whether or not an operator could handle more machines. For example, you have a spinning frame, all our spinning frames have individual motors with a direct current driven with an armature shaft—a motor shaft stuck right into the casement, so our guarding problem is very simple. But if an operator is going to walk around machines and walk around a belt line, it would pay to spend quite a good deal of money to guard that machine because, as the owner, he is bound to take precautions.

If it is a section where the operation comes through the belt substantially, a person slows up naturally. We consider the premium saving, but the premium saving has to be saved in a year.

The other reason is when the efficiency of production can be increased, frequently you are justified in making savings on making the equipment installations. I might say that as merely a variation of our year's requirement, where there is a question of quality of product we place no limit on it, even if it is a twenty year saving, because you may never determine on a cost basis what will be the economic result in improvement of quality except that costs are reduced when you improve your methods and machinery. You can reduce that by avoiding this system which causes employees to slow up as they approach some danger point. The case has to be handled individually; in some cases we would not be justified in spending a dollar and in others we might be justified in spending a hundred.

JOHN A. PERKINS (Agent, Harmony Mills, Cohoes, N. Y.): I have heard two or three suggestions that foremen be held responsible. I remember some of the accidents as I look over the items—they always come to me. One case, pulling a hose along the floor to clean the loom, he hits his hand alongside the loom. What would you do? Fire the foreman for that? Another fellow burns himself on the lathe. He had been weaving forty years. Another man cuts rough off a bobbin, strictly against the rules, and cuts his hands. Of course, the foreman can fire the hand, but what are you going to do with these people? And this physical inspector—what are you going to do with all the dead wood that nobody wants—they have to live? You have to get down to a little bit of hard facts.

In regard to that inspector, you know we don't have any in our plant. This isn't any one man job. We are all a cooperative unit. Every man there is trying to make the thing a success. The overseer sees something wrong in the room, he reports to the master mechanic to have it fixed or somebody is going to be hurt there. The inspector goes around. He reports to the master mechanic. Well, if it is something particularly out of the usual run he will go to the superintendent. If the superintendent doesn't want to take the responsibility he comes to me.

Well, now there are a lot of these guards which are controlled by the State Labor Board, they generally are. In Utica we guarded all the pick-up belts while we made a tour of inspection. A week afterward I went down and found a man cleaning up a guard, putting the belt on. Ten times as dangerous as ever before. I fixed looms for years and years and a weaver has no cause for going near the belt. If you won't touch the belt you won't hurt. It's the only way they ever get hurt on a belt of that sort unless it winds up around the shaft and the loom. Whoever is to put that belt on and off is the man who may get caught there. But get away from the weaver—then you are going to hold a foreman who has four times as much as he can do now, responsible for somebody bumping themselves against the wall or loom or stubbing their toes or a thousand and one things that can happen. Nobody can be held responsible except the person hurt.

CHARLES H. EAMES (President, Lowell Textile Institute, Lowell, Mass.): No doubt we take away many points from these papers which are remembered. It occurred to me that it might be worth while for a committee of this section to attempt to prepare a standard form of reports of accidents which may be open to corrections from time to time, but which may bring to this section or to others, printable articles, and those who are interested in preparing data concerning accidents, a form which will give the same data in all cases and which may some day be standardized.

I realize that that is open to certain suggestions, for no doubt insurance companies and state departments have their own forms which require certain reports for certain reasons. It is very possible, perhaps, to consolidate those, or if not, for this committee to set up a standard which they believe is the best one and which may sometime form a standard of report, and which will result in obtaining data which is much more reliable than any data upon which we base our conclusions at the time.

CHAIRMAN WASHBURN: That is a good suggestion certainly. There is a form which is sent by the National Safety Council, which has answered the purpose to a great extent. Are you familiar with that form?

MR. EAMES: I must confess my ignorance of such a form.

MR. SAUL: Mr. Chairman, I might add, commenting on Mr. Eames' statement, that four or five years ago our Textile Section did work up a special form for reporting statistics for the textile industry and that was in operation for a number of years and the Safety Council brought a certain pressure to bear on us to use the standard form which has brought about the condition now which Mr. Eames has reference to.

B. F. GRIFFITH (Supervisor, J. & P. Coats (R. I.), Inc., Pawtucket, R. I.): Mr. Eames can get a copy of the 1927 statistical exercises in the Exhibition Room, if you want them, and that shows about everything.

I had one or two things that came to my attention that I wanted to speak about and one was the question of environment. I have had quite a little experience of conditions in departments which result in accidents. Now, I have found that as the environment in a particular department improves—in other words, as your housekeeping of your mill improves, without doing anything else, taking everything about accidents, I believe that your accidents will reduce. I also have charge of a large recreation building. I find that if I create certain standards of environment, I am not going to have the workers who enjoy that building throwing papers all over the floor, spitting on the floor, writing obscene language on the walls and doing things to deface the property. The workers, many times where the environment is not good, will do things that they wouldn't think of doing if they were in this hotel, if they were in their own home, or if they were in a public and up-to-date theatre. You improve housekeeping in your mill, do away with the carelessness in taking care of the garbage, as far as possible eliminate cockroaches, vermin and everything of that nature, keep the aisle spaces clean, under the frames clean, and you will find that the workers are going to pull right along with you. I have seen it work out.

Now, as regards foreman's responsibility. Of course, Mr. MacNulty and I always have had different sides on that, and it seems Mr. Perkins has gone in on Mr. MacNulty's side, and I am left all alone. I believe a great deal in the foreman's responsibility and it came about in this way. We had a department where accidents were running wild. It seems to me the foreman, the man in charge of the department, is responsible. The accidents in the department are charged against that department. If the accident rate is high and it costs several thousands of dollars to pay for accidents, it costs the finished product of that department the expense of those accidents. Now, if that foreman, through ignorance, neglect, carelessness, or anything you want to say, does something in the department or

allows something to be done in the department that injures the production, reduces the production, and costs the company a thousand dollars, who is going to get it? Just the men with accidents? I believe that it is the foreman. You take away that responsibility and say, "Here, we don't care if the accidents cost a thousand dollars. That has nothing to do with production."

I think we are losing sight of the fact that that foreman is responsible for everything that goes on in that department. I don't believe that the foreman can be right there when the accident occurs, but I understand he is in a great way responsible. When you go a little further back the manager is further responsible for nearly all accidents that occur—the management makes the environment, the management creates the safety department, the management puts in the machines, the management who creates this safety department hires the man. In almost every case these men are ignorant of the conditions that surround the department where they are going to work. Proper training of the new employees will in great part reduce our accidents.

In our plant every new worker is given a little booklet in which we bring out some of the important facts in accident prevention work in that plant, and we also tell them how they can report their accidents when they do happen. They take that into the department in which they are employed and two days later the foreman asks them if they have read it; and if they haven't read it, he has them read it. In case they can't read it we have a bulletin board as big as one of these signs. There the same thing is written in French and English, as the French is the predominating language there; and we have very few who cannot speak the English language or the French language. Practically everybody is covered. If we find the person can't read English or French, they are told what is in the pamphlet, so everybody is covered.

Just one thing more. Regarding punching the clock, I thought it would be of interest to mention that at the meeting yesterday we spoke about the men running out of the plant when it came time to go home, and one man mentioned the fact that there was nothing he saw could be done to stop that. I think there is a great deal can be done to stop it. We are responsible for an accident that happens until the man gets out and off the step of the mill. If he is coming down the stairs in any part of the mill, even after the whistle blows, we are responsible, and if it is going to cost the company money, they should take care of it.

We had 38 per cent of our accidents coming from falls of persons. That percentage has been increased, but the number of lost hours reduced. The percentage is over 50 per cent, but our lost hours are greatly reduced, so that shows up a great deal more. But the most serious accidents were falling downstairs at closing time, and we had a great many of them. Now, we have stationed the foremen, the men in charge of the different departments, from the top of the mill down, on the stairways. It only takes a couple of minutes and everyone that is caught running down the stairs or any hallway, the case is severely dealt with. It has been entirely eliminated, for the last three years. To add to that we have put in proper rails and guards, etc., to prevent further accidents on stairways. When you have accidents from that cause I think they can be eliminated.

IGNATIUS MACNULTY (Department of Labor, American Woolen Company, Boston, Mass.): There is one accident particularly attributable to women who wear high heels. I thought they belonged to the ancient Egyptian period and not to a modern one in a textile mill. I am not here to advocate the wearing of high heel shoes. I am here trying to give an opinion as to what are the bases of accidents. There are very few falls of women in a modern textile mill today. I am of course referring at this time to my friend Perkins handling the cotton mills, and I have some interest in the woolen mills. In analyzing the basis of falls, we don't find many due to rubber heels. In eleven mills holding quite a large number of people, counting roughly some four thousand people, we had one woman who

fell. I think woman is balancing herself pretty well on high heels—I meant high heels not rubber heels—she is balancing herself pretty well. If you study your accidents in any state that gives complete reports on these, or check a couple of accurate reports of accidents, you will find the contribution of accidents by women is very slight. I mean her contribution to accidents by falling and not to other complaints.

As to the contribution of a wet floor to falling, I think that is exaggerated also. You will find if you analyze your causes of falls that the wet floor is a very small quantity in that contribution. So, I will take floors that are constantly wet and where the danger is continuous the whole eight hours or the entire working period. Out of fourteen mills, there were seven falls on wet floors. These are not all compensable cases. To quote all our accidents, there were 95 of these accidents, covering a period of one year, out of a number of nearly four thousand people. Where the nature of the process doesn't call for water, there was one more fall than on the wet floors. There were seven there, showing that the dry floor contributed equally to falling as well as the wet floors.

Now in washing floors, the weaving room is as good an example as I could give you, where floors have to be cleaned when the people are working; and covering the same number of mills and the same number of people in each of these mills, there were not any due to washing the floor. Every fall there was due to some fault of the individual himself, possibly carelessness. There were two out of that group serious. You will see that we are not yet reading the causes of the accident when we give old fashioned ideas. I think those of you who visit mills, like insurance reporters, will grant that the cotton mill is a reasonably safe place to work in.

I want to call your attention to the contribution of fatigue to an accident in a textile mill. This argument is largely given by Italian people and we have been interested, and I am not finding fault with them. I am going to give you these figures. There are 95 accidents covering the same number of people in the same number of mills—you can judge for yourselves whether fatigue entered largely into the cause of these accidents. There were 55 of them before the hour of ten a. m., and there were 20 of them after ten o'clock in the forenoon. There were 18 of them before three p. m. and the balance were between three and five p. m. You might say, "What about women? Does the fatigue show in the same degree among women?" So I took a number of women and found that that fatigue was affecting them more than the men. I found that out of sixteen accidents in which women had the misfortune to be hurt, again not compensable—I want that emphasized—there were seven of them before ten a. m. and three of them after ten and before 12 noon. There were seven of them between the hours of one and three p. m., the balance from three to five p. m. Out of 95 cases all together in which that small number of women were involved. In our safety card we show the hour of the day at which the party was injured. An exception is of course the exception, but usually for all practical purposes, these figures are correct.

But, you say, that is not a fair quotation. Why don't you tell us the industry in which the accidents happened—the particular phase of the industry? Would that have any bearing on it? For instance, a man working in a spooling room would be less fatigued than a girl working in the same room. Now, the weave room had their largest percentage of accidents in the mornings. There were nine of them in the weave rooms before ten a. m., and in the capsizing room where the men have to smell odors and fumes that are not the best thing because of the disinfecting that is prescribed, they were all in the morning—there were none in the afternoon at all. In the finishing where a great deal of mechanical apparatus is used constantly, seven of them were in the morning and none in the afternoon. I forgot to give you the weaving in the afternoon. Out of the total, nine before noon, five took place before ten o'clock. There were four between then and five

o'clock. In the finishing shop there were two in the afternoon and the balance of seven in the morning. In the wet finishing where the men have to use good judgment, where there is water more or less constantly flowing, accidents occurred in the morning and not in the afternoon. In the drying house, the only department of which I haven't spoken, the accidents—there were three of them altogether during the year that I gave you—were all in the afternoon during the hours of three to five.

I hold that the overseer is responsible, but I have to agree with Mr. Perkins that it would be very unjust and unfair to hold an overseer or foreman responsible for everything that happens in his department. He only exists at a particular point of space at one particular time, while his operators continue all the time and he can't tell what they are going to do, save in a general way.

In one point I would like to criticize Mr. Glenn Cook—that it would not be good to give up the education of the man in safety. If the manager of the mill in the textile industry is establishing fair conditions of labor, fair wages, fair hours, reasonable precautions to protect the man or woman, then the help is bound to contribute their share in the safety of that mill.

CHAIRMAN WASHBURN: It is very evident that we did not have enough time for this discussion yesterday. Now, the time is running along and there are a lot here who want to ask questions on "How I Want Safety Work Conducted." If there are any gentlemen here who want to ask these questions, now is the time to do it.

EVERETT F. KING (Safety Engineer, H. A. Hale Jr. & Co., Boston, Mass.): I just want to explain my position before I quote some figures here. I have been doing this safety work for nine years for H. A. Hale Jr. & Co. At present I am covering six mills, four of which are textile, and I just wanted to say one word in agreement with part of what Mr. MacNulty said about education of the employees.

It seems to be the consensus of opinion that more stress should be laid upon the length of physical hazards in the plant. I think that that work is incidental to the main safety care of the plant. You know as well as I do that after a while the physical hazards in a plant are pretty well taken care of. It remains to eliminate a large number of accidents due to what we call carelessness. These accidents can only be eliminated through the cooperation of the various employees and that does not include the newest employees alone—that includes the men who were for twenty-five years in this trade, men who have never been hurt.

We have to lay a little more stress on the education of the employee and we should also place responsibility on the foreman, although not all the responsibility on him. I think the safety committee cops in the various departments should assist their overseer in eliminating accidents.

About falls, I just want to say a word. I have some figures here that have been gathered from some of the plants in which I have been doing work, covering 24,000 employees in three different plants. Here are 643 involving some 30,000 days lost. Mr. MacNulty is quoting from his experience and I am quoting from mine. Just let me tell you about some of the accidents from falls in some of these mills.

Here's one plant of 6,000 where falls cost 12 per cent; here's another, 300 employees, 58 per cent; 6,000, 34 per cent; another mill with 1,200 falls cost 27 per cent; 1,500 falls cost 21 per cent; another, 500 employees, 60 per cent. Here's another with 3,500, 39 per cent; one with 4,000 employees, 46 per cent. A large number of these accidents occurred from falls on floors. They are not segregated into various types of falls but they occurred from falls on floors, either from wet or slippery floors or obstructions in aisles. I think our attention should be directed along the lines of preventing accidents from falls.

Just let me cite you one instance. I know a plant in Maine that employs 2,000 people, where the agent recently passed a very drastic rule regarding high heels.

He has forbidden any woman employee to come into his plant with high heels. If a girl comes in with spike heels on she is sent home for a regular pair of shoes.

CHAIRMAN WASHBURN: See if we can't confine ourselves to the subject. What this last gentleman said is O. K., but there are a lot of members here who came here to get information, so I would like the speakers to confine their remarks to the subject.

DR. ROBERT P. KNAPP (Medical Director, Cheney Brothers, S. Manchester, Conn.): I would like to find out by the consensus of safety engineers here if the opinion of Mr. Perkins is held by all. If so I would say there is a danger of accepting an erroneous statement, which I think would certainly not lead to any good results in the end.

In regard to Mr. MacNulty from falls, I could say briefly there were three falls due to high heels, because many of our female operators take off their high heel shoes.

I do agree with Mr. Griffiths in placing responsibility on foremen. I know our foremen are not so busy that they can't be held responsible.

I think it is a great mistake our friend Mr. Perkins is making. I think they should cause physical examinations to be made.

MR. PERKINS: I want to say I didn't touch on our first aid and medical department. We have one, and I would say that there is thorough cooperation between them. With all due regard to your opinion, I still have to say that we are probably having less turnover than any mill in America, and I think our accidents are as low as any mill in America. I don't hold my opinion as a theory or by statistics, but by long years of experience in going through the mills and knowing what has caused accidents. Many men have been in our employ thirty-five to forty years and want to see accidents prevented. Many of their own families are working there. It isn't theory or statistics, or it is not what we get in some cellar; it is what we got right there in the mill so the people with their fingers taken off or their arms broken can learn to know how to guard against it.

ARTHUR BARLOW (Chairman, Safety Committee, Armstrong Cork Company, Lancaster, Pa.): There were some things said this morning that I don't agree with. One of the best means of getting the foreman to recognize his responsibility, is to make him a part of the factory supervision. For the purposes of prevention of accidents, put him on the safety committee, let him familiarize himself with the conditions in the factory, place him outside his own department and by this means you gradually get that man to see things from a different viewpoint. The same thing applies to the worker. The more you can bring the foreman and the worker into close and personal contact with this accident prevention work that we are all interested in, the nearer we shall come eventually to cutting those accidents to what we would regard as a satisfactory basis.

I hate to hear you fellows say about the safety supervising work, just bring all your responsibility to the foreman. If some of you had been foremen you wouldn't talk that way. The foreman is just human like you are, and he has his own economic responsibility. Then, as a rule he has got to keep his job. The first thing that he had to do is to show the boss that he is working that department all right. Let the safety supervisor get close to the foreman. "Come along, boss, or whatever you are, let's you and I come to work together." Forget that. Let him come in and say, "Now, is there any way in which I can help you to prevent that kind of accidents." The fellow says, "Yes. You can do a lot, but I guess the best thing you can do for me is to help these people that are working for me to get educated how to take care of themselves."

C. C. KEEFE (Armstrong Cork Co., New Brunswick Plant, New Brunswick, N. J.): Our records for the last year show that about 85 per cent of our accidents were non-mechanical. We have a safety committee that inspects the mill regularly and has its meetings. About 99 per cent of their reports are for mechanical im-

provements in mechanical guards. We have state inspectors coming around. All they do is check up guards. They claim the guards are about perfect. Still 85 per cent of our accidents are non-mechanical and we are supposed to eliminate them all by education. I would like to know how you get that education to the employee for preventing those accidents in which he himself is undoubtedly responsible? We have had posters, all those things, and still people will fall and step on things and drop bricks on their feet and do those sort of things. How are you going to do it?

D. FRANK LORD (Safety Engineer, M. J. Whittall Associates, Worcester, Mass.): From experience I will answer that question. There is a motto across one of the buildings in our city, "Eternal Vigilance Is the Price of Liberty." I think that is the only answer we can make. Eternal vigilance on the part of superintendents to see that the housekeeping conditions in a plant are perfect. Mr. Cook says he thinks the inspection job is now actually deteriorating into one of housekeeping. Why isn't that a pretty good thing? If we have our guards so that we can't find any fault, let that be part of the vigilance committee. In my own committee we had 27 suggestions at the last meeting. Twenty-six of them were housekeeping suggestions—loose bricks over doors, a place where the stairs needed fixing, etc., so let that committee be a vigilance committee.

In regard to the question of the textile industry being the safest industry, we have a man here that I want to ask a question of, and I know he is thinking about it because he is the man who is handling the money; and that is, how Mr. Frieder reacted to the amount of the budget that he has to meet at the next meeting of his directors. Will he go home feeling that a reduction or an increase in the budget is going to be necessary?

For Mr. Eames of Lowell, with regard to statistics. There has been formed by the National Safety Council a standard which covers the number of accidents, lost time, and the number of days lost; and if every member of the textile branch that is a member of the National Safety Council would fill in that blank in full, leaving the frequency figures and the various figures alone, then the textile section would have a complete analysis of the accidents and statistics they could use. It seems to me that is one of the answers to Dr. Stewart's statement yesterday that his statistics "weren't worth three hoops in Arkansas." If the people would all send in the same kind of forms they would be valuable; and that emphasizes the fact that I want to make for this coming year the slogan, "Every textile plant a member of the National Safety Council." Then we will get statistics that are valuable.

We have a good chairman on the statistical committee and I think if we will all join and put in our little bit, we will get the good of it.

LEONARD P. FRIEDER (Vice-President, National Spun Silk Company, New Bedford, Mass.): In the first place, personally, I am only interested in a very general way as to what the individual plants are doing except as those things can apply to ourselves. One thing I do know about our own plant is this: What accidents cost us, what it will cost in terms of production, what efforts we make to try and prevent accident hazards. If the textile industry is in line with those that will help us, we are interested, but if we, by analysis of our own conditions, can improve our status as compared with the industry, that is where I am interested. We have to take our own condition where there is an opportunity for safety work to be handled individually, and if the textile industry were almost perfect and we still could improve our own conditions why those conditions would go into our own budget to correct the hazards and reduce our own expense whether it is direct or indirect.

GLENN W. COOK (Supervising Engineer, Travelers Insurance Co., Hartford, Conn.): So many of the gentlemen present disagree with me today, I had better say something before it is too late. Foreman's responsibility—it is easy to reduce

any idea, if you are antagonistic to it, to its absurdities. All I know about foreman's responsibility is this—that where it has been tried they like it and use it. We don't mean by foreman's responsibility that the foreman is responsible for the accident. He is responsible for the conducting of safety in his department but the fact that somebody gets hurt in that department doesn't mean we are going to hang the foreman for it.

On the subject of education, I am not condemning the education of the employee. The only brief I have is that on education of the employee we should not try to bring the foreman on the accident work, which could just as well, or better, be done by the manager. I have come over my desk every month bulletins of the National Safety Council, the Insurance Council, etc., and as I see all those bulletins come across my desk, I wonder how much value there is to these bulletins that are posted. Yet, we have found no way of measuring just what value that particular form of education has been; even though we can't measure it, I do not think we should give any of it up. My only thought in criticizing education is to bring ourselves to let these efforts be put into constructive safety work, to act as an assistant to the things the foreman and the manager should be doing.

C. N. YOUNG: Mr. Frieder spoke a few minutes ago to the effect that he thought a safety investment should pay for itself in one year. I would like to ask if he expects any other item of his plant investment to pay for itself on that basis? Why should safety be put on any other basis than any other item of plant investment?

MR. FRIEDER: The reason is this. It sounds very nice to say an investment cost you 6 per cent a year, but it doesn't—I have kept records of it—I have amended that—every investment cost is 20 per cent a year, that is at first. The reason we don't make it five years is this. For instance, if you want to increase your production, it is hardly possible that you could get it other than by an investment that would yield much less than that basis, but when you come to equipment, etc., we find so many opportunities, we feel that a one year basis is wise. Some people put it at two years. When I say one year you must bear in mind that our plants are two or three shift plants, and we have much better opportunity for making accidents than others have. Another plant may have to say two, another three, before they can be superior to us, but in our own case one year is plenty.

MR. PERKINS: One gentleman said he wondered how effective those bulletins were. Back in war time there was a bulletin posted about a man who stepped on a nail, and he had the worst looking foot that I have ever seen. That is something I have tried to guard against because I was brought up on a farm and it would turn a whole place into confusion to step on a nail. I said, "You put a carpenter on and have these bulletins put up all over this plant." I saw the man doing the work. A few days later I was up in the spinning room and he was repairing floors that were partially worn out. He was throwing the nails down—he had spent a day and a half putting up these bulletins and here he was doing the same thing himself. I didn't speak very gently and I don't know that I confined myself to the Scriptures. "Didn't you go around here putting bulletins up to guard against that?" He said: "That is for the help."

HARRY D. IMMEL (Bureau of Inspection, Department of Labor and Industry, Harrisburg, Pa.): One of the gentleman said something about state inspection being entirely a matter of machine guarding. I think it might be of interest to him to know that the Department of Labor and Industry of Pennsylvania is preparing to try it. The idea is no more than this: Our state inspection, beginning in a month or two, is going to be based on individual plant experience largely. Heretofore, our state inspection, just as other state inspection, was a matter of routine—block by block system, door to door for the factories almost. And then our Bureau of Registration, which gets a record of every accident, we are going

to have prepared every month and sent to our supervising divisions a record of lost time accidents in every trade. They will be kept intact as a permanent record and will largely be the basis for routine inspection. Mechanical safeguarding will of course be a large part of our work, because we are the most interested in that phase of the work, but education is going to be second and a considerable amount of work will be done in bringing in an interchange of ideas. As far as possible, enterprise is going to be a part of our work and we think the textile industry is going to appreciate that method of inspection.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Woodworking and Lumber Manufacturing Section

New Section Officers

General Chairman—J. M. BISSELL, Marathon Lumber Company, Laurel, Miss.
Vice-Chairman (Manufacturing)—M. C. GOODSPEED, General Electric Company, Erie, Pa.
Vice-Chairman (Sawmills)—H. R. ORCHARD, Marathon Lumber Company, Laurel, Miss.
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mittee Chairman, E. ROSS FARRA, Grand Rapids Safety Council, Grand Rapids, Mich.; *Publicity Committee Chairman and News Letter Editor*, O. J. OLSEN, Fisher Body Corporation, Detroit, Mich.; *Poster Committee Chairman*, H. D. HERRON, International Harvester Company, Chicago, Ill.; *Engineering Representative*, G. A. ORTH, American Car and Foundry Company, New York City. *Executive Committee*: THE OFFICERS AND G. E. SANFORD, General Electric Company, Schenectady, N. Y.; A. O. JACKSON, Aetna Life Insurance Company, New York City; H. C. WIBERG, Lumber Mutual Casualty Company of New York, New York City.

October 1, 1928

JOHN B. GRIER, Chairman

**Employment and Safety Manager, American Car & Foundry Company
Wilmington, Dela.**

The first luncheon and afternoon session of the Woodworking Section at the Seventeenth Annual Safety Congress was called to order at twelve-thirty o'clock by the chairman, J. B. Grier, Employment and Safety Manager, American Car & Foundry Company, Wilmington, Del.

CHAIRMAN GRIER: Gentlemen, we had this luncheon meeting arranged today so as to become acquainted. Today I would like you to meet your neighbors on both sides and across the table and become acquainted, so that when we gather in these sessions we will know one another and not be standing in the lobby looking for some one of our personal friends.

I started last night in the Congress. We had a little dinner to President Niesz. There were a lot of nice things said about President Niesz, and there was a lot that was not said that could have been said. President Niesz is a very likable man, and anyone who has known him for a year, and has worked with him, can't help but acquire a love for him. He is an ideal man and has made us a wonderful president.

What we are going to do here today is just sort of hash things over and try to get you fellows to give us some of your experiences which are odd, and we will call on two or three of our members here for a short talk. We have a man with us who has evolved in his mind the super-excellent safety plan for preventing all accidents. That is a big offer, and I am going to let him put it across. I don't know how well he will get away with it. One thing that struck me rather funny last night, was that Dr. Stewart said that the Jonah-and-the-Whale incident was an accident that was reported but there was no lost time. He also said that that accident could have been prevented had the whale not exceeded the speed limit. If he hadn't exceeded the speed limit, he would never have caught Jonah.

To start our meeting off, I am going to ask Dr. Leroy P. Kuhn, Chief Surgeon of the Lumbermen's Mutual Casualty Company, Chicago, Ill., to give us just a few minutes' talk. It is just a talk on his personal experiences in accident prevention work.

Address

By DR. LEROY P. KUHN

Chief Surgeon, Lumbermen's Mutual Casualty Company, Chicago

I feel just a little out of place in this meeting of safety engineers and safety men. A physician or surgeon usually tries to mend what happens as the result of accident. That has been my work for perhaps twelve or fifteen years, and especially in the woodworking industries of Chicago. During this time, in treating

patients, of course, one would naturally obtain a definite history of how the accidents occurred, and with the more serious types of accidents, we become very much interested in the cause, as the history is taken of each patient brought to us for treatment.

In the last ten or twelve years I have become especially interested in the more serious accidents from their etiology; first, the physical condition of the man; second, the mental condition of the man—whether his mind is slightly confused or whether he is balanced so that he can carry on the kind of work that is given to him.

I have found during the last three or four years, that the mental attitude or the illness of a man's mind (if I may so state—of course, there are so many different types of mental illnesses that I won't attempt to classify them) but if a man's mind is wrong, he is a fit subject for an accident. In other words, if he leaves home in the morning mentally confused, perhaps by nine or ten o'clock he is going to be over at the hospital or, in the doctor's office. If this man is depressed, if he is melancholy, if he has financial worries, if he has domestic troubles at home that started him away to work wrong in the morning, he is just the type that comes to us later in the day.

It has occurred to me during these past few years that we ought to give a little more time in our accident prevention work to the mental condition of men about the plants. I don't know how much it is worth to you men in accident prevention, but from a medical standpoint, it appears to be as something that ought to be given more consideration.

Then, too, in these more serious accidents that come to physicians, the question of guards, the type of machines used, is something that the doctor is interested in. He finds that from a certain class of machines, certain types of accidents constantly occur, some of them serious—a small percentage serious, possibly three-fourths not of much importance.

During this woodworking experience that I have come so closely in contact with in the past years, I have a good many abdominal injuries come to me for attention. I would say that a third of them have been very serious, while two-thirds were just minor injuries to the abdominal or the chest portions.

There was a time when men did not wear glasses—no goggles were used at all. Then, finally, the workman was interested in glasses to prevent eye injuries, so that in the Detroit session in 1922 of the Safety Council, I brought to the attention of the Woodworking Section, some abdominal form of protector for the revolving rip saw or planer or any type of woodworking machinery that might cause an employee to receive an abdominal injury. I thought that the average guard that is used was very good—especially when it is used.

We have gathered a good deal of statistics from guards, the number of different types of guards used in the woodworking industry, and we find that there are some very good, some standard guards used, and then there are other places where guards should be used where they haven't been used at all. It is from these sub-standard guards and the industries that have guards but do not use them, that we obtain so many serious abdominal injuries.

So it has occurred to me, during the past years, that it might be advisable to have some form of abdominal protector that a man could wear, similar to wearing glasses for injuries to the eyes. I am very much interested in that particular subject, so much so that during the last three or four weeks, I have gotten up a sort of abdominal protector that I believe will deflect or make the blow to the man's chest or abdomen less serious, so that he will not receive an injury to some internal organ in the abdominal cavity. If you had gone through some of the experiences that I have at the operating table, if you had seen some of these men who have suffered from a kick-back of the rip saw or the planer, you would find that a sub-standard guard was used, or else no guard at all; and you would find that man has

to have four or five inches, maybe four or five feet of intestinal tract removed, because he has been so seriously injured. You would begin to think of some way to prevent that type of accident if it is possible to do it. As a physician and surgeon, I don't know whether it is possible or isn't possible, but I do know from the statistics that we have gathered, that some of the guards that are on the market now do not protect. A first-class guard does protect. We have found that very few accidents occurred with these saws where a good guard had been used.

I am indeed glad to be here at this meeting, and to see the interest that is taken generally in the physical examination of employees, and especially what the last speaker emphasized this morning in the general meeting. It seems to me it was one of the best addresses that I ever heard.

CHAIRMAN GRIER: Thank you, Dr. Kuhn.

I would like to hear now from anyone. Bring up any of your accidents or any of your strange experiences—something that is unusual. Let's get acquainted and have a general roundtable discussion.

R. C. BARR (Manager of Safety Instruction, Lumbermen's Mutual Casualty Co., Chicago, Ill.): I would like to ask how they have prevented the kick-back accidents in rip saws and planers. I would like to ask the different individuals collected here how they have prevented kick-back accidents in their plants?

W. L. WALLACE (General Attorney, Hines Associated Lumber Mfrs., Lumberton, Miss.): I am going to ask my able, efficient associate, Mr. Buchanan, to give you—not the experience of our operations, because we no longer have that character of accident—but I am going to ask him to give you an explanation of a device that the J. J. Newman Lumber Company has evolved and adopted, which in my mind, from seeing it in active operation, makes a kick-back accident impossible.

MR. BUCHANAN (Safety Engineer, Edward Hines Lumber Co., Lumberton, Miss.): Mr. Thompson, the safety engineer for the J. J. Newman Lumber Co. interests in Mississippi, had two kick-backs last year—one of them on a two by four straight through a man, another one a week later. They thought at first it was dull saws. They said the saw file was at fault. They got good saw filers, the same saw filers who had been filing in those mills for years and never had any trouble at all, and they knew there was something wrong. Mr. Thompson told me that he had worked and worked, trying to devise some way. They got a planer foreman by the name of Mr. Buckley. Joe asked all his foremen to think up something to help stop these accidents. Mr. Buckley went to work on it, and I believe that he contrived the first, but it wouldn't work. They put it on the back of the edger instead of the front. It is a device that has four teeth, and the feeder stands like this (indicating) and as the lumber comes through, the minute she hits that, these teeth rise and ride this lumber, and you couldn't get it out of there if you took a tractor and pulled it. You couldn't get that piece of lumber to kick back. That lumber will not kick back. It is an absolutely fool-proof device. You can put them on planers, on re-saws, on edgers, you can put them on anything.

Several people have been trying to buy the patent on it, and Mr. Buckley will not have it patented at all. He has had it copyrighted, I believe, and had it fixed in the patent office so that nobody can commercialize it. But, if any of you are interested in that and want to see that thing, Mr. J. I. Thompson of the J. J. Newman Lumber Company of Hattiesburg, Mississippi, will furnish you blueprints of it, gratis. The president of the J. J. Newman Lumber Company was so well pleased with it that he told Mr. Thompson to have a number of blueprints made up, so that if anybody wanted them they could have them.

I notice in all the lumber magazines—in the American Lumberman, and Southern Timberman and National Timberman, and all the big magazines all over the country—they are all featuring this device. It is not a publicity stunt of the Newman Lumber Co. at all. It is a sound proposition, and one that is absolutely fool-proof. So, if you want to stop your kick-backs, that is the thing that will stop them.

M. J. MCCARTHY (Fisher Body Corp., Detroit, Mich.): Mr. Barr, I think if you will just bear with me until Mr. Olsen gives his talk on Wednesday, you will see both of the questions illustrated.

G. A. ORTH (Chief of Safety Dept., American Car & Foundry Co., N. Y. C.): That device has been in the plants of the American Car & Foundry Company since 1915. It has been illustrated in the *National Safety News* by the National Safety Council. We have been using that for about 13 years. We have never had a fatality since its use.

MR. WALLACE: Mr. Orth bears out what Mr. Buchanan has said—that device makes a kick-back accident impossible. That is what we are all trying to do. Now our Newman people declined to even try to patent it. Why? Because they want to spread safety throughout the universe.

CHAIRMAN GRIER: Are there any other questions? Is there further discussion on this subject?

MR. BARR: In connection with the same subject, many times you find that in sawmills they can use non-kick-back devices, but in the box manufacturing plants where the saw operator has to retrieve the saw again, we find there is some objection to using that form of non-kick-back device, that is, in sending short pieces through the machine. It is really our problem in the box manufacturing industry to find something that will prevent kick-backs and not use that form of dog. I think that dog mentioned by our friend from Mississippi is a very effective dog to use in the sawmill. I don't know whether the address to be given later will cover box manufacturing or not, and that is the reason I bring that up again.

M. J. MCCARTHY (Fisher Body Corp., Detroit, Mich.): It covers that kick-back guard in two or three different forms.

O. B. FREDERICK (Safety Supervisor, Dierks Lumber & Coal Co., Dequeen, Arkansas): Is this kick-back guard used on edgers?

MR. BUCHANAN: It is at the present time. It can be rigged on any saw, rip saw, planers, edgers, and I am going to begin to use it on table saws. I am fixing for that now. They told me it couldn't be used on rip saws. Nevertheless, I rigged one on a rip saw and got it working.

MR. FREDERICK: One other question: Is the dog put in front of the saw?

MR. BUCHANAN: In front of the saw.

CHAIRMAN GRIER: Any further discussion on the same question?

A. W. BLOIS (Foreman, Owens Bottle Co., Huntington, W. Va.): After the board passes through the saw, what effect does that have in preventing an accident after it passes through to the back of the saw where you get your kick-back?

MR. BUCHANAN: Probably I didn't make myself clear. The saw teeth are like that (indicating). They hang down like that with a slight curve, as you will see by the blueprint. As the lumber goes under it, these teeth fall down on the top of this board. That is the front edge of the board. I have seen kick-backs from knots in the middle of boards. We had one of them caused by a knot in the middle of the board. The board broke and flew back. But, if that device had been there, it couldn't have happened. The knot is the only thing in the world that is going to cause you to have a kick-back with that device.

MR. BUCHANAN: Understand me—I have had this device working only about two months, but I see the feasibility of it, and it is a good device. I think it is the only solution that I have seen so far that will absolutely stop it. Now, you can't control the knot hazard, but very few timbers that you get in your industrial plants outside of the mills have knots in them. The mills themselves are subject to the knot hazard. We class that as No. 3 common lumber, and there is very little of it sold.

CHAIRMAN GRIER: I think probably what would explain it a little more clearly is the fact that the dogs are long and the bar holding the dogs in front of the

saw prevents any material from coming back over the top, if the board ~~should~~ break in the back.

MR. BLOIS: My experience has always been after the board passes through the saw, if that lumber happens to lie there a few minutes, and your vibration happens to bring the lumber in contact with the saw tooth, that is where you get your kick-back.

MR. MCCARTHY: It can't do that. The lumber comes right down on the table. While the lumber is not being fed in, the dogs are practically on the table. These dogs, you understand, are loose. As the lumber is fed in, it goes right straight through. After she passes the dog, the dog drops down and lies on the table.

MR. BUCHANAN: Another thing is: The modern plant layout today doesn't call for an offbearer of lumber. If you keep up with the *Engineering News*, you see that the offbearer of lumber is a thing of the past. It is all done by chains and automatic conveyors. In our planers we have one man, and no man ever touches that lumber until it is 300 or 400 feet away from that planer after it comes out the other end. It falls and is automatically taken away.

CHAIRMAN GRIER: Probably you are not clear on just which is the front of the saw, or which they are considering the front of the saw.

MR. BLOIS: I call the front of the saw the part which the operator faces.

MR. BUCHANAN: That is the back of the saw. The feeder stands in back.

CHAIRMAN GRIER: Where do you have your guard placed?

MR. BUCHANAN: At the front of the saw.

CHAIRMAN GRIER: And the guard gets hold of the material after it passes through the saw?

MR. BUCHANAN: Yes. It won't work on the back.

MR. BLOIS: I misunderstood that. Does that also apply to planers?

MR. BUCHANAN: Planers and everything.

CHAIRMAN GRIER: Is there any further discussion?

DR. LEROY P. KUHN (Chief Surgeon, Lumberman's Mutual Casualty Co., Chicago, Ill.): The gentleman from Mississippi made some remark about knots in the wood or knots in the board being sawed. I have noticed in getting histories from employees' kick-backs that most of them will describe something about a knot in the wood that caused the kick-back. If I understand you correctly, you said your guard wouldn't work where the saw hit a knot.

MR. BUCHANAN: Kiln-dried lumber is subject to shrinkage. It wouldn't do it on natural dried lumber. You take a knot in a board, kiln-dried lumber, and it will shrink so that you could take it and hit it with a hammer and knock it out, practically all the lumber. It is tight, but it is not as tight as it should be. Sometimes the moisture dries up so much in that lumber that that knot becomes loose, and if that saw is just a little bit dull, it is going to cause trouble on that knot, because that knot is going to fly as soon as it touches it, and if it hits just in the right place or if the board is turned over, you are going to see the knot come out of there. I have noticed it time after time. I have spent days in the planing mill down there watching just that one thing. We had a knot in a board—the board was about three inches on one end and one inch and a half on the other, and about three feet long—and it went right through a man right here. It was caused by nothing but that knot breaking. A piece of that board kicked back while the main part of the board went on.

DR. KUHN: Then you have no guard for that particular situation?

MR. BUCHANAN: No sir, we have nothing for that.

O. B. FREDERICK (Safety Supervisor, Dierks Lumber & Coal Co., Dequeen, Arkansas): We have had some kick-backs due to the fellows feeding the lumber in crooked and raising the rollers when they saw that they had made a mistake. We have had a few kick-backs from that.

W. J. CULLEN (Safety Engineer, Royal Indemnity Co., New York City): Speak-

ing about these saw guards: Is the blade of the saw guarded with a cage guard on top?

MR. BUCHANAN: You say a table rip saw. It is an automatic feed rip saw.

MR. CULLEN: I am talking about a manual feed rip saw on a table.

MR. BUCHANAN: The majority of these rip saws that you push lumber through are practically obsolete anyway.

MR. CULLEN: As far as I can see, in one industry alone they are not obsolete, and in practically all the plants around here they just stand in front with a board and shove it through.

MR. BUCHANAN: I am speaking now of the modern methods is running a shop. I say that the rip saw (of course, there are a lot of those things still) as they are renewed, are going to be automatic. There is nothing open except just the drop guard.

CHAIRMAN GRIER: I think the discussion has centered around a particular operation. This kick-back device can be put on almost any type of rip saw, and the hood guard and splitter in addition to that. It doesn't interfere in any way with the operation of the hood guard which covers the top of the saw entirely and the splitter which is the biggest safeguard of all.

H. R. ORCHARD (Supt., Marathon Lumber Co., Laurel, Miss.): In connection with a kick-back device on edgers, it is well to keep in mind the point that the gentleman brought up about the operator raising up the rollers after he has put the board in. It is very essential to keep that in mind when you are considering safeguarding any piece of machinery, because there would still be a lot of troubles coming from the operator not using the safeguard provided for him. Of course, I know that is true in every industry.

Now, in connection with these edgers, while it is a splendid idea, and our plant expects to equip our edgers with this kick-back device, fortunately we haven't had a kick-back accident in our mill in five years. We do not manufacture as much lumber as the plant this gentleman here is connected with, but we do manufacture around forty-five to forty-eight million feet of lumber a year, and we have only two edgers in that machine, and they have to handle a lot of material.

After the last kick-back accident, our people insisted on close attention being paid to the edgers. That includes the sawmill people, they understand it—that it applies to all machines; that includes the condition of your saws, the condition of your feed-in rollers, the condition of your out-feed rollers and all of your devices, and what I think is most essential is to inoculate in the mind of the feeder not to take that chance; when he gets a board in there (naturally, we don't want him to put a board in crooked) but if he does put a board in crooked, let it go on through and lose that piece of lumber; and if he gets a piece of lumber in there hung up, not to lift up those rollers or interfere in any way with the device until he gets the machine stopped and can take it out. I think that is one point we have all got to keep in mind: That while mechanical safeguarding is absolutely essential, we shouldn't think it is going to solve all of our troubles, because the operator is still the most important factor.

W. A. WILSON (Personnel Manager, Frank Graves Sash Door & Mill Co., Los Angeles, California): I would like to know if there is a guard that would properly operate on a railroad or dado saw, where we are cutting and dadoing fairly wide material, 12, 14 or 16 inch sills. I would like to know if there is such a guard.

R. C. BARR (Mgr. of Safety Instruction, Lumberman's Mutual Casualty Co., Chicago): I can't answer that myself, but I can refer Mr. Wilson to Mr. McKiel, who represents the Wisconsin Industrial Commission, who has worked out a satisfactory guard for that.

CHAIRMAN GRIER: I am sorry he is not in the room with us, and if he is later, we will call upon him.

MR. FREDERICK: We have, I think, fairly successfully solved that problem of

the dado with an overhand guard which swings or, in other words, bounces when the lumber is fed under. It raises the lumber and as the timber goes through, it drops down. We also have a hand for clearance to hold the lumber, so that the man doesn't necessarily have to put his hand anywhere near the dado head, and he merely clamps the lumber on the table with this and shoves it through.

MR. WILSON: May I ask if that is done with a foot lever that will bring the saw into contact with the wood?

MR. FREDERICK: No, it is not done with a foot lever. We have a sliding table.

MR. WILSON: I have in mind where the saw is moved by a foot lever.

MR. FREDERICK: That is different from our operation.

CHAIRMAN GRIER: I might say that we have covered that operation fairly well with an iron bar clamped to the carriage of the saw that travels with the saw and carries the guard overhead. The guard is tapered so that when it strikes the material it rides up over it and as it comes back, it comes down and covers the head.

MR. WILSON: Does that operate for all widths of wood? We are thinking of this to take a fairly large curve coming back.

CHAIRMAN GRIER: It operates within a limit. It can be set for the large operations or the small.

MR. WILSON: This is a large piece.

CHAIRMAN GRIER: It would operate for that if you made the guard for that operation. You would have to make a guard for an exceptionally large operation. The bar which carried it would have to be heavier than would be necessary for the lighter operations. It would be governed entirely by the amount of that work which you would have to do.

Is there any further discussion? Does anyone else have any question?

MR. BARR: With this guard, does the guard extend out far enough to strike the operator?

CHAIRMAN GRIER: It does not; it clears.

Are there any further questions? If not, I am going to ask Dr. Lucian W. Chaney, Economist, of the U. S. Department of Labor, Washington, D. C., to give us some of his experiences.

DR. LUCIAN W. CHANEY (Economist, U. S. Department of Labor, Washington, D. C.): I inherited a job for which I am not particularly fitted. I happen to be the chairman of the committee which is operating a division of the National Standards for Woodworking Machinery. I would like, in that connection, to ask the members of this section for any information which they may have with regard to a request which has come to the committee from the manufacturers of woodworking machinery. The code, as you probably know, contains a statement of maximum speed which should be adhered to in the operation of the saws. This has stood unchanged for a number of years. The Manufacturers' Association has presented to us a request that we raise the limit on saw speeds about 67 per cent. The members of the committee almost unanimously are very doubtful as to the safety of this procedure. We have already conducted some investigations as to the relations between speed and the strength of the mounting and the strength of the steel which the saw is made, but the most noticeable thing which turns up in connection with our investigation is that after all, we don't know very much about it.

There are a considerable number of technicalities which we are entirely at sea about, and I was authorized, as chairman of the committee, to appoint a sub-committee which should deal with this question.

Now, if the members of this section have any wisdom on the subject of saw speeds, we would like to have you give it to us. If you will set down what you think about that, I shall be glad to furnish you with copies of the statements made by the manufacturers, and in any way cooperate with you in clearing up the matter

so far as your views are concerned. We need this information badly in order to make an intelligent modification of the speeds prescribed in the present National Standards Code.

CHAIRMAN GRIER: Has anyone developed some questions now?

R. WILLIAMS (Thomasville Chair Co., Thomasville, N. C.): If the gentleman will take it up with our organization, I think he will probably get some information along that line, as we have a number of saws that are running at probably twice the speed at the present time, of the code of which he speaks.

M. B. GATHMAN (Plant Manager, Fisher Body Co., Detroit, Mich.): For twenty-five years at least, there has been a rule for figuring the saw speeds. That is, dividing 36,000 by the diameter of the saw. That is a rule they all went by until all saws today are motor-driven (or practically all of them). Now the motor is applied right to the saw and there is no way of changing the speeds. The speeds are set, and it is now left up to the judgment of the man who runs the mill as to how big a saw he can run either at 3,600 or 1,800 r. p. m., because those are the only two speeds you can get with alternating current motors at 60 cycles.

On that basis, a 12-inch saw would run 3,000. Now they are running 14 and 16 inch saws at 3,600 and they are not having any trouble with them.

CHAIRMAN GRIER: Are there any further experiences along that line?

M. C. GOODSPEED (Safety Engineer, General Electric Co., Erie, Pa.): I would just like to suggest in that connection—it appears to me that there should be a definite relationship between your speeds, the set of your teeth, the sharpness of the saw, and a few of those conditions, that will possibly run you into considerable trouble if they aren't watched more carefully at the higher speeds than at the speeds that we have been accustomed to. Those points should be very carefully developed by this committee, and brought to the attention of the users of the saws, if the higher speeds are permitted.

CHAIRMAN GRIER: There is one question that came up during my administration as chairman, which I have not been able to check up. In one of our Safe Practices Pamphlets there appears a statement, "Do not use a cracked saw whether or not it has been drilled." I was asked to furnish some definite proof that accidents had occurred from that source. So far, I have been unsuccessful. I have written to quite a number of large woodworking concerns, asking them if in their experience they have ever known a saw which was cracked and drilled at the end of the crack to prevent it from cracking farther and breaking. Is there anyone here who has had that experience?

R. G. BUCHANAN (Safety Engineer, Edward Hines Lumber Co., Lumberton, Miss.): Do you mean that a saw that has been cracked and the saw filer had cut it off and braced it and drilled it?

CHAIRMAN GRIER: No. I mean a saw that had cracked from, say, the perimeter of the saw, in probably an inch and a half or two inches toward the center, and then at the extreme end of that crack, a hole drilled to prevent it from going on further into it, and no bracing done.

MR. BUCHANAN: We had a band saw that the saw filer tried that on, and it broke.

CHAIRMAN GRIER: I am speaking of a circular saw. This is the experience I have had: The same answer to all of my letters, no one has ever had that experience.

MR. GOODSPEED: The National Safety Council has had a committee working on that particular question.

CHAIRMAN GRIER: The committee was after me, as chairman of the Woodworking Section, to furnish them proof of an accident to substantiate this clause, "Do not use a saw whether or not it has been drilled." We have never had any and our plant has been in operation for 65 years, and we have used drilled saws. We don't at present.

A. W. BLOIS (Foreman, Owens Bottle Co., Huntington, W. Va.): At what depth crack do you consider drilling the saw?

CHAIRMAN GRIER: Personally, we do not consider drilling a saw at all, regardless of how far it is cracked, but I have found them around our plant which were used, drilled in as far as three inches from the edge of the saw, in a 14 to 16-inch saw.

If we have no further questions, I am going to call on some one else, perhaps he can give us this information. Is Mr. Harold S. Norton in the room at present? Mr. Norton, I would like you to give us something.

H. S. NORTON (Safety Engineer, Bureau of Standards, Washington, D. C.): I believe I am in the same position with Dr. Chaney, regarding actual experience. We gather our experience from the industry and from the manufacturers, and I was about to ask the same question here regarding the maximum speeds of saws which, of course, we haven't received a good answer on as yet. Realizing the fact that the motor is directly connected with the arbor on the saw, and that the motor speeds are more or less constant. Of course, there are all kinds of difficulties that arise as far as the steel is concerned in the saws, and there was a question in my mind whether the steel in saws made today is any better than that made 20 or 25 years ago. I hear from some old-timers that it is not, but I am inclined to think that that is not an accurate statement.

CHAIRMAN GRIER: Thank you, Mr. Norton.

Next we will hear of our Safety Plan, of which I spoke in the beginning, and we will let the father of this plan explain it to us—Mr. A. L. Bussing, or rather, "Al be Careful!"

A. L. BUSSING (Al be Careful, Inc., New York City): I feel quite healthy—I am sure I look quite healthy, and I am almost proud to be the father of this plan of mine.

For the last 35 years I have been interested in accidents and accident-prevention. Some 20 years ago I did my first job in accident-prevention, and that was as an insurance man in New York City, in the putting up of notices to drivers of horse-drawn vehicles, to "be careful."

Since that time, I have seen losses, accidents and suffering continue, so that even now those who do not live in metropolitan areas know of the seriousness of these accidents which befall you, me, your mother and your children. I have told you that I was in the insurance business, and I hated to see these premiums for accident-prevention grow and abound; whereas 20 years ago an employer paid a rate, perhaps, of 30 cents to protect himself against an employee, today, to give him the benefits of the Workmen's Compensation Law, the average rate is beyond 3½ per cent. When we consider and know that there is over 2 per cent in the State of New York paid out in indemnities alone, we must realize and we must know that the cost is great.

Several years ago, I had several large concerns that I insured, and irrespective of their premiums, the casualty company said to me, "Bussing, there is nothing wrong with your risks—morally they are O. K.—but we can't make any money out of them." I started in to place those risks elsewhere and I learned that the other companies did not want them because of the system of rating by debit and credit.

I went back to them, and I said, "Give me a chance to make those risks safe" (this was some seven years ago) "and I will show you what I can do." I started in, and my first impulse was to get to the home, to the mother and the wife and kids of these men who were causing the accidents and the suffering from them. That is no new story today. My first line of approach was a lot of postal cards, followed up by meetings, bulletins and everything else that the casualty companies and myself could devise, but I did not have at that time the full force to approach these people in the way that I wanted to approach them. I wanted to send a

message home each day, each week, whereby the mother, the child, the father, would say, "Daddy, don't get hurt—come home—don't get hurt—and bring me something."

We all know of cash awards, but what to give to these people I didn't know. I wanted to give them something that didn't cost the boss all of his profits; I wanted to let the boss live and, at the same time, I wanted to cut down the terrible experiences that these people were having. It resulted in my getting out a plan known as the "Al be Careful" plan of premiums, getting out a catalogue to get to the homes, the catalogue filled up with the previous messages that I had sent, which would cost the boss two cents per week or more, whichever way he might feel that his accident needs required.

With this plan being started, I realized that I needed to build up an experience, to find out how it was working. I went out to Chicago; I showed it (not in elaborate form as it is today) but I came back here to New York and have been plugging on it ever since. We have been running in connection with the use of the premiums and the rest of the work which we do, and which each and every one of you could do, and we have been obtaining results that are far beyond anything that I had expected.

I just got through a "No-Accident-Month" with a concern which has been paying some \$70,000 or \$80,000 in premiums, and in August of last year (which was a month which resulted in some 71 or 72 accidents and a cost of over \$5,000 for losses and reserves), with this plan we have come through that month of August this year with the same number of accident reports, accident frequency—for you all know that there is none of us who can run an accident program without having our accident frequency keep up—but in the last analysis, we have five lost-time accidents on compensation this year as against five lost-time accidents last year.

I haven't the comparisons here, but the actual comparisons are a minimum as against last year, for last year, while the total losses and reserves were over \$5,000, using the casualty companies' figures, the total loss and reserves on their entire losses was \$1,348, and with it all, this concern had increased their business over 20 per cent.

But with it all, I have learned that we need to educate the men in the factory, first. Secondly, we need the assistance of the fathers and the mothers and the children by having them say, "Daddy, don't get hurt—don't have an accident. I want that pair of roller skates."

CHAIRMAN GRIER: Gentlemen, this plan came to my attention at the Congress last year, and I have looked it over, and I bring it here not as an advertising scheme, but, as Mr. Wallace said, to put it before you. He claimed that Mr. Orth didn't put our program before the others on our kick-back device. Here is something before you. It is something that I, myself, believe is good and am giving you the benefit of looking into Mr. Bussing's plan—"The Al be Careful Safety Plan."

Mr. Farra, will you give us a word?

E. ROSS FARRA (Manager, Grand Rapids Safety Council, Grand Rapids, Mich.): There are being formed now, and have been formed in some of the local council cities, what we call a "Women's Home Department," and I have been convinced for a great many years that a good part of the success of industrial safety can be helped by Home Department work. It seems to me that the industrial men who are living in local council cities can well make use of this Home Department work.

We organized in Grand Rapids last spring, the Women's Home Department, with one of the prominent club women as the chairman. I will show you my point when I finish what I am going to start to tell you—last spring we carried

on a series of Home Safety lessons with the professional home visitors, such as the visiting nurses, the community health nurses, and so forth. The topics taught those nurses were such as: The Home to Live In, Engineering the Home, Fire Prevention, and such other topics as would touch Home Safety entirely.

But my thought, and the thing I am selling to our industrial men in Grand Rapids, is this: That I am doing a real job for industrial safety when I am putting over a good Home Safety program. We are planning a Thanksgiving No-Accident Month in Grand Rapids, in November, similar to what they have been holding in Pittsburgh for many years. I am going to ask the Home Department to put on a program in the homes for industrial safety. Yet we have a very low industrial safety record in Grand Rapids. We had 24 home fatalities last year; 22 motor vehicle fatalities; 17 public and only 11 industrial, and yet, I believe, the solution is in having the folks in the home interested in industrial safety.

I think that part of the program (I haven't seen the program) is very good, and I think all of you who are living in local council cities or close enough to feel the effect of local council cities, can well cash in on their Home Department work. Possibly the manager of your city hasn't thought of that particular phase of it, and you have an opportunity to bring it to his attention.

Just one other thing: I have humbly tried to serve this organization for the last year as chairman of the Membership Committee, and I am going to say something that will hurt. There isn't a single member of the Membership Committee, and only one or two members of the section that have got a single member for the Woodworking Section in 1928. Now, friends, the success of this section (and I have been tied up with it as many of you know since 1920) or the success of any other section, depends entirely upon you gentlemen. Your chairman can't do it, neither your present chairman nor the one to come; and I am going to ask you again as I asked you last year at Chicago, if you will go home and make up your minds to send to whoever is your new chairman one industrial membership for the National Safety Council between now and the 1929 Congress? I don't know where it is going to be held—I haven't any inkling of it. But, if you will do that, we will have twice as many members in this section as we have now, and the Woodworking Section a couple of years ago was the second largest. I think we are the third now.

Of course, some cancellations were due to the fact that the logging mills were closing down, so you couldn't have any sales argument to get them to renew. But we ought to cover that with the re-manufacturing, and I beg of you men to go home to your communities and get just one member for the National Safety Council. You will be doing yourself a favor in this, for every other industry close to you which is not now a member of the National Safety Council, whose interest and support you get for the National Safety Council, will help your industry, because you are bound to employ some of their men sooner or later.

If you had a community where every single industry in that community was a member of the National Safety Council and doing safety work (just being a member of the Council doesn't mean anything—but doing safety work does), I am sure that accident-prevention would be much easier in your industry than it is today.

CHAIRMAN GRIER: Thank you, Mr. Farra. I am sure that will help us wonderfully. Mr. Farra has a right to talk that way, because I know of seven memberships that he sent in through his own efforts from in and around Grand Rapids.

MR. FARRA: They took work, too. They didn't come easy.

CHAIRMAN GRIER: Have we any further questions?

MR. G. A. ORTH (Chief of Safety Dept., American Car & Foundry Co., New York City): I want to say in connection with the "Al be Careful" Plan, our company, the American Car & Foundry, is putting this plan into two of our departments in two plants—the Berwick Plant, employing some five or six thousand men,

and the Wilmington Plant. While we have no record on its workings, having just gone into effect several weeks ago, I do say for it, after my investigation of the plan, that it has merit, because it brings up the one thing that Mr. Farra very clearly stated, and that is: You are getting the message to the families, to the wives and to the mothers, and there is no doubt in my mind but what the little kiddie at home, when he gets these coupons which are part of the plan (similar to the plan that we have here in the United Cigar Stores and which is broadcast throughout the country) he will save these coupons and then have them redeemed for prizes or awards. I think Mr. Bussing has hit upon a very excellent scheme to reduce accidents in industry.

Before I consented to putting the plan into our plants, I talked the matter over with able safety engineers, and without exception, they have arrived at the conclusion that it has some merit to it.

We know in our plants that we have got to keep up the effort of the man. All of you know of the Andy Gump cartoons which appear in many of the newspapers. I wrote to Mr. Smith, asking his permission to use Andy Gump in a series of cartoons in our plant, just in order to get the men interested in safety and to have the continuance of this effort in safety. We had the men in our 18 plants draw up something that would apply in this series. They have responded and some of the messages are excellent. I would say that nearly all of them are, and they relate to our particular industry. If any of you would care to have a copy of this, I shall be very glad to have them made up and sent to you, if you will just let me know.

CHAIRMAN GRIER: Any questions on this plan?

MR. BUSSING: Might I make a further explanation? In regard to the cancellation and collection of the coupons, we insist that the employee make the application through his employer. In other words, we are not going to allow these coupons to be sold around the streets. We propose to have the employer in direct control of the whole situation, and when Mr. Employee cashes in the number of coupons, Mr. Employer will know just where they are going. In addition to that, we have an award that goes to the employee pronouncing that he has been a safe employee for a certain period. I forgot to state also that this year and a half—that is, these coupons that are coming in at the present time have been saved for periods of from six months to a year and a half, meaning that that family has been working to get enough coupons to get some one of these awards. I claim that no family can work to get any of these awards, from the silverware to the roller skates or kodak, without looking through the calendar, and by so doing they cannot help but obtain some idea as to safety.

L. GLAZER (Manager Safety Dept., Dierks Lumber & Coal Co., Kansas City, Mo.): In regard to getting safety in the home, we have used a little scheme that I think has been quite effective. Of course, it is difficult to trace tangible results.

A short time ago, we started a little campaign among the school children in our communities. It was a literary contest with the subject, "Why My Daddy Should Be a Safe Worker." I do not think the plan is original with us. It has probably been used by other people, but we instituted that contest in every one of the country schools, tributary to our operations, and we received, from some schools, as many as 70 essays, written on the subject, "Why My Daddy Should Be a Safe Worker." We offered a prize of \$2, I believe, for the first essay and \$1 for the second, and it was really remarkable to see what thought the children gave to the subject. We feel that that has served to bring Safety into the home, because these children in making up their essays will probably speak to their daddies and ask them why they ought to be safe workers. Most of the essays brought out the point that daddy should be a safe worker because, when he gets hurt, the children suffer. Now, that is a point that we have been trying to

hammer into the minds of our workmen for many years—that they are not the only ones to be thought of when you try to impress safety upon them. As a matter of fact, we know that it is really the children and the mothers who suffer when the wage-earner is laid up.

So, that is a suggestion that perhaps many of you could use—institute a contest in your communities on that subject, and I feel that that will serve to bring safety into the home in a way that perhaps it has never been introduced before.

M. C. GOODSPEED (Safety Engineer, General Electric Co., Erie, Pa.): I would like to emphasize what Mr. Farra said about this work in the home. I have been sold on the idea for several years. I believe if you could take the kids and teach them safety, when they get into the shop they are going to be better off, for their own good, and for the good of us, who have to work with them, than would be the fact if they have no idea of what safety means before they get into the shop.

The idea of home safety can be put across whether you have a Safety Council at work or not. You can do that for your own employees only, or several shops can join together and put a safety home campaign across as a group. In any case, you can get these safety lessons already prepared which give you the outlines from the National Safety Council, and I can tell you just exactly how you can work it out to make a success of it.

You have got to have somebody who is interested to follow the work, first. That person will have to get enough people who will go through those lessons, learn them themselves and then give them to the groups, so that they can properly present the subject. This spring, we operated in approximately 16 groups of women, with over 45 speakers following these lessons. Those speakers were all volunteer teachers, you might say, or speakers secured from the insurance people, from the utilities, and whatever the subject of the lesson happened to be, we pick the speakers from the city to handle that lesson, the speakers best able because of his knowledge of the subject. Any of you can do the same thing and you are going to secure results that will surprise you.

You will get the results and the attention of the women's organizations and work back through them right into the homes, carrying these safety lessons, and it is absolutely worthwhile.

ADJOURNMENT

October 2, 1928

JOHN B. GRIER, Chairman

**Employment and Safety Manager, American Car & Foundry Company
Wilmington, Dela.**

The second session was called to order at nine-thirty o'clock by the chairman, Mr. J. B. Grier.

CHAIRMAN GRIER: According to the program, I see there is a report and an address due from your retiring chairman.

It is with a great deal of pleasure and honor that I welcome you to the Seventeenth Annual Congress of the Woodworking and Lumber Manufacturing Section of the National Safety Congress.

This section, during the past year, has moved to the third place in membership, due to the loss of several industries in the Western states, caused by ceasing operations. I will bear on that just a little later.

Another year has passed, during which time safety activities have been carried on with success which cannot be measured. We do not know how many lives or how much suffering has been saved or prevented during the past year. Our accident records are not yet to the place where we can definitely say ten lives have been saved or fifty accidents have been prevented. We do know, however, that lives have been saved and that accidents have been prevented. Everywhere we read of wonderful no-lost-time accident records. Our accident experience covering the past eight years has not decreased in frequency, there is a slight decrease in severity. These reports, however, are very inaccurate as the number of concerns reporting to our Section has increased steadily from year to year. There were thirty more establishments reporting in 1927 than in 1926 and so on down the line. Combating this statement, of the 167 establishments reporting during 1927, 10 of them completed the year without an injury causing loss of time.

We are receiving reports now from numerous sources which have been closed to us in past years. Industries have accepted their burden in the accident problem and are handling it as they do a production problem. They realize that accidents are far more reaching than they seem to be on the surface, particularly since the interpretation of our Compensation Laws have been stretched far beyond the realization of the sponsors.

It is my duty to present, as chairman of the Section, a report of the activities during the past year. We have had quite an active list of officers. In order to conserve time, it was moved at our meeting held in March that the Chairman would make a report covering the activities of all of the officers.

I have a letter from Mr. J. M. Bissell, vice-chairman in charge of Sawmills, expressing his inability to be with us, and in Mr. Bissell's behalf, I wish to state that he has been of invaluable assistance to me in the past year in carrying on the work of this Section. He is thoroughly sold on safety work and has brought into the Council a number of members during the year. He has also been instrumental in retaining several memberships which would have been cancelled in the Southern States but for his activities. He is devoting considerable time to the safety work in the South particularly in the interest of the lumber and of the Section. He was one of the leading men in the Gulf States Regional conference held in New Orleans last June. He has been instrumental in having the Southern Loggers Association devote part of their annual meeting to the discussion of safety measures in the logging operations and has attended all meetings of the officers of your Section.

Mr. E. K. Prichett of the Prichett-Powers Company, Grand Rapids, as vice-chairman in charge of Sawmills, has been quite active in the furniture manufac-

turing interests through the state of Michigan. He has been instrumental in putting on safety programs through the Grand Rapids Safety Council and has himself assisted with the membership by securing new members in and around Grand Rapids.

Vice-chairman in charge of logging, Major Harry Steere-Clark of the British Columbia Loggers Association, Vancouver, B. C., Canada, expresses his regret in not being able to attend this Congress, but you will realize it is well out of his latitude. However, Mr. Clark has sent us quite a number of bulletins applicable to the Logging and Lumber Manufacturing side of the Section and has, himself, advanced logging safety throughout British Columbia, where he is in charge of safety work of several large logging concerns.

Secretary Goodspeed of the General Electric Company, Erie, Pa., has been in attendance at several of the Executive Committee meetings of the National Safety Council as well as the meetings of the officers. You have heard from him, no doubt, several times through the minutes and general topics he has sent out.

Mr. W. L. Wallace of the Edward Hines Lumber Company, Lumberton, Mississippi, as chairman of the Program Committee and a member of the 1928 Nominating Committee, has been the outstanding officer of the year. He has devoted considerable time and thought to the Section. He has the interest of this Section at heart and has been of invaluable assistance to the Chairman during the past year. This program which you will listen to has been arranged by Mr. Wallace, with the help of the other members. He has also been instrumental in securing for us a reputation throughout the Southern States, and has sold the National Safety Council to numerous Associations. He worked with Mr. Bissell in the Gulf States Regional Conference, the Southern Loggers Association, and is at the present time, advocating the holding of the next National Safety Congress in the South, where we have never gone to spread our gospel.

E. Ross Farra of the Grand Rapids Safety Council, as chairman of our Membership Committee and a member of our Nominating Committee, has been quite active. He appointed regional officers to assist him in this work and through his efforts has been able to keep in the Council quite a number of members which would have sent us their cancellations. He has also sent us several new ones in and around Grand Rapids, through his personal solicitation. Mr. Farra is now manager of the Grand Rapids Safety Council, and must spend most of his time in that section. However, he is very much interested in the Woodworking and Labor activities.

Right here I want to divert just a moment, from the regular routine of reporting our Executive Committee, and state that it has been my experience that we are paying entirely too much attention to safety in our small plants. Safety does not only deal with men in our own particular plants, and when we asked these people to sell National Safety Council memberships, they said they did not have time—the safety program in their own plant was too large. I often wonder just what caused the safety program in their own particular plant to be so large. I wonder if it isn't the new employee who comes in from another plant, a neighboring plant, which has not put on an attractive safety program, who are not members of our local council, and not members of the National Safety Council. Those men, therefore, in coming into our plants, are not trained in the ways of safety and present our greatest hazard. They are unskilled in our method of working, and even though the plant from which they come has nothing in common with our plant, a man who is drilled in safety will be on the lookout and be a much better employee. Therefore, I say that we have been devoting entirely too much time to our own Safety program. We can sell Safety to our brother and in that way, benefit ourselves. It has worked out in numerous cases.

Mr. O. J. Olsen, Safety Director, Fisher Body Corp., as chairman of the Publicity Committee and *News Letter* Editor, has gotten out for us five first-class *News Letters*. You have all received copies of these, and, when you realize that Mr. Olsen had very little assistance from the 400 and some members of our Section, you will feel, as does your chairman, that the job was well done. It is quite a feat to write a *News Letter* applicable to four hundred members and not have any more come back than he has had.

H. D. Herron of the International Harvester Company, Chicago, Illinois, as chairman of the Poster Committee, has been successful in producing 23 posters for this Section, 12 of which applied to the lumber interests and 11 to the woodworking manufacturing. He was assisted in this work by Major Harry Steere-Clark of the British Columbia Loggers Association.

Chairman of Engineering Committee, G. A. Orth, of the American Car and Foundry Company, New York City, has attended the meetings of the Engineering Society and kept us informed as their activities as well as given us advice in the conduct of this Section. He has made several addresses during the year, one of which was reproduced in the July issue of the *National Safety News*. He also is a member of the Nominating Committee.

Messrs. Sanford, Jackson and Wiberg, members of the Executive Committee of the Section, in addition to the ones just mentioned, have been very active in their work, serving as members of our Nominating Committee, and have given their advice freely as to the conduct and activities of the Section.

Your chairman has, to the best of his ability, carried on the work of the Woodworking and Lumber Manufacturing Section during the past year. As a member of the Executive Committee of the National Safety Council, he attended all but four of their monthly meetings, and passed out to the membership of the Section, the outstanding activities of the parent body.

It has been my pleasure to attend the meetings of the Foremen's Safety School in Grand Rapids, Michigan, and address them, as well as several of the industries in their individual plant safety meetings. Also to represent this section at Newark, New Jersey, and talk before the safety school there on the activities in which we are so much interested.

The program, which will be carried on, following my remarks, has been arranged to the best of our ability. This morning we cover the activities of the woodworking and lumber manufacturing interests and tomorrow has to deal with the re-manufacturing interests. We hope that this program will meet with your approval, but also look forward to any suggestions for its improvement and betterment.

Your officers, which will be elected tomorrow, cannot carry on successfully the work of your Section unless each man lends his support. It has been my experience that we are too attentive to safety in our own individual industry and do not spread the safety gospel outside of our plant. We should talk safety to our fellowmen and endeavor to sell the Safety Council membership to them in an effort to make industrial safety as far-reaching as possible.

Men trained in safety in one plant will be a valuable asset to any other plant in which he may become employed. By spreading the gospel of safety and getting safety installed in our neighboring plant, we will in a way, reduce accidents in our own industry for eventually will not some of the employees of our neighboring plants become employees of ours?

I was, at this time, going to call on the chairman of our Nominating Committee or his slate which he has prepared, but I am going to just delay that until before our Luncheon Meeting. After that slate has been presented by the Chairman of our Nominating Committee, it is not closed. It is open until our election which will be held tomorrow morning, in this room, and any additional nominations can be made from the floor. If there are no additional nominations, this time will

give you an opportunity to become acquainted with those in whose hands it is planned to place the operations of this section next year.

Judge William S. Bennet, who was to talk to us today, has sent his regrets at his inability to be with us. He has, however, sent his paper, which will be read by his safety engineer in the operations—Mr. R. G. Buchanan, of the Edward Hines Yellow Pine Lumber Company, Lumberton, Miss.

Mental versus Mechanical Factors in Accident Prevention in Woodworking and Lumber Manufacturing Industries

By HON. WILLIAM S. BENNETT

General Counsel, Edward Hines Associated Lumber Interests, Chicago

Before results can be obtained from any efforts looking towards the prevention of accidents it is imperative that the management do their part and show the sincerity of their purpose of seeing that safe machinery and tools are supplied; that is, that the machinery is fit for the purpose intended; that it is in proper condition and kept in a proper state of repair and equipped with adequate and sufficient safeguards.

Quite naturally the first thought that presents itself in the matter of "Injury and Accident Prevention" is the danger from unguarded machinery, and the first step generally taken is to see that adequate guards are placed wherever necessary or possible.

When suitable machinery, tools and appliances, equipped with the proper safeguards have been furnished then about all that can be, has been done to overcome the true mechanical hazards. Of course, there are hazards incident to the place and manner and method of work that are the responsibility of the management which strictly speaking, are neither mechanical nor mental, but to a certain extent may said to be both. In making the place of work safe both thought and labor are required. The method or manner of doing the work is a mental process inaugurated by the management and transmitted to the labor; but be a place equipped with the most efficient and the most perfectly safeguarded machinery and all surroundings of the place in which the work is done be made as safe as possible and the method of doing the work be the safest that can be devised, the job is just about begun.

It is my view that in a systematic and intelligent effort to eliminate industrial accidents, or personal injuries, it is essential that the cause of each one should be ascertained, and for several years at our Mississippi operation, we have made careful investigations of each one that has occurred, and the cause or reason for its occurrence and have kept a record thereof.

Our investigation has included not only lost time injuries, but those of the most trivial nature, a scratch, bruise, abrasion no matter how slight, is required to be reported, and we endeavor to ascertain the cause of each one. The cause of a most superficial hurt today might be the cause of a major injury tomorrow; in other words, the same cause can and might produce vastly different effects.

Our record of "Causes" is divided into four general classes: First: those purely accidental; Second, those caused by the fault of the man injured; Third, those caused by a fellow workman; and, Fourth, those which may be said to be caused by some failure or negligence on our own part.

In logging and lumbering operations, there are certain types of injury, hazards of the very nature of the work, which no guard, plan or forethought can avert and which are truly accidents. These are of the first class.

Those due to the negligence or lack of proper care of employees are included in the second and third classes, and the fourth class covers not only those caused

improper guards or failure to guard machinery, but any injury which any act the company could have prevented.

We assume the duty of providing safe machinery, safe ways and safe methods work and for any injury due to our failure to meet these obligations, we think e responsibility is our own.

Our records for a number of years have shown comparatively few injuries are rely accidental. By far the greater number are either rank carelessness or failure think, and very few are caused by defective or unguarded machinery.

Record for Two Years

Total Accidents	1926	Days Lost	Total Accidents	1927	Days Lost
	Lost Time			Lost Time	
1218	688	8890	761	344	4622

Lost Time Accidents Divided Into Classes

	1926	1927
Class A	445	173
Class B	189	137
Class C	43	21
Class D	11	13

This record brings us to the inescapable conclusion that the human equation is it most essential to be considered in accident prevention, and to my mind sup-rts the further conclusion, now I think universally reached by all those who ve given the subject thought, that education of workmen in safe practices and fe thinking is the answer to the Safety Problem—that is to say workmen must taught to protect themselves and their fellows—taught to surround themselves th a safe guard of mentality, and depend upon that rather than upon mechanical ards.

As I have suggested there are dangers that cannot be overcome by mechanical ards—there are latent hazards and those inherent to the nature and place of rk, in the machinery and even in the guard itself. It is almost a truism that machine, nor guard for that matter, can be made "fool proof" nor can I imagine y character of work incident to the Wood working and Lumber Manufacturing lustries in which the careless man is not liable to severe injury, and a constant nance to his fellow employees. The most perfectly designed mechanical guard i itself become an element of danger when improperly placed or when not laced on a machine when it has been removed. We are all familiar with the uries resulting from the operation of various types of saws caused by failure replace a guard which has carelessly been left off.

Several months ago we had a most severe injury occur because a guard on a dder had been left off while the machine was in the shops. The foreman con-ued the use of the machine with the guard off—did not report it and the safety ineer had not discovered it. The result was that in gying the skidder a man rking along side two large gears which should have had the guard over them, ped, caught his hand in the gears, and part of his hand and three fingers were shed off. Here the mechanical guard has been supplied—would have prevented : mutilation of the man if in use, but the true cause of the injury was the lure of the mental factors to work and not the failure or lack of the mechani- device.

Another case that comes to my mind is the loss of a man's leg just below the ae. We use for loading logs on to the cars in the woods a movable machine,

which might be termed a derrick. A pin holding the boom had broken and the boom had fallen to the ground. Several ineffectual efforts had been made to raise it; men were standing all about and around the fallen boom when a fireman stepped up and volunteered a suggestion, went in and fastened a cable about the end of the boom, and signalled the man on the loader to lift. The boom in rising, swung around, struck the front of a man's leg and mashed the leg against a stump. We think the cause of this injury was the failure of the mental factors, and not the failure or breaking of the pin. The pin was between two pulleys, and out of sight; the boom on the ground and its liability to swing when raised was apparent; the men in its possible path and the stump were in plain view, and had a plan of work been mapped out, each man helping assigned to his place and the others of the crew kept out of the arc of danger, the injury would not have occurred; had the safeguards of mentality been in use the man would have been spared the loss of a leg.

Just another case: These log loaders when in operation—indeed at all times—are fastened to rails affixed to the cars on which the loaders stand to hold them stationary. When one car is loaded the machine moves ahead, or back, under its own power, to the next car. It is, of course, necessary to unfasten the stay chains before it should move; to do this a man stands on the ground alongside and out of sight of the operator on the machine. We call this "transferring," that is, transferring the loader from one car to another. At the time referred to the man was unwrapping the chain with one hand and holding on to the rail immediately in front of the loader wheel with the other. The operator assuming the chains were released and without notice started to move the machine; the man's hand being over the top of the rail over which the machine must pass; the result is self-evident. The mental safe-guard was not at work.

Another case: From a different angle: In felling timber for sawlogs men work in pairs in different "drifts" or strips of timber. As sometimes happens a tree from one drift will fall across or into another, frequently falling or crashing into another tree and when this occurs often a limb is broken or left hanging in the standing timber. A pair of sawyers go to fell it without seemingly thought or care as to the broken or hanging limb. The shock of the ax or the vibration of the saws, or perhaps a gust of wind dislodges the limb and a broken head, shoulder or arm results. It seems that ordinary common sense would prompt a man to look up, and see a situation as wide open as this, but sometimes it does not. I have known it to happen in five minutes after the foreman had not only warned them of this very thing, but pointed out the exact danger—and no foreman, nor could a dozen stand over 40 or 50 pairs of sawyers and direct each stroke of the saw or ax in the felling of each particular tree. Foremen can but give general instructions and warn of dangers and beyond that each man must work out his own salvation, and if he be not working with the safe guard of mentality the best mechanical devices merely lessen his danger.

Instances can be multiplied indefinitely where the failure of the mental factor to work was the direct cause of injury despite perfect mechanical safe guards, but the foregoing seem sufficient to illustrate my position. Where the mind of the foreman and the workman are not running in a channel of safety—which is one of the safe thinking—accidents and injuries are going to occur.

Every modern manufacturing plant is planned for efficiency and safety. Every builder of a machine now designs it for efficiency and safety. When a machine leaves the factory, it is now equipped with adequate safeguards. Industry, society and statute law now demand this, but these things are not enough. They will lessen the toll of course. Both man power and machine power are necessary to manufacturing, industry, and the best of each is demanded. "Best" includes efficiency and safety—Intelligence is necessary for both efficiency and safety. The producer can in the market buy the best machinery and material, but he has to

educate the intelligence to use it properly, in the supply of labor that is available.

The inefficient and careless man is a menace to himself and his fellows, far greater than is an unguarded machine. In the machine the danger is visible, but that the particular hazard may be from carelessness is unknown and cannot be anticipated, and it can only be guarded against by changing the man himself, converting him from a liability to an asset of the organization. Accidents will, of course, always occur, but preventable injuries will not in an organization of men trained in safe practices and safe thinking.

On the other hand, some people believe that if you put on an intensive safety campaign without guarding your machinery to a practical standpoint, that is enough to reduce accidents, but I have found that both safeguards and education are necessary. It has been proven that a plant mechanically safeguarded in strict accordance with the Underwriters standard, still has accidents and it has also been proven that plants with non-mechanical, or safety education, work alone still have accidents, so neither is wholly effective without the other. For example, I have been told of one plant that spent very close to fifty thousand dollars putting in mechanical safe-guards on saws and belt; taking out open set screws and replacing them with set-in set screws and every other form and make of safety device that anyone told the superintendent of the plant would reduce accidents. After he got all that work done, he sat back and said "Well, our accidents are going to decrease now," but one week after he had all this work done but had done no safety education work to provide mental safe-guarding, he had the loss of three hands and several other men laid up with serious injuries caused by not knowing how to effectively operate these mechanical safety devices. Why? Because this superintendent sold himself on the idea that mechanical safeguards were all that were needed and that no safety education was needed among the men, as he had, or thought he had, intelligent men working for him.

It is very easy for you, as safety men, to understand what should have been done—after the guarding was complete. The big job is to convince such people as his superintendent that you must have both mental and mechanical guards. I am not a fanatic on non-mechanical guarding alone, nor am I a fanatic on mechanical guarding, but I have seen the effects of both and am convinced that both are necessary. I do not believe that any plant, regardless of how small or how large it may be, or the number of men employed, can successfully cope with the Safety problem if they do not use both methods. I have yet to see saw guards that can be put on a saw and stop entirely all accidents or stop a man from getting his hand caught in it if he has not some safety knowledge to work with that saw guard. Around a sawmill I believe that large drive belts that will fly if they break, open sprockets, wheels, open gears, frictions, horizontal or vertically inclined belts, walkways or passageways, should be guarded fully. As to saws, I believe that the guard that will work to a practical standpoint with the work or job that this saw has to cut is the best guard for that saw, but I repeat that this saw guard is of little use if the man operating it has not some safety education to go with this guard.

Let me cite to you what both mechanical and non-mechanical or safety education combined have done for our company in its Southern mills. Up to June, 1926, we did not go in for an intensive safety work and we had no safety engineer. We guarded our machinery as best we knew how and preached safety as best we could, in without systematic direction. Our safety engineer spent his first six months in our southern mills getting acquainted and learning how lumber was manufactured. Beginning January 1, 1927, our safety engineer went into an intensive safety education or non-mechanical program. No additional mechanical guards have been added on our machines or around other places since that date, but an intensive safety campaign has been carried on—by personal touch with the foremen and the workmen themselves; use of moving pictures; starting a publication of a house

organ, that is distributed monthly to every employee; the foremen's meetings and most of all, the personal touch with the workmen themselves. We have also in our plant what is known as the "One Year Club" among the foremen, which entitles any foreman who has gone a year in his department without a lost time accident, to automatically become a member of this club and receive a gold watch fob stating that he is such, with his name engraved on the back of it at the end of his year. Also in our mills there is a thermometer that keeps the men informed as to how many accidents the mill has had and it is a daily sight to see men gather around this thermometer counting the number we have had and talking among themselves as to the reduction that has been made.

These figures that I am going to quote are for the two sawmills only. These mills are two-band sawmills, one works night and day, working about 750 men, and the other works days only, working about 400 men. For the year 1926 we had a total of 1036 injuries, out of which 388 were lost time. In 1927, we had 447 total injuries, out of which 145 were lost time, or a decrease of 56.85 per cent in total accidents and a 62.63 per cent decrease in lost time accidents. And for the first six months of 1928, we had a total of 164 accidents, out of which 103 were lost time, which shows that in 1928 we will show a still further decrease in our year's total.

May I add this, that no two locations can carry on exactly the same safety educational methods. The man who has charge of the safety work must use his brain in studying the men and understanding them to know what they will absorb and how much of it they will absorb.

CHAIRMAN GRIER: Are there any questions on this paper as presented by Mr. Buchanan for Mr. Bennet, of the Edward Hines interests?

O. B. FREDERICK (Safety Supervisor, Dierks Lumber & Coal Co., Dequeen, Arkansas): May I ask Mr. Buchanan why the loaders are chained to the rail?

MR. BUCHANAN: They have 30-foot booms on them and they reach out and turn completely around and pick up the logs. In order to hold that, you have got to chain them.

MR. FREDERICK: Your loaders, then, are of a lighter type than the ones we use.

MR. BUCHANAN: They are the heaviest American loaders they make.

MR. FREDERICK: It isn't necessary for us to chain them to the rail. We have the heavy American loaders.

MR. BUCHANAN: I may be wrong about that, but it has been done since I have been there.

W. L. WALLACE (General Attorney, Hines Associated Lumber Mfrs., Lumberton, Miss.): Our operations are over a very rough territory. It may be at an angle, this way or that way, and it would be an impossibility to maintain it in a state of equilibrium if it were not chained.

CHAIRMAN GRIER: Are there any other questions on this paper?

Let's get the good out of it. If you have any questions, bring them up, and Mr. Wallace will discuss the paper for us. Mr. Wallace, probably you have a few remarks to make on the paper that would be enlightening, without questions.

MR. WALLACE: I don't know that I could add very much to what has been said. I am somewhat of a fanatic on the question of mental safeguards rather than mechanical. I had hoped I might get the benefit of somebody else's ideas as to the advantages of the mental safeguards. I had an experience this summer that made a very great impression on my mind. I was in the mountains of Tennessee, where, in certain places, there is a 45 per cent grade on the roads. I was there for about four or five weeks, and not during that time was there a single automobile accident on any one of those mountain roads. I live in country that is

most as level as this floor. I can hardly walk across the street without hearing crash of a car. My 16-year-old boy was driving a heavy car on those untain roads as safely as we walk around this room. The point is that people lize and appreciate the conditions, and so are careful. I have always tried bring such influences as I could to get the man into a safe frame of mind. other words, to get them to think safety. I would have been glad, instead of ing something to say, to listen to somebody else on that subject.

ROBERT TOMS (DuPont Co., Portland, Maine): In that report of the accidents, understood that one of the firemen made a suggestion regarding booms. Was part of his work to look after that?

MR. WALLACE: No sir.

MR. TOMS: Was he the man injured, or was it some other man?

MR. WALLACE: Another man.

MR. TOMS: That is the point I brought out: That it seems to me it was lack supervision on the part of the handling of the crew, to allow a man who was xperienced to take part in work which he wasn't supposed to do, and allow 1 to make suggestions and follow them, is unsafe practice, whereas, if the man o was accustomed to handling this job and was cognizant of the risks and of danger of that boom swinging, he probably would have seen that his men re out of danger before the boom was attempted to be lifted.

That, I think, is the mental hazard which has been stressed in this paper, and ink it is very pointed, that frequently these accidents come from men attempt- to do things which they are not assigned to and for which they are not fitted, l do not know the risks.

n our business we try to have every man handle his own job and not let ebody come in and run it for him, because he is trained for the special risks the job at which he is working. He recognizes it, he knows there is a safe y of doing it, and he is instructed and trained to do it in the safe way.

GLAZIER (Manager Safety Dept., Dierks Lumber & Coal Co., Kansas City,) : In the wood operations, the point was raised about mechanical guards. ur operations, we find it practically impossible to provide any mechanical rds against the most prevalent accidents which are those which occur from handling of axe and saw. We have often wondered if it would be possible provide a guard when a man is carrying a saw from job to job, or when he carrying his axe over his shoulder, but it would be practically not feasible put a guard on that saw or axe to keep him from getting cut. We have had n carry cross-cut saws on their shoulders, and some were foolish enough to the teeth towards their neck—then they stumble and fall and the teeth cut shoulder or neck.

ome time ago we thought we would investigate to see if it would be possible put a guard on that saw while it was being carried. I wondered if the Edward nes Lumber Company had ever thought of that, and if they had ever gone o it?

CHAIRMAN GRIER: Before calling on Mr. Wallace, I will answer your question m my own viewpoint which is not logging. We do handle cross-cut saws in plant, cutting finished lumber. When I say "finished lumber" I mean logs t have been sawed to the square, probably 12 x 14, 40 feet long, in-constructing ges or work of that kind. We have provided our men with a stick of wood an h and a half wide and about an inch thick, which has been grooved in a sticker. ey set the saw teeth into this groove and either carry it without any retaining e or string, or they can tie it with a string and hold it in place. That is re- red when we are carrying our saws from one operation to another.

Mr. Wallace, do you have anything on that?

MR. WALLACE: We have had the same proposition that Mr. Glazer has. Most

of the sawing injuries, however, in our operations, occur while the men are actually engaged in cutting. They catch the saw in something, or they fall.

We have thought of the same problem and we think it would be impractical to use any guard at all while the men are actually engaged in the work. In the course of five years I remember only one injury to a man from carrying a saw when he was not actually engaged in the work.

R. G. BUCHANAN (Safety Engineer, Edward Hines Lumber Company, Lumberton, Miss.): Some time ago, down at the Southern Lumber Association, I had occasion to have a talk with a Simon Saw man. I went around to their local distribution house, and saw a strip of wood that had a groove in it, just the curve of the saw. There was a little strip of metal that clamped on the other side, around the saw. I asked our purchasing agent to insist that each one be equipped, when we bought saws in the future.

The problem I now have to contend with is getting the men when they are carrying these saws, to put these guards on, in going to and from the labor train. We have a labor train four cars long and it has a baggage car on it.

Our bridge foreman who is a very active safety man, told me some time ago of a man who had occasion to leave the logging camp. He had a bridge to work on that the labor train had to go over. He went out and got an automobile truck and loaded the men into it. In loading the saws, one man cut his leg. He told me that he stopped right there and made that man show him five different ways that he could have loaded that saw so that he wouldn't have hurt himself, and he only found one way that he could cut himself. He said, "I made an illustration of it right then, before my whole crew—showing them how to handle the cross-cut saw."

H. R. ORCHARD (Superintendent, Marathon Lumber Co., Laurel, Miss.): We are very much interested in saw accidents. We have had more saw gang accidents this year than we have ever had, and we have about reached the conclusion that it is a matter of discipline. One of the troubles with saw gangs is that the men like to go out there in the morning on the work train the same time as the regular crew, but they find ways and means to get back into camp ahead of the other men.

A good saw gang in the timber that we are cutting now would probably cut up 70 to 80 trees—maybe more. They like to go out there and do their work in a hurry, get through about two or three o'clock in the afternoon and get back into camp ahead of the rest of them. It is the personal element in the saw gang accident—the haste to get through. Most of our accidents, as Mr. Wallace said, do not come from carrying the saw or the axe, but through carelessness. They throw the axe, something deflects it and they cut their legs. The saw accidents mostly come from cutting through, frequently after the tree is down—they just pull right on through and cut themselves on the knee or leg.

We had a safety meeting at our camp about a month ago. We had 18 reportable accidents in our saw gang in July, and when the figures went on our manager's desk, he got worried about it and said, "I am going up there to talk to those boys personally." We have a saw gang foreman who is much above the average. He wanted to know what we do after we hire a good sawyer, to prevent him from continuing to cut through the tree until he cuts himself. The only thing we could say was, "Educate them; keep after them." In order to put over safety in those cases—if you can't do it by kindness and reasoning and education, the only thing I know to do is to take the man off the pay roll or put him somewhere else. We let one saw crew go, after a good deal of talk and thought about it, but we intend to reinstate them a little later if they apply for work. This crew had seven reports in 60 days, four on one man and three on the other, and we just got afraid of them.

The saw gang accident is a management problem. You have to put backbone

> your foreman and then he has got to stand pat, in order to eliminate a at number of them.

L. LOCK (American Mutual Insurance Company): About 15 years ago, I working in the lumber woods in British Columbia, surveying. I noticed re that all those men carrying their saws out from camp into the woods, had m strapped onto a board. This board was about six feet long and about width of the saw. I asked the manager why his men carried their saws that way, and he said that it was to stop accidents. While we were iding there, a man came along without the board on his saw and the manager ed him where it was. He said he forgot it. Well, the man was sent back r it. The manager told me that they had reduced their accidents from carry-saws almost to a minimum. That was quite a while before we thought much ut safety—and it was just through supervision.

TOMS (DuPont Co., Portland, Maine): Speaking of another class of saws—band saws in band mills—I operated a band mill for four years in conjunction my other work, and when I took the management of this mill I had absolutely experience in operating a mill, but I did realize those heavy band saws were element of danger. I watched the men handling them, taking them off and ing them on, which we had to do quite frequently; and I noticed they were g unsafe practice. I made a study of it and I decided that there was a safe to handle the saws without a mechanical guard. I attempted mechanical rds but found they were not practical. They hindered the work and really e an element of danger, because they taught the man to believe that with this rd, the saw was harmless.

he idea that I wanted to get into their heads was this: That a saw is always gerous; it is a very sharp instrument and has a great many teeth. It is apt lip and cause a very jagged wound and quite frequently carries infection in eeth. That was the thought that I instilled into the minds of these men. One he things they would do in taking the band saws off for changing was to turn teeth out, invariably, so that everybody walking back and forth would run risk of cutting himself on those teeth. I told them to turn the saws around hat the tooth side was toward the wall, otherwise there was the risk that a might trip and fall, and strike the teeth of the saw.

he result was that they used safe practice in handling those saws in taking off and on the machines, for four years, without a single lost-time accident. lieve you have to train the men first and instill in them the idea that it is gerous, that they must handle the saws in a safe way and always "think ty" and in that way, you will avoid nearly all the avoidable accidents.

CHAIRMAN GRIER: In handling band saws, we have always found the board safe and the easiest way to handle them.

B. FREDERICK (Safety Supervisor, Dierks Lumber & Coal Co., Dequeen, Arkansas): I would like to ask if you are ever troubled with wedging accidents wood—the making of wedges by the men while they are on the job.

R. ORCHARD: Yes, I think we have had two instances this year where a man red himself by making a wedge. As I say, it is a matter of supervision. ardless of what you say about accidents, the idea gets through an organiza-sometimes that if it doesn't cost you anything there is no harm in it. We t subscribe to that theory at all in our management. We handle our claims in tle different manner. A lot of our foremen get the idea that an axe injury saw injury wouldn't cost anything, because that is the only thing we can use fissippi without being liable. An axe or a saw is still a simple tool in fissippi. So they get careless in those things. We consider it in just the class as the actual cutting in working on the tree, because it is due to the idual carelessness of the man. The tools these men use, they purchase them-s. They are on piecework. They buy the tools from the company, although

they can buy them anywhere they want to. The condition of the tool does not really enter into it. We keep a filer there for them, and keep their saws sharp.

CHAIRMAN GRIER: The next paper will be presented by Mr. F. W. Braum, manager of the safety engineering department, Employers Mutual Liability Insurance Co., Wausau, Wisconsin.

Snags in the Safety Stream

By F. W. BRAUN

Manager, Safety Engineering Department, Employers Mutual Liability Insurance Company, Wausau, Wis.

When I was asked to go on this program, I requested Mr. Bissell to change the title, and he said, "No, you won't have a chance." I wanted the title to read, "From Stump to Car," but he said you can go right ahead with that idea.

I am not a logger, as I told Mr. Bissell, and I want to tell you, but we have had considerable experience with loggers and their methods. Every establishment that uses lumber as a raw product should be interested in the manufacture of that product. The steel mills of Pennsylvania and Indiana are vitally interested in the safety of mining of iron ore in Minnesota and Michigan. You furniture men from Grand Rapids, Michigan, buy your lumber (a good share of it) in Northern Michigan and Northern Wisconsin, and should be interested in the safety of the mills from which you buy that lumber. Incidentally, you ought to interest those mills and loggers in this section of the National Safety Council. There should be more loggers represented here. You have made a good start in putting it into this section, but you ought to continue.

Logging presents so many different hazards that it is difficult to portray them all. The main factor and the first danger point in logging is the lumberjack himself. Nothing is so important in industry as personnel. Good, sound, healthy lumberjacks are the biggest asset in the logging industry. You should conserve that manpower. Everybody loses when timber burns and everybody loses when a lumberjack is injured. If they were to desert us, all the woodworking industries would have to shut down their plants.

Another hazard is terrain—the logging territory. If it is hilly, it is doubly difficult. In Northern Wisconsin, where I live, the logger has the road problem—ice roads. Much has been said about ice roads, as to the safe material to put on ice roads on hills. Some use sand, and sand is all right if the hill is very steep, but if it is long and gradual, sand is not so good, because the runners get hot and then when you get out on ice again—you know what happens. A good many loggers now use hay. Don't pile the hay down in big piles, but a gradual sprinkling of hay. Some use fertilizer, but that has its drawbacks on account of eating up the ice.

The weather in our section has a lot to do with the logging hazard. The small logging contractor who is contracting to deliver a certain amount of logs to a sawmill, gets about three-quarters done when the weather breaks. About the middle of February, it suddenly gets warm for a few days, and he rushes his work, hires anything and anybody as a lumberjack, to help him out, and then you have the lumberjack hazard.

Where do they happen? Nothing is so convincing as a fact. I am going to give you just a few statistics:

In 1925, we had reported to us 425 axe accidents, and axes take first place every year in logging. In 1924, 251; in 1923, 245. The second and the most serious cause is trees in felling. Then slipping, being struck by objects, and spring poles are the cause of many broken teeth.

I cite these figures because every lumberman ought to know where they are happening. You cannot begin to do anything in accident prevention unless you know where they are happening. If you expect to get anywhere, you have to start from where you are.

I am going to give you briefly some of the methods that some of the lumbermen in Wisconsin use to prevent these accidents.

The first and most important thing is management or executive backing. The management must be sincere, because nobody is so superstitious as a lumberjack. If he is led to believe one thing, and the management does not back it up, he will never lose faith in that particular management.

The woods foreman and the logging superintendent are the management. You can't find the executive or the president of a logging concern very intimately acquainted or in daily contact with his lumberjacks, and the lumberjack looks to the woods superintendent and the foreman on his particular job as the management, and they must be sincere in their purpose.

There are two kinds of leadership that these foremen or woods superintendents must exercise. One kind of leadership is that which the men follow willingly; the other is the driver. Cooperation can not be demanded nor commanded. It must be won. The hardboiled woods foreman, with a jaw like a snowplow, with sand in his bladder, can never command the respect of a lumberjack. Much has been said about these jacks in novels and in movies, but they are human just like you and I.

The woods foreman should place his men. Do not put a club-footed fellow at sawing. You have to have fast, snappy men as sawyers. Do not put a lumberjack to work with an axe who is bothered with rheumatism. Do not take the lumberjack's word as final. If he hires out to you and you ask, "Have you had experience in the woods?"

Sure!"

What have you been doing?"

I do anything."

All right, I need a sawyer."

A lumberman told me just last week that they do not have drivers in the woods any more—they just have boys holding the reins. Whose fault is that? It is the fault of the management, the woods foreman. Show him how to drive if you are a woods foreman. Tell him what is expected of him.

That holds true with a new man. You might say, "We don't get new men in the woods." Oh, yes you do! The city employment agencies are sending men into the woods in Northern Wisconsin and Michigan, out of the Twin Cities, from now until spring, every single day, and some of these fellows have never handled an axe before. A lumberman told me not long ago that he hired two men as expert sawyers. He sent them in to cut, and this is what happened: They were cutting a large birch that was leaning. They started to cut without notching the tree. Soon the saw pinched, they started on the other side. What happened? The tree split to the top. A beautiful birch that took nature years and years to produce, was spoiled by the hand of man in two or three minutes. That tree is probably rotting there today, because a woods foreman hired these men as sawyers and never investigated whether or not they could saw.

The new man should be instructed as to how and what he should do, and it should be put to him in such a way that he knows if he is not doing it that way, he is expected to leave. If you had every logger sold on that idea, the lumberjack would not wander from camp to camp because of the privileges that he has in one place and not in another.

Every logger would be educated to the fact that there is only one way to it, that is the safe way, and every camp followed that plan, you would reduce the accidents.

Safety education, safety bulletins, safety talks to the men are prime factors in reducing woods accidents.

I have some pictures that we had taken, showing the right and wrong way on several woods operations. We get out safety bulletins to our logging interests, highly-colored like that, because a lumberjack likes pictures.

This is the correct way to carry an axe. You do not need to put on all kinds of explanations, but show a lumberjack that picture and he will understand it. Here are two fine illustrations—stumble either way and you will cut your head—you will cut it plenty. You will see men carry it this way and that way and they will slip and fall, whether you have snow or not.

Here is a fellow ready to cut. He has plenty of brush in which his axe can get caught, and anything might happen then. The proper way is to clear that brush and then chop the tree. The right and wrong way of doing that operation.

Here is a swamper and his helper standing too close. If the axe should slip as shown on the lower picture, something must give, and it is always human flesh that does.

Here is a picture of a spring pole—it is a small one, but remember that we had to get out and make these and we used the small ones, but you have larger ones than that. Look at this operation to the left. Lots of men do it that way. What is the result? The axe doesn't clear the cut, the tree snaps, and then you have an accident.

Here is an operation—(one of these boys that holds the lines) standing between the team and the log instead of in back of the log as it should be properly hooked.

Here is an operation with the tongs and the lines and everything tangled up—his feet too—the horses start and away he goes. It should be done in this manner. Safe position at the end of the log and you can do better work. Never get ahead of your log when tailing down.

Here is an operation that is right and wrong, either picture, depending entirely on the circumstances. A good many loggers will disagree with this picture where the man rides the roll. Some say he should stand on top. In this picture, the safest thing to do is to stand on top, because it is a small load, but where you have four or five thousand feet on a load like that, the fellow is way up here, and your wrapper must be safe. If it becomes unhooked, he has to be an A-No. 1 log roller to get out of all that mess.

Down here the road is rough, he is half asleep, he falls, and the team keeps right on going.

I have any number of these sets. I am sorry I did not bring them along, but I would be glad to mail the Safety Bulletins and these pictures to anyone who is interested.

I want to talk briefly on the sawmill hazard. The sawmill, with its high speed-belts, pulleys and machinery, is a difficult problem to guard practically. Some men have recommended, having gone into a transmission room basement in the sawmill and counted the belts, that all the belts and pulleys, shafting and everything be guarded. That is not practical. You might just as well nail the doors to the transmission basement from the first floor to the basement, and call it guarded. But, you can do this: You can guard every single gear. There is absolutely no excuse under the sun for an open gear at any location. I remember an incident in which I was talking to a sawmill foreman and I recommended that a gear be guarded. It was 9 feet from the floor, above the platform on which stood the hog. The sawmill foreman said, "Nobody ever goes there, except the oiler." That is the trouble. If he is a good oiler, why not protect him? Three days later that oiler was in a hurry. He threw up a ladder against the hog platform and instead of going around, he reached through a sprocket to oil the cup, standing on a little 2-inch board. He slipped and left his left arm hanging in the sprocket. Then they guarded that sprocket—they enclosed it. Now that man is doing oiling,

and that is all he ever will do—that is all he ever can do, and “nobody ever goes there.”

Live roll gears in a sawmill represent a hazard and have taken fingers and toes. We had a young fellow do the Charleston in one of the sawmills, kick his foot underneath the live roll gears, and it took his toes off. The foreman was watching him do the Charleston. A fine foreman! Was he sincere in his safety work? He is foreman no longer in that particular building.

Live roll gears can not be completely enclosed on account of the fire hazard. You can not begin to box these things up so that all the sawdust and dirt accumulates—that causes friction and then a fire. But you can do this: You can put a board over the top, a board far enough down on the sides, and then put one on an angle this way, so that your gear is up here—all the sawdust and dirt and everything can fall down, and a man would have to deliberately get in there—he cannot get in there accidentally.

There isn't a guard made that guards a hazard in a sawmill 100 per cent. If he wants to get in there, he can get in.

Saws should be sharp to be safe. A dull saw is a bad hazard. They should be gummed and hooked, sharpened and changed regularly. A sharp saw sings and a dull saw grunts. Your sawmill foreman should see to it that they are changed. Keep your filer busy. He hasn't enough to do as it is. Make it the duty of your filer to get out in the sawmill and look these saws over. That is a good safety measure, and a lot of sawmills in Wisconsin are doing that now—making him responsible for the saws.

The layout of sawmills should be considered in the safety of a sawmill. Frequently a one-band mill changes to a two-band mill, and then you have a conglomeration of machinery which they try to put into a small space, and you have a hazard.

Maintaining interest should not be a difficult problem in the woods or in the sawmills, if the management provides that interest. If they are sincere in their purpose, the battle is won. If the management would exert as much effort and zeal in accident-prevention as they do in production, the accident problem would be solved.

CHAIRMAN GRIER: Have we any questions on Mr. Braun's paper? Is there any discussion?

I think Mr. Braun handled the subject in a masterly way, and I feel that he can answer some questions along that line.

L. GLAZER (Manager Safety Dept., Dierks Lumber & Coal Co., Kansas City, Mo.): Just about two weeks ago, we had one of these gears that we didn't think needed to be guarded, down in the basement of one of our sawmills, pulling a mule chain. This gear, I suppose, was about three or four feet in diameter. It was open underneath so that the oiler could put his grease in there, using a wooden paddle, and while he was carrying on his work, his paddle got hung up. He tried to get it out and the gear, slowly moving, pulled his hand up against the timber. He lost four fingers of that hand. While trying to disengage his hand, he reached in with the other hand and lost a finger of that hand. We thought that it was impossible for a man to get his hand in that gear. The oiler claimed that his foot slipped. We didn't see how his foot could slip at that particular place. There was no slipping hazard there as far as we could see, but it just illustrates the point brought out by Mr. Braun that no gear should be left unguarded. It doesn't make any difference whether or not there appears to be a hazard there, a gear is a dangerous instrument and should be guarded in every possible way.

That accident is going to cost us about \$2,500, under the provisions of the Oklahoma Compensation Law. It need not have occurred at all if we had had that idea in our minds that every gear should be guarded, regardless of whether or not there appears to be a hazard.

ROBERT TOMS (DuPont Company, Portland, Maine): Might I ask Mr. Braun a question? In regard to guarding, I don't think that he meant us to infer that he didn't believe in guards around the belt, but I would like to ask if this is safe practice—to fence off or board off dangerous sections where nobody goes—absolutely nobody, not even the oiler—parts of the machinery that are oiled when the machinery is shut down and to guard all moving shafts or moving pulleys or belts that are adjacent to passageways where men have to pass to and from. Would you agree that that would be safe practice?

MR. BRAUN: Yes. I am glad you brought that up.

Passageways should be guarded. The shafting should be guarded on the top and sides and the sides to extend well below the shaft, and the belts and pulleys in those passageways should be protected so that anybody stumbling or slipping can not fall into them.

R. C. BARR (Manager of Safety Instruction, Lumbermen's Mutual Casualty Co., Chicago, Ill.): I don't know whether Mr. Braun intended to cover live rolled shafting in that statement or not. It is my impression that a good deal of attention should be given to the guarding of live roll shafting, even though it is smooth in character. We have had two serious injuries during the past year, one resulting in death, and the other resulting in the loss of a man's right arm, including the shoulder blade that was pulled entirely separate from the body. The man whose arm and shoulder blade was removed is still in fair shape and working again.

Another thing that we can give consideration to is long distance oiling. There are some sections of the sawmills where it is difficult to get in and get the oil to the proper bearing. We have worked out, in several instances, tubes leading to the oil cuts or oil bearings where the oiler does not come in contact with the hazard. He introduces the oil at the end of the pipe and oil runs through the bearing, and they tell me that they are able to keep track of the bearing without feeling it to see if it is hot.

O. B. FREDERICK (Safety Supervisor, Dierks Lumber & Coal Co., Duquoin, Arkansas): We have had in our plant, a number of accidents due to the carriage slipping down while the men were working, and I am glad to say that it has been overcome. We have a sawyer at one of our plants who has designed a carriage hook. I understand that he has it patented now. However, anyone can fix one up himself by using a chain, if necessary, to hook the carriage back because the steam, more or less, especially when your valves begin to get old and worn, will leak into the drum. This man who designed this guard last year was awarded, I think, \$100 by the Southern Pine Association for the best device to eliminate waste, and he also received \$50 from the National Lumbermen's Association. I think that it is very, very good and the carriage is locked at the proper end and there is no danger of the carriage slipping down on the man while they are making the necessary repairs and changing saws. A chain or a hook and eye can be fixed there. At one of our plants, we have a large hook and eye, similar to a screen door hook.

MR. BRAUN: I failed to mention one thing that might be of interest to the logger and the sawmill operator, and that is the proposition of camping. Wisconsin is noted as the playground of the Middle West, and thousands of campers camp in these forests. They put up improvised washlines, by pounding nails into trees, taking the rope off and leaving the nail in the tree. Fifty years from now, they will log that section of timber, cut down that tree and find that the bark has grown over and around that nail. The saw will hit that spike and you men all know what will happen. Allow no campers in your timber.

CHAIRMAN GRIER: We have a few moments yet for general discussion of the papers presented this morning, or for any other questions that you might care to bring up.

I will now open the meeting to discussion and questions. If you have a question on your card, kindly hold the card up and we will get it.

W. S. CLARK (American Mutual Liability Co., Boston, Mass.): There was one point in Mr. Braun's talk that I wanted to ask a question on. Just what bearing does good light or inefficient lighting have in the transmission basement, and further, what bearing would self-oiling bearings have in preventing hazards of that type?

MR. BRAUN: There are so many things I can take up in a sawmill, that it is good that you bring these things out in the discussion. It has been my experience that sawmill basements are not very well lighted, and they should be well lighted; any establishment should be well lighted. The self-oiling bearing, of course, is a time-saver, and if it is placed properly, so that the oiler doesn't have to creep around a lot of stuff to get to it, it is certainly a good thing to install.

G. A. ORTH (Chief of Safety Dept., American Car & Foundry Co., New York City): Reference was made by one of the speakers in connection with an accident on smooth rolls. I am not familiar with the logging business, but we have on rollers in our rolling mills, an electrical shutoff, so that if any of the operators of this roll should get their hands in the rolls, they have a rod that they throw over and automatically shuts off the power. I wonder if that could not be applied to these smooth rolls that were spoken of a moment ago?

R. C. BARR (Manager of Safety Instruction, Lumbermen's Mutual Casualty Co., Chicago, Ill.): The accident that I referred to was on the live roll shaft and not on the rolls.

CHAIRMAN GRIER: On the straight line of shafting?

MR. BARR: Yes.

CHAIRMAN GRIER: Mr. Braun, I believe, referred to the live rolls.

MR. BRAUN: The live rolls are not rolls as they are machined, they are rolls that take the lumber from the band saw and convey it down through the mill to the different operations.

CHAIRMAN GRIER: A conveyor is what you have in mind.

MR. BRAUN: It is a small roller conveyor, driven by a small gear. As to the point brought up by this gentleman on the shafting, it would of course be taken into consideration at the top and sides and the board at the bottom. If that were placed, it would take care of that hazard.

R. G. BUCHANAN (Safety Engineer, Edward Hines Lumber Co., Lumberton, Miss.): In our lumber, we have got to keep pine lumber from bluing when it is put on the yard. It is run through a solution of caustic soda before it is stacked in the yard for air drying. This caustic soda eats the hands of our men who handle this lumber. I want to know if anybody ever heard of any solution to keep that from ruining his hands—an oil of some kind or a glove or something that these men can put on to keep their hands from getting sore and so that the caustic soda will not eat into their hands?

H. R. ORCHARD (Superintendent, Marathon Lumber Co., Laurel, Miss.): I would answer Mr. Buchanan's question in this way: A good many of the mills are dipping their lumber in a solution which does not affect the men's hands. We dip our lumber; about 60 per cent of our cut, which makes it somewhere around 78,000 feet a day, goes through a solution, and we believe that it is as effective as any solution on the market.

CHAIRMAN GRIER: Do you know just what that solution is?

MR. ORCHARD: We buy bicarbonate of soda. We have tried other preparations which I would not care to name, but we did not find that they were any more efficient or any more economical than straight bicarbonate of soda. I may get in bad on this, but I think we carry this at a temperature of 120 degrees—about 4½ per cent.

ADJOURNMENT

October 2, 1928

Luncheon Session

JOHN B. GRIER, Chairman

**Employment and Safety Manager, American Car & Foundry Company
Wilmington, Dela.**

The second luncheon session of the Woodworking and Lumber Manufacturing Section was called to order at twelve-thirty o'clock, Mr. J. B. Grier presiding.

CHAIRMAN GRIER: Gentlemen: We have concluded our work this morning, and as I promised, we will have a report now from our Nominating Committee, who will name the officers they have selected as logical men to lead this section during the next year.

This Nominating Committee is appointed early in the year to look over the prospects, select those men who they think will be able to handle the work of the section, and to secure from those men, their acceptance or promise that they will serve, provided they are elected. This committee is not appointed with the idea of railroading through a slate. It is appointed so that we will have active officers and men who will devote time to the work of this section, and it does take time to carry on the work of this Woodworking and Lumber Manufacturing Section.

Mr. G. A. Orth, a member of the Nominating Committee, will make the report, in the absence of the Chairman, Mr. Jackson.

Report of the Nominating Committee

G. A. ORTH (Chief of Safety Department, American Car & Foundry Company, New York City): The Nominating Committee reports as follows:

Chairman, J. M. Bissell, General Manager, Marathon Lumber Co.

Vice-Chairman (Manufacturing), M. C. Goodspeed, Safety Engineer, General Electric Co.

Vice-Chairman (Logging), Hon. William L. Wallace, Attorney, Edward Hines Lumber Co.

Vice-Chairman (Sawmills), H. R. Orchard, Mill Superintendent Marathon Lumber Co.

Secretary, O. J. Olsen, Safety Director, Fisher Body Corp.

Chairman, Program Committee, J. B. Grier, Safety Engineer, American Car & Foundry Co.

Chairman, Membership Committee, I. W. Rowell, Wisconsin Land and Lumber Co.

Chairman, Publicity Committee & *News Letter* Editor, A. O. Jackson, Supervising Engineer, Aetna Life Insurance Co.

Chairman, Statistics Committee, H. J. Kelley, American Seating Co.

Chairman, Poster Committee, F. W. Braun, Mgr. Safety Engineer Dept., Employers Mut. Liab. Ins. Co.

Chairman, Engineering Committee, G. A. Orth, Chief of Safety Dept., American Car & Foundry Co.

Executive Committee, E. Ross Farra, Mgr., Grand Rapids Safety Council, Grand Rapids, Michigan; G. E. Sanford, Chief Safety Engineer, General Electric Co.; and H. G. Wiberg, Lumbermen's Mutual Casualty Co.

CHAIRMAN GRIER: The election of officers will be held immediately following the reading of our first paper tomorrow morning, in this room. If there are any nominations, suggestions, or corrections, we will be glad to have them at that time. If you find it convenient, I would say, make yourselves acquainted with these men and you will concur with the Nominating Committee.

At this time, and to start some little discussion such as we had yesterday, I will call upon Mr. Barr.

R. C. BARR (Lumbermen's Mutual Casualty Company, of Chicago, Illinois): I don't know what the members here want to hear about, but perhaps some of the experiences of an insurance inspector will interest them.

Our company deals with a great number of small risks, and in dealing with small risks, it is probably different from the average man's connection who attends these meetings. But I think the purpose of the National Safety Council is to cut down accident frequencies in woodworking trades, and you have got to consider the experience of the small risks in measuring the results of the work of the Council, because the good work that you build up can be torn down considerably by the bad experience of the smaller risks.

I think the insurance men present will agree with me that the insurance companies are not after the smaller risks. We carry a good number of them because of the necessity in insurance work. They must have the insurance and somebody must carry it. But, the small risk is a hard one to reach from the standpoint of safety because of their isolation from the business districts, and they are hard places to work on in the matter of safety, because it is a slow process of building up education.

I might submit one experience we had down in a little town in Alabama two or three years ago. I stopped at a small sawmill and they had a boiler in operation—no roof over it—out in the open, and I noticed there was no water gauge glass on the boiler. I made a remark about it, and the superintendent of operations said, "No, our water is too muddy here, it covers up the glass, so we can't tell where the water level is anyway, so we took it off." I said, "How do you tell where your water level is," and he said, "We open up the bottom pet cock and we know we have enough." On the same boiler, I noticed they had an old-fashioned safety valve with a lever on it, in addition to the regular weight, they had a couple of castings from a well-known automobile engine and I asked him the reason for the additional weight. He said that steam kept coming out of it and they had to keep the steam in the boiler, so they put on the additional weight.

To cite another case in the state of Georgia, where our company had experienced a great number of accidents and they sent me down to find out why. I spent about an hour and a half in the plant, talking to the various foremen, and while I was there, I noticed a great number of cabinet-makers coming out from the cabinet department and operating the saws, the joiners, stickers, in the woodworking section. I noticed they had a full complement of machine men and wondered why the cabinet-makers thought it necessary to conduct those machine operations themselves. Naturally, the person to go to would be the foreman of the machine section.

He said, "I can't stop those fellows from coming out here. They just come out and take possession of the machine and shove my men aside." When I went back

to the office the superintendent of the operations asked me if I had any recommendations to make and I said, "Yes, one." He said, "That is rather unusual for an insurance man to make one recommendation." I said, "The only recommendation I can make is that you give some attention to the supervisory force in your mechanical department." He said, "We have a foreman out there." I said, "You have a man out there, but he is not a foreman." He asked me what I meant; I told him that the man seemed to have no power over the cabinet-makers using the machines. Well, a week later they changed foremen in the mechanical department, and our

accidents were reduced to almost nothing. I made a checkup of the accidents six months later, and there had only been one minor accident in that department, whereas we had been having five and six a week.

In insurance work, we run into a good many problems that probably have been worked out in the large plants; but in the smaller plants, it is a little more difficult, because of lack of finance to take care of proper safeguards.

In another mill, a sawmill in the South, I was standing on the sawmill floor one day, when the whole building was shaken violently, creating considerable scare on my part. It was caused by a piston ring in the shot gun carriage breaking, the end of the piston ring dropping down into the feed pipe and lodging itself in the valve so that a quiet shutoff could not be handled by the saw operator. The shot gun carriage went down to the end of its travel and struck the large timbers which acted as buffers at the end and dislodged them entirely. In fact, set them back six inches. They overcame that difficulty by introducing a screen in the pipe so that if any pieces dropped down in the pipe they would be caught by the screen instead of lodging in the valve.

I have a note here, "Right Man on the Job." That occurred to me while one of the speakers was talking this morning. The Atlanta incident that I spoke to you about is only one example of it. We find on insurance records that too often men are injured because they are not acquainted with the machine they are operating. A yard man will come in from the yard and operate a saw (this is a small plant where they don't have the supervision that you have in the larger plant) and because of his unfamiliarity with the machine, he is often injured. The use of men of advanced ages in lumber yards which are connected with some of the larger sawmills and some of the smaller sawmills, is something that ought to be watched very carefully. A man of advanced age will climb to elevations, and he is not so sure of his footing as a younger man; if he does fall and sustains a fracture of any bones, it takes a good deal longer to heal than it would in the case of a younger man.

I expected somebody in the discussion of safety subjects in the Woodworking Section would mention the new saw that has been gotten up by one firm called the "non-kick-back" saw. Every other tooth is a bumper tooth. The sharp end tooth only extends about one sixty-fourth of an inch above the bumper tooth and in plants where this has been tried out, I believe they have had absolutely no kick-back accidents. You could take a piece of timber and throw it on top of the saw and very seldom is there enough force from the contact to throw it off from the saw table.

One more point is the device you use (it is known under different names) for the loading of lumber into box cars and the unloading of lumber from box cars. Usually this device consists of a rod with a right and lefthand thread on it. When it is introduced into the car door, it depends for its support upon the wedging between the sills of the door. We have had two death losses from the use of that device. Men depend upon it to hold the lumber as they load it into the car and load it out of the car, and it fails and the man is precipitated to the ground below. He is very likely to receive a broken neck as a result; in fact, that was the death loss we had.

CHAIRMAN GRIER: Does anyone have any questions to ask on Mr. Barr's remarks?

ROBERT W. TOMS (E. I. DuPont de Nemours & Co., South Windham, Me.): I would like to ask in regard to that death loss that you spoke about in connection with the device that they had for loading lumber into the cars, do I understand that was wedged into the car door and there was a roll on top for handling the lumber over the roll?

MR. BARR: Yes, it consists of a right and left hand thread, so that when it is

placed in position, one end is turned so that it wedges itself between the sills of the door.

MR. TOMS: The reason I asked was this: We use a device similar to that for loading lumber, but we don't use the friction that way to hold the roll in the door. It is a bar going across with a long slot on either end and in that slot is a hook. That hook hooks around the jamb, where this timber is large enough to go around the outside of the door. These hooks are made adjustable for different width doors, and then there is a handle on either end that brings that up.

The idea is: Here is your bar, and there is a hook that goes through and around the jamb of the door on each side. Then you screw up on the outside, making that bar absolutely rigid in that door, any height you want. You raise it and lower it quickly. Then you have your roll on top. In that way, there is no chance of that falling. It is held very rigid in the door and you would have to break the bar before you could get it down. I can easily understand how just the jamb against the side of the door would get loose very easily. Ours is very easily moved, higher or lower, and can be taken off very quickly, and we find it very serviceable. In the sense of this, we have an attachable roll that moves back and forth on this, that is hung in the center. That can be moved back and forward on this load to change the angle of it. In that way, you can handle a lot of lumber with very much less labor and with safety.

O. B. FREDERICK (Safety Supervisor, Dierks Lumber & Coal Co., DeQueen, Arkansas): Mr. Barr, I would like to know the name of that saw which you mentioned. I believe it would be enlightening for the members to know the name of that saw you spoke about that had the anti-kick-back device.

MR. BARR: It is called the Dubrule.

CHAIRMAN GRIER: I am going to call on a gentleman who has honored us by his presence at our luncheon today, and in return for that, we are going to ask him to say a few words to us. I am going to call on Mr. Ernest Hartford, Chairman of the New York Chapter of the A. S. S. E. and General Secretary of the American Society of Mechanical Engineers.

MR. ERNEST HARTFORD: It is good to be here to join in your luncheon and I am glad to be able to tell you one or two things about the Metropolitan Chapter of the A. S. S. E. I imagine most of you come from other cities, but we would like you to know that we have established a policy this year in the Metropolitan Chapter of having our monthly luncheon meeting regularly on the third Thursday of each month at the Fraternity Club, which is at the Southeast corner of 38th Street and Madison Avenue. We had our first meeting the third Thursday of September, and we had Commander Elsberg of the U. S. Naval Reserve there, to speak on Safety as it applies to submarines. Commander Elsberg had charge of the work of the raising of the S-51 and was also called back, although he had left the service, to assist in the raising of the S-4. He told us a very interesting story—one which was so attractive, that I believe we are going to get rather a large attendance at the next meetings. We are going to try to put on a program through the winter that is going to help the Safety movement in New York, where, as perhaps all of you know, it is very badly needed.

I can't tell you in detail regarding the remainder of the program, but there is another matter that I would like to speak about while I am on my feet, and that is, the possible relationship between the work of your particular section and the A. S. M. E. where I spend most of my time. We have, in A. S. M. E., as perhaps you know, a Wood Industries Division, as we call it. You call it "Section" in Safety work—we call it "Division." The Wood Industries Division, would, I am sure, be delighted to have an opportunity to cooperate with the section, and in so far as the Safety work is concerned in making suggestions, we would be glad to have you get all the credit for anything that is done in that connection. In other words, I am not merely trying to suggest something which will help to put

A. S. M. E. more in the limelight, but rather to give you an opportunity to utilize something which is pretty well organized.

In that connection, we have organized groups working actively in 69 cities in 38 states of this Union. We would like to see each of those local groups utilize more of the material which could be brought into these meetings from the Safety viewpoint, and we think it is rather up to you gentlemen to take the initiative in telling us what we should do to bring Safety into the woodworking industry or Safety from other points of view, because I imagine some of you are interested in it from other aspects than purely the woodworking.

We place freely at your service and disposal anything that we have in our organization, in the hope that you will take it in that spirit and, as I say, take advantage of a well-organized proposition.

We have in the Engineering Societies Building on 39th St., which was made available to the whole engineering profession through the generosity of Andrew Carnegie, a very wonderful collection of technical literature. That includes, of course, everything on Safety as well as other branches of Engineering. You may not realize that there are something like 1,400 technical periodicals published in various parts of the world, these being printed in 26 different languages. Now, I mention that because there is available for any of you men, regardless of whether you hold membership in any of the societies that occupy space in that building (and by the way, the Metropolitan Chapter of A. S. S. E. has its headquarters in that building) you have access to this wonderful fund of information, and should you care to get it, there is being conducted a card index service whereby you can get every week, on a 3 x 5 card, very convenient for filing, information in any of these 1,400 publications that applies to Safety or specifically to the Woodworking Industries. That is a service which is being rendered to the entire engineering profession, and although it was started only last January, its value is already widespread, still there are only a small proportion of the engineers and industries that can use it that, I think, have even heard about it.

So, Mr. Chairman, I am very glad of the opportunity that you gave me to say a few words. I want all of the men who are here interested in any kind of engineering work, to feel that when you are coming to New York (and there isn't a convention or a congress such as this, which offers the opportunity to get into contact with various industries here) that you will feel perfectly free to come to the Engineering Building and feel that that is your headquarters, that you are wanted there, and that anything we can do for you in any way, to place at your disposal these facilities of a number of engineering societies, is yours for the asking. Thank you very much.

CHAIRMAN GRIER: I am sure that all of us here appreciate the generosity of the Engineering Societies of New York, and that some of us will avail ourselves of the privileges and facilities that Mr. Hartford has so generously extended to us.

Mr. Farra, our past chairman, has a word for us.

E. ROSS FARRA (Manager Grand Rapids Safety Council, Grand Rapids, Mich.): I want to back up what Mr. Hartford said, that the Wood Industries Division will cooperate with you, because I have appeared before them in New York City twice, and in Providence once, and in Grand Rapids once, regarding the Woodworking Code, and I have promised that either myself or one of the directors of the Safety Council will be on the program of the Wood Industries Division in Grand Rapids this coming month.

I also want to say that I have sat in a great many of the Engineering Society Executive Committee meetings, and there has always been the cry that you can't get the Engineering Societies to cooperate. I want to say this to you: We have a pretty hardboiled Engineering Society in Grand Rapids—a good many of them are the older type of engineer—not the younger men—but I find that if you go after these fellows, it is surprising how much you can get out of them to help you in

your particular work. That, of course, applies more to the folks in community work. The Grand Rapids engineering work has been right back of me, and they are putting on for me (not solely, but as the main sponsor) an electric illumination institute which begins there about the last week in November, and they are doing the brain work of it at least. I am doing the printing work—that is about all I am doing. The Engineering Society is going to sponsor that with the Light Company and the Gas Company, and I think it is going to be an outstanding change in our industrial work. It has never been put on there before. I couldn't have put it on without the Grand Rapids Engineering Society of which Mr. Spindle, of the Gas Company, is chairman.

CHAIRMAN GRIER: Are there any further questions or any comments that anyone desires to bring before the meeting?

If there are no further questions, I am going to call on Mr. Sam Fowlkes, manager of the New Orleans Convention Bureau to tell us something of the South. Mr. Fowlkes is here in the interest of New Orleans, and New Orleans is trying to get the National Safety Congress to meet there next year. We are not backing up Mr. Fowlkes as a body—we are just giving him a chance to tell us something of the old South.

MR. SAM FOWLKES: First, it is a great privilege to be able to have lunch with you gentlemen today. I appreciate it very much.

Mr. Grier has told you my primary object up here is to look over the Safety Congress, to see what you have, what type of meeting it is, and also to accompany my local delegation, of which we have quite a number of gentlemen—not only from New Orleans and the immediate section, but from all over the South—who are working with us and with our people in trying to convince the officers and the members of the National Safety Council that the South needs this wonderful organization to meet in her territory.

We feel that it would not only be of great benefit to the South, but would be of great benefit to the organization as a whole. Our people are just beginning to realize what the safety movement means to them.

To give you an illustration: In New Orleans, there has never been a safety movement at all, up until about last spring, and we organized a little sectional meeting and had an attendance of some 400 around New Orleans and the immediate vicinity, who went on record as being in favor of the movement and wanted to invite the Safety Congress to meet in future years in New Orleans. Our section down there is really in its infancy, regarding the industrial plants; our schools are just beginning to take up the safety movement, and our city (which is also directly interested) and Mayor O'Keefe, chairman of my board, who sent me up here, have all taken an active part in it. I assure you that we will appreciate your support and cooperation and some of these days, we hope that we will be so fortunate as to have this wonderful organization meet within our city, so that the South will benefit greatly from it and help us out in this movement, and we also feel that it would be of much benefit to you.

G. A. ORTH (Chief of Safety Dept., American Car & Foundry Co., New York City): I should like to ask a question. First, tell us something about where we can place the Congress, should we vote to put it down there, and about your hotel facilities, and whether or not the hotels can take care of the visiting delegates.

MR. FOWLKES: That is one of the reasons why I am in New York City today. This morning I have gone over the situation quite extensively, trying to take in all your meeting rooms and the number that you require. Among our four hotels and our three theatres which would be available, (they adjoin our leading hotels, in New Orleans) we will be able to take care of the Congress and the meetings, and from our exhibit standpoint, we have a large Government warehouse which is a 10-minute drive from the center of the city, which would be available. However, we also have another proposition which we are going to offer the directors, and that

is, housing the whole thing under one roof. That is, at the International Trade Exposition, which has its own restaurant, can give you all your meeting halls and your exhibits, has your telegraph service, your taxicab service and everything out there under one roof. We feel that we have the proper accommodations. However, we also know that you won't have the attendance at a Southern meeting that you would have in the East or the Central West, and we feel sure that we can take care of you very nicely.

MR. FARRA: How far is the Trade Building from the main hotel?

MR. FOWLKES: It is a 10-minute drive. We have a taxicab concession that always has taxis at the hotel and out of this building which makes a minimum charge of twenty-five cents and that will take you to any hotel. We have just recently had the Bottlers—they had 100,00 square feet of exhibit space, and all of their meeting rooms, and about 50 per cent of the gentlemen had lunch at the restaurant that is open every day in the year out there, and they were very well satisfied. We had an attendance of 6,000 delegates at this meeting.

ADJOURNMENT

October 3, 1928

JOHN B. GRIER, Chairman

**Employment and Safety Manager, American Car & Foundry Company
Wilmington, Dela.**

The Wednesday morning session of the Woodworking and Lumber Manufacturing Section was called to order at nine-fifty-five o'clock, by the chairman, Mr. J. B. Grier.

CHAIRMAN GRIER: This morning we will have talks on Wood Re-manufacturing, and the election of officers for the coming year. We will also have discussion after each of the papers, and at the end of the session, if we have time, we will have a general discussion for any questions that anyone cares to ask, pertaining to this Section. We will have them answered at that time.

Last fall it was my pleasure to be in one of our mid-western cities and visit a number of the furniture industries located in and around Grand Rapids. While I was there, I made a visit through a plant which attracted my attention. The plant was clean, well-guarded, and being chairman of the Section, it furnished food for thought.

I believed that if the factory was kept in such a condition, that man who was responsible could tell us something about accident-prevention work. So, it is with great pleasure this morning, that I introduce Mr. H. J. Kelley, manager of industrial relations of the American Seating Company of Grand Rapids, Michigan.

MR. H. J. KELLEY: Mr. Chairman, ladies and gentlemen: I prepared a paper because I believe that I can stay with my outline much better by sticking to this paper, and if there are any questions at the close of the paper, I will be glad to amplify any points that you may be interested in.

The Fourth Cornerstone

By HARRY J. KELLEY

**Manager Industrial Relations, American Seating Company,
Grand Rapids, Mich.**

It has often been said that the foundations of society rest upon three great institutions, the Home, the Church, the School. To these I would add another, the Factory, the fourth great cornerstone of our modern civilization. In a factory a man spends one-third of his adult life, one-half of all his waking hours. The factory exercises a considerable influence on his character.

What society is today and what it is to be tomorrow is to a degree a reflection of what your factory and mine are. Is there any greater responsibility, then, than that of making these factories fit places in which to live and work? the sort of places whose influence on the father will compare favorably with the influence the schools are exercising on the children?

In discussing this subject I expect to show:

1. That men are less likely to be injured in a plant which is clean and orderly because:
 - a. Disorderly conditions are the direct cause of more industrial accidents than any other one thing.
 - b. Carelessness in upkeep of the plant engenders careless habits among the workers.
2. That better morale is maintained among the workers through maintaining a clean and orderly shop and that this results among other benefits in fewer accidents.

3. I shall discuss some of the common difficulties in the way of good housekeeping.
4. I want to tell you about an interesting experiment which we have carried out in our plant, solving the problem of housekeeping in a most satisfactory manner.

Direct Cause of Accidents

First, then, bad housekeeping is the cause of more industrial accidents than any other one thing. Falling objects, stumbling, bumping into objects, stepping on nails, are familiar terms to all of you while defective wiring, spontaneous combustion, and dust explosions are common causes of plant fires too often augmented by blocked exits and failure of sprinkler systems, evidences of lax inspection and bad housekeeping.

Statistical evidence of this can be found in almost any tabulation of accident reports. Here, for example, in a tabulation of all reported industrial accidents in the state of Pennsylvania for the year 1924, I find:

Twenty-one thousand injuries out of 83,000—somewhat over one-fifth of the total—were listed under the following causes:

Falls of persons.

Stepping upon or striking against objects.

Falling objects (mines and quarries not included).

Hand trucks.

It is safe to assume that a very large share of the injuries in this list were caused by bad housekeeping of one sort or another. It is also certain that a lot of accidents caused by bad housekeeping were listed under heads other than these. For example, "handling objects," causing about one sixth of all reported accidents, had in it a great many cases in which disorderly surroundings contributed to the injury. Likewise, accidents charged against motor vehicles, explosions, and cranes and derricks are often caused in reality by bad housekeeping. These caused 6 per cent of all accidents while our old friend "Miscellaneous" which covers among its other multitude of sins "Bad Housekeeping" was responsible for another sixth. According to Michigan figures for 1926-27, about 14,000 out of 30,000 compensable accidents were caused by:

Falls of persons.

Stepping on or striking against objects.

Falling objects.

Trucks.

So we may safely deduce that from a fourth to a half of all reportable industrial accidents are caused directly by bad housekeeping in one or more of its many forms.

Quoting Boyd Fisher's "Mental Causes of Accidents," Lewis DeBlois says in his admirable book, "Industrial Safety Organization":

"There was an automobile body manufacturing plant in Detroit which had so many accidents in the woodworking department that it became known as 'the slaughter house.' In running circular or band saws, workmen frequently made false movements and cut their hands instead of the lumber. In one particularly bad month, 27 fingers were lost. This brought matters to a crisis. The management was more or less conscientious. They faced the situation humbly and came to the correct conclusion that the real trouble did not so much lie with the workmen as with the fact that scheduling and plant housekeeping were both as bad as possible. Trucks of material blocked all of the aisles; finished pieces were not removed promptly, or in proper sequence; stock chasers were running all over the plant for what they needed. The workmen on piece work at one time were laboring under the double pressure of the foreman's demands and their own desire to boost their earnings. At other times they were waiting for

material blocked at previous machines. A general atmosphere of physical and mental confusion prevailed. Periods of hurry and anxiety kept men distracted when their attention should have been fixed in an orderly and peaceful way upon the dangerous task in hand.

"At last the company introduced an efficiency engineer who had done good work in a neighboring plant. In a very brief time he straightened out the scheduling and the material movement. There followed promptly a noticeable reduction in the accident rate. The unsavory reputation which the plant had had with its workmen was improved and the company was saved from being dropped as a bad risk by a mutual compensation insurance company."

So much for the direct physical effect of Bad Housekeeping on accident frequency.

Let us consider for a moment the indirect but none the less significant effects. Go back for a moment to the fundamentals of accident prevention. You have heard repeatedly at this Congress the statements, that "Safety is a matter of education," that "Eighty per cent of all accidents are caused by carelessness," that "The best safeguard is a careful workman," and the like. If it is true, and we know it is, that the price of safety is constant care, then carelessness is the arch enemy of safety and the problem of accidents will be whipped when we train our workmen to be everlastingly careful.

Can we train our workmen to be careful when they live in a plant which, because of our carelessness, is unclean and disorderly? Will they be careful workmen when you permit them to be slovenly in the care of their workplace? If you and I are going back to our plants with the message that 80 per cent of all accidents are caused by someone's carelessness and that we want the workmen to join us in preventing such accidents, then in all consistency, if we hope to succeed, it is up to you and me to lead the way by cleaning up the place and putting it in order. Not until we have done that can we produce any very serious effect on the minds of the workmen whose carefulness we solicit.

Morale

Long ago we learned that accident prevention could not be accomplished if safety work were made to stand by itself as a separate activity or "movement." Safety work, if it is to succeed, must be a part of a whole program of satisfactory relations between employer and employee. High turnover, excessive illness, absenteeism and tardiness, insubordination, unrest and dissatisfaction, and a high frequency of accidents are all evidences of failure on the part of the employer to maintain cordial industrial relations. It is futile to attempt to correct any one of these without going to the root of matters and so changing our attitude and that of our men that there is a mutual feeling of confidence and common interest between us.

Through long experience in working to maintain satisfactory relations with our men we have found that disorderly and insanitary working conditions are a destructive force in morale building and that regardless of what else we do to promote good feeling among our men, bad housekeeping has the effect of creating a dissatisfied worker and destroying pride in their workmanship and their company.

If we believe this it follows that among other things we will look about and give intelligent thought and planning to the working conditions of the men in our plants.

It is not my purpose here to go into great detail as to standards of order and cleanliness. These standards are discussed at length in *Safe Practice Pamphlets* of the National Safety Council under the following heads:

	No.
Industrial Housekeeping	45
Stairs and stairways.....	2
Floors and flooring.....	11
Yards	17
Woodworking machinery and equipment.....	20
Shop lighting	22
Drinking water, wash and locker rooms and toilet facilities.....	27
Exhaust systems	32
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Health service for small plants.....	57

Many of you have a complete file of these pamphlets and all of you should have them.

Too often employers are satisfied if their plants conform to the legal requirements of the states where they are located. A study of state codes and experience with state inspectors has shown that the standards enforced by them are intended to relieve only the very worst cases of labor exploitation and are entirely inadequate from the standpoint of progressive employers. It is indeed far more to our interest to maintain working conditions which make for highest efficiency of our labor than for the benefit of any other, even the state. So a study of some of these *Safe Practice Pamphlets* and a critical study of working conditions in your plant will be advisable if you hope to maintain the standards we talk about when we speak of Good Housekeeping as an aid to production and accident prevention.

Difficulties in the Way of Good Housekeeping

Now since I have said that a substantial share of industrial accidents are caused by bad housekeeping and can be prevented by good housekeeping, it is pertinent to ask just what do we include in housekeeping. Good housekeeping includes three main functions:

1. Orderliness which pertains to the arrangement of space; marking out of aisles and storage of stock, raw, in process and manufactured.
2. Maintenance including floors, stairways, trucks, power and light lines, transmission equipment, sprinkler and other water lines and steam pipes, compressed air equipment and exhaust system, and elevators.
3. Cleanliness from a sanitary standpoint and the cleaning of lights and windows.

Covering as wide a scope of activity as these, it is not surprising that housekeeping presents a vexing problem. Not only are these functions many and varied but they are the sort of things which do not come to the every-day attention of foremen, and any one of which can be neglected from day to day without the actual stoppage of production. Pressed as he is by the ever present necessity of crowding through orders and keeping down costs, even the best foreman is more than likely to neglect the things which are not of immediate necessity. As he neglects them he becomes used to working in a house badly kept until presently he is not even conscious of such conditions and an unsatisfactory standard of housekeeping prevails. That is one reason by the way why industrial engineers can come into a plant and make a wonderful show of progress by cleaning up the things which have been going on unseen before our very eyes.

Another thing which causes neglect of housekeeping is the fact that everybody's business is nobody's business. Our company has centralized control of production, centralized control of costs, centralized control of employment, centralized control of methods, centralized control of research and time study and centralized control of housekeeping.

Our Experience

The history of improved housekeeping in our plant constitutes a successful experiment which is so thoroughly practical and satisfactory that I wish to repeat it here as a possible solution to similar problems in other plants.

A few years ago we were confronted with an apparent shortage of trucks and a lack of space in our wood shop brought about, we thought, by increased production.

The floors were cluttered with truck loads of stock in process, departments were held up one day waiting for stock to work or trucks to load it on and were working overtime the next day in a frantic effort to catch up with an accumulation that had been dumped on them all at once. Instances are remembered of loads of stock being lost for weeks at a time. Stock chasers rushed about trying to move first one order, then another depending upon pressure from the sales organization.

The situation got so bad that we assigned one of our engineers to study the job. He put on an assistant who acted as a labor foreman. This foreman hired a crew of men whose main job it was to unload trucks. This we knew to be uneconomic but in the emergency there was nothing else to do. There were times when this crew unloaded stock from trucks to the floor and back to trucks again the same day. Then gradually order began to come out of the confusion.

The first step was to introduce lift trucks and platforms wherever possible. This at once forced us to mark out aisles and storage spaces because you can't use a lift truck unless your loads are in orderly arrangement. The lift trucks were eventually followed by electric lift trucks which further emphasized the need for clear aisles and orderly arrangement.

Next came the centralized control under the labor foreman, who had proved himself well fitted for the job, of all interdepartment transfer. There was no longer any chance for shifting of responsibility from one foreman to another for the movement of stock. The transfer foreman was responsible from the moment the last operation was completed in one department until he had a receipt from the foreman of the next department. This did a great deal to keep stock moving through the plant instead of standing about. Incidentally it was a great aid to our scheduling department because the records of the transfer department practically eliminated the stock chasers.

Success of this plan finally brought forth the suggestion that the transfer department assume control of transfer within certain departments where lugging, as we used to call it, had gotten to be too much of a job for the department foreman. The first place this occurred was the upholstering department. During a rush period the foreman of this department had so many extra men on lugging work that they were in each other's way and the lugging cost per productive man hour ran as high as 16 cents. Now it ranges between 4 cents and 6 cents. The transfer foreman, who by this time was becoming somewhat of an expert, took charge of the movement of stock within this department and in a few months had the transfer cost budgeted and the work organized so that without confusion stock was flowing through the department and the accumulation of loaded trucks had entirely disappeared.

Following the excellent experience in this department, other departments were rapidly added to the list and within a few months all transfer of stock both within departments and from one department to another was brought under the control of one good foreman. There is an incidental saving here which I am sure will interest you. It used to be the practice on the part of foremen to assign idle men to lugging. It didn't matter if there were already enough luggers to take care of the work, when a man ran out of a job temporarily he was put on lugging. In some instances this was so bad that when our production went down our lugging cost went up. With a foreman whose sole job it was to handle transfer work and keep the cost down, this was stopped at once.

This foreman, as I said was working under the supervision of the engineering department and this arrangement made easy the installation of mechanical handling devices, conveyors, cranes, special trucks, etc., many of which have been installed in the past four or five years. In that time incidentally we have had only one accident with a conveyor while we used to have several every year with hand trucks.

So much for orderliness. Now as to cleanliness. Cleaning and sweeping has always been done in our plant about as in every other where only superficial attention was given to it. Each department had its sweeper or sweepers as the case might be or in the case of small departments maybe they shared a sweeper. He was under the supervision of the foreman who had him keep the place swept up according to his own standards, some good and some bad of course. In addition the sweeping job was used as a miscellaneous account into which idle time of operators could be thrown, just as I described to you in the case of transfer work. Sometimes the sweeper, who was probably superannuated, would be asked to relieve a man on a machine and in one instance we had a sweeper lose a thumb relieving on a job for which he was unfitted.

Then there was the problem of stairways and other places which were in nobody's department and were always the subject of controversy. Toilets used by men in more than one department were also no man's land and in settling discussions as to who should keep them clean they sometimes got pretty bad. And worst of all, the foreman's supervision would become most lax during periods of rush at the very time when we could least afford to have the men distracted and dissatisfied with unclean working conditions.

Window cleaning and electric light cleaning were done partly by a cleaner under the supervision of the steam engineer and partly by department sweepers on request of the department foreman. We found on investigation that some foremen did not even know the procedure of requesting windows cleaned.

We have safety committees in our plant, one consisting of rank and file workers, one of foremen. These committees make monthly inspections and reports and there was hardly a report for a long time that did not include an item or two about unclean toilets, drinking fountains, washrooms, windows or lights, sometimes all. And finally the foremen's safety committee made the recommendation that all cleaning and sweeping be placed under the supervision of the department of internal transfer.

Since we had at first encountered some resistance getting foremen to relinquish transfer work, it appeared that this was a compliment to the success of the changes we had made and it looked like too good an opportunity to let pass. So we placed all cleaning and sweeping under the same control as transfer work and the results have been gratifying. Since the change we have not had a complaint from either safety committee about dirty conditions and we are complimented by visitors of wide experience on the cleanliness that prevails throughout the plant.

By way of illustration here are two comments of which we are rather proud, the first by Dr. Ernest Levy—one of a party of German executives who visited the plant in this country—as follows:

"We have visited many plants in the United States and Europe, but the like of yours we never saw. For cleanliness, modern construction and sanitary consideration and care of your workers' health your plant stands as a model for other woodworking factories. We recall with great pleasure our visit to your establishment."

The second comment is by Dr. Dokoff, head of the Department of Labor and Industrial Hygiene of Bulgaria, who spent over a year in this country visiting all types of plants:

"You have attained a remarkable degree of cleanliness in your plant. I have been in many woodworking plants but in none have I seen so little dust and dirt."

Now, of course, you are interested in the cost. Well we were prepared to pay more for cleaning to get a better job. As a matter of fact our cost per square foot is exactly the same now as it was before.

What is the effect on accidents? Our accident frequency rate has gone from 107 accidents per million hours in 1920 to 21 accidents per million hours in 1927 and 1928 will be around 18 or 19 if we continue through the year as well as we have gone the first nine months.

Negligent housekeeping still claims about one-fourth of our cases, but bear in mind that we have attacked accidents from all angles, and accidents from all causes have decreased materially. The point is that accidents from bad housekeeping have been kept in line and that we have made progress in this just as we have in machine guarding, prevention of infections, and other phases of our safety work.

I have tried to cover a very important subject in a suggestive manner, hoping that someone who has overlooked this vital subject may be caused to give it thought.

More accidents are directly caused by bad housekeeping than by any other single cause. In addition carelessness in this breeds carelessness of habit and leads to still other accidents.

Morale is built by good housekeeping and destroyed by bad housekeeping. We have reduced our accidents, improved our morale, and increased our production by centralizing the control and execution of the most important housekeeping activities.

The Question of Foreign Labor

CHAIRMAN GRIER: Thank you, Mr. Kelley. I think that was a very enlightening paper, and there should be some questions. We will take about five minutes for discussion before going to the next paper.

Are there any questions? Mr. Kelley, I am sure, will be glad to answer any questions that you have concerning his paper or concerning housekeeping in general. We are not going to waste too much time waiting for questions.

FELIX WEILL (Indemnity Insurance Company of North America, New York City): What do you do in regard to foreign labor? That is, if you have any that don't talk the English language very well? Their homes are not as clean as some of the average ones.

MR. KELLEY: Our plant personnel is probably a little unusual in that the average education of the group is above the eighth grade. That explains your question, partly, because people who have received an eighth grade education in our country, as I noted in my paper in the beginning—the factory is one of the fundamental institutions of our country, but the school has taught most of our people, we feel, the early fundamentals, or I should say, sir, early training in the fundamentals.

W. S. PURDY (Hartford Accident & Industrial Co., New York City): How long were these innovations in an experimental stage—that is, over a period of how many years have you effected this change into working order as you have it now?

MR. KELLEY: We have been operating on the basis of years, but just as soon as this engineer was assigned to a survey of the situation, conditions began to improve, and it was but a short while after we were able to assign this labor foreman to the task, and he has carried on ever since. So I would say that in a period of a year, one ought to make good progress.

CHAIRMAN GRIER: Are there any further questions?

If not, we will go on to our next question.

We will now try to put on the first paper by Mr. O. J. Olsen, who has charge of the Safety work of the Fisher Body Corporation, of Detroit.

Accident Prevention in Wood Mills

By O. J. OLSEN

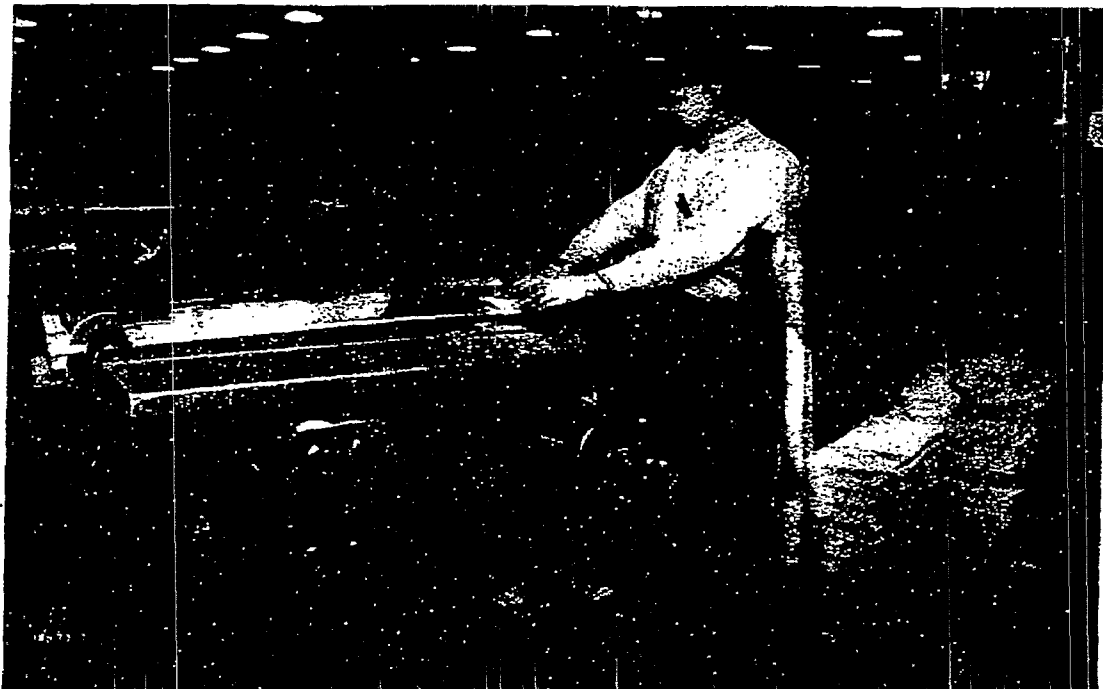
Safety Director, Fisher Body Corporation, Detroit, Mich.

The Fisher Body Corporation is one of the largest single units of the General Motors Corporation, with a production of over 1,250,000 bodies per year. A considerable amount of the total manufacturing space for wood mills of the corporation is located in the state of Michigan in plants at Flint, Pontiac, and four plants in Detroit. There are also large wood mills at Cleveland, St. Louis, Memphis and Fleetwood.

The Fisher Body Corporation is one of the world's largest users of fine lumber. In order to supply its demand it buys three-quarters of the total lumber which it uses; the other fourth it gets from its own forests.

Fisher uses about 300 million board feet of lumber a year. In other words, at least between 40,000 and 50,000 acres of timber land must be cut over a year to supply Fisher with the lumber it needs, or, to put it in other words, about 133 1/3 acres of timberland are cut every day for the use of Fisher.

The lumber manufacturing operations in the Fisher Body Corporation are carried on by a subsidiary, the Fisher Lumber Corporation, which owns more than 100,000 acres of timberlands in the northern part of Michigan and about 100,000 acres in Ferriday and St. Joseph, Louisiana. It operates saw mills in Ferriday and Wisner, Louisiana, and in Memphis, Tenn.



Slide No. 1.

At all times there are kept in the various Fisher lumber yards and kilns over 25 million feet of lumber. Most of this is hard wood, and approximately 16 million feet is kept on sticks in the yards where it remains 90 days or more for the first seasoning, or as lumber men term it, air-drying.

The yards are kept scrupulously clean and every precaution is taken to prevent fire hazard. The yards are protected throughout by their own individual fire protection system, while the saw mills and the parts plants are protected by sprinkler systems.



Slide No. 2

The plants in Memphis consist of a double battery saw mill and a large factory which manufactures all of the wood body parts and assemblies for Chevrolet bodies, these being shipped for final assembly into the complete body framework to Fisher plants operating in conjunction with Chevrolet plants throughout the United States. The saw mills in Ferriday and Wisner are single battery saw mills, each with a daily capacity of about 90,000 feet of lumber with about half the capacity of the double battery Memphis saw mill. In St. Joseph, Fisher has about 30 miles of lumber railroad, in Ferriday about 21; in Wisner about 14.

It is interesting to know that, exclusive of interior trimming, window mouldings, etc., there are approximately 100 wood parts in the smallest body Fisher builds, viz. the Chevrolet, and in some other bodies there are more than 200 wood parts used in the manufacture. Upon these 200 parts, some 1,200 operations are performed preparatory to their setting up on the assembly of the body framework. On the

roof rail alone, there are between 15 and 20 operations. These figures show the work necessary on a wood body as distinguished from the absence of such detail work on a steel body, and the length to which Fisher goes to give the best possible kind of a body from the point of service, appearance and safety.

In the average door of a body by Fisher, there are $9\frac{1}{4}$ board feet of lumber and $15\frac{1}{4}$ square feet of sheet metal.

The framework of Fisher Bodies is of high grade lumber, reinforced by metal, and for the purposes of this article we wish to state a few of the salient features in making and fabricating wood parts with the inherent risks in wood-working operations.



Slide No. 6.

It is obvious to those who are familiar with wood-working operations from the time the timber is felled, transported to the rough mill, then the finishing mill, where the lumber is cut to dimension for automobile body parts and the proper dimensions for veneering for use in furniture manufacturing, each stage has its individual hazards which have been difficult to overcome. This is true especially in such cases where it is a question of guarding the point of operation. Although the equipment used in the various industries where wood-working is a part of the product is essentially the same, each one has its own conditions to be overcome, due to the method and requirements of the product.

Slide Number 1—Shows a Table or Mitre Saw. No doubt you gentlemen who have been operating mills know that the usual protection for a table saw was to make up a guard entirely of wood, same generally being a section cut so that it

would act as a spreader, with a flat board placed on top of this to extend over the saw, and a piece of canvas or rubber over the front edge of the flat board.

This was primarily used to stop saw dust from flying around, but did have some value as a protection, having been improved upon by making an apron on each side of the flat board, which prevented blocks ricocheting if they should happen to catch on the back of the saw when cutting off small blocks. I know of cases where this has happened, resulting in serious injury.

In order to make our guards on these saws of a more permanent nature, we purchased various types from manufacturers of guards and wood working machinery; have also been experimenting with guards of our own design, and you will note from this slide our first step towards a guard combining metal with wood—slide being of wood with a height adjustment, and having a metal shield over the saw. The guard is pushed back by the fence and returned by means of a counter weight.



Slide No. 8.

Another important point I would like to bring out, although not shown in this slide, is to have a box built on the back of fence so that when same rides over the saw it does not project through. Accidents occur quite frequently at this point, and I might add that fence should be securely fastened to the table and should not have too many saw cuts—particularly when using a Dado head for cutting a blind recess in flat stock that does not cut through. When board is held against the Dado head, if, for some reason, a kickback occurs, hands would drop on top of head. In order to prevent this happening, it is better to slide stock under a pressure bar which keeps operator's hands off board while it is passing over the head.

Slide No. 2—Shows a Table or Mitre Saw with an improvement on the guard, inasmuch as we use metal entirely on cross-cutting and mitering operations, and a hard wood bar with a spreader for ripping operations. You will note that this guard is supported so that wide stock can be run over the saw, and has adjustments three ways.

Slide No. 6—Shows a Gang or Multiple Spindle Boring Machine. This machine is also considered a hazardous one and difficult to guard properly. You will note that we have arranged slides to fit on the spindle support, and the picture shows guards at the low and high limits. These guards are actuated by the movement of the table.

Particular care must be taken in placing the screws in the spindle support so that they do not clog the oil passages. In addition to this we place a bar around the spindle, midway between the upper and lower bearings, to prevent spindles from swinging out in the event that the pin in the universal joint breaks. We have



Slide No. 10.

had several cases where this has happened, but were fortunate not to have anyone injured.

I have noted in my travels that other plants use, as an additional precaution, a cut or boot placed around the lower universal joint, but this can only be used on cases where spindles are not tipped too far from a vertical line. In adjusting these guards, we have them extend one-half inch below the bit point.

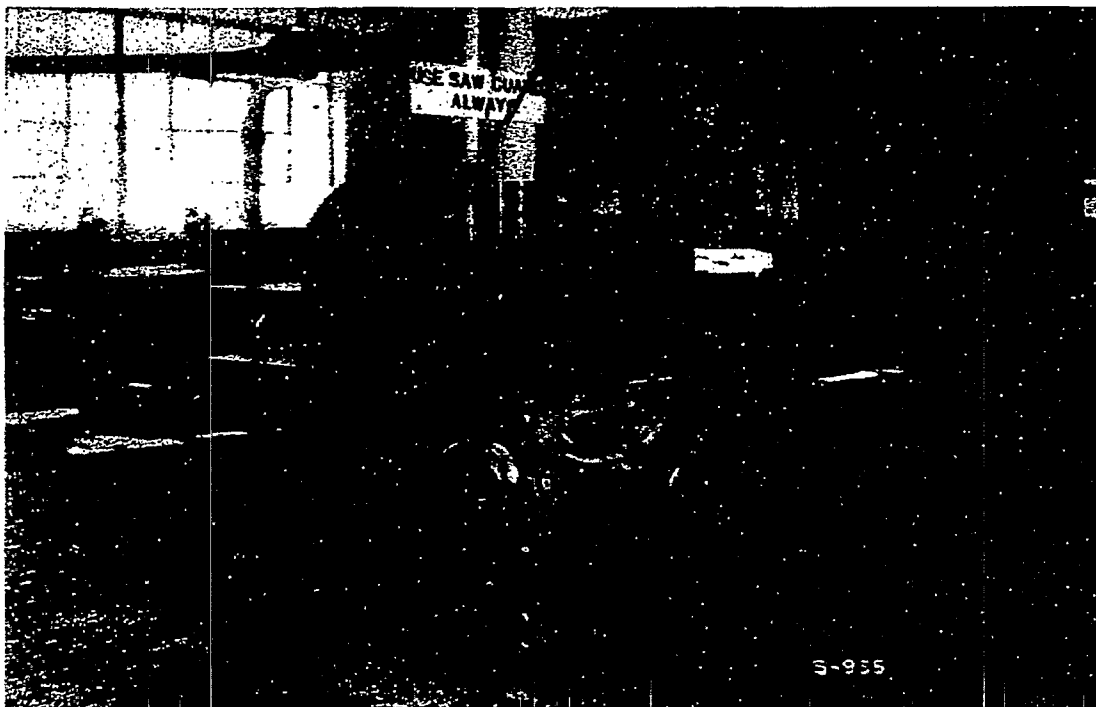
These Gang boring machines represent about 10 per cent of our wood-working machinery, and I believe that 90 per cent of the operations on same can be protected.

Slide No. 8—Shows a Jointer with a swing guard, which we have installed on practically all our jointers, and this can be obtained in the open market. It is not only necessary to cover the jointer head on one side of the fence, but it is also necessary, when fence is moved in on the table, that a permanent guard be attached

to the back of the fence, so that regardless in what position the fence is on the table, the jointer head will be covered.

We have had accidents of a serious nature when the jointer head was not covered in back of the fence, and we try to have the operator remain at his machine until the head has stopped revolving.

I have recently seen in a wood-working machine tool manufacturer's plant a braking device which I believe could be incorporated on such machines as jointers, shapers and moulders.



Slide No. 10-A.

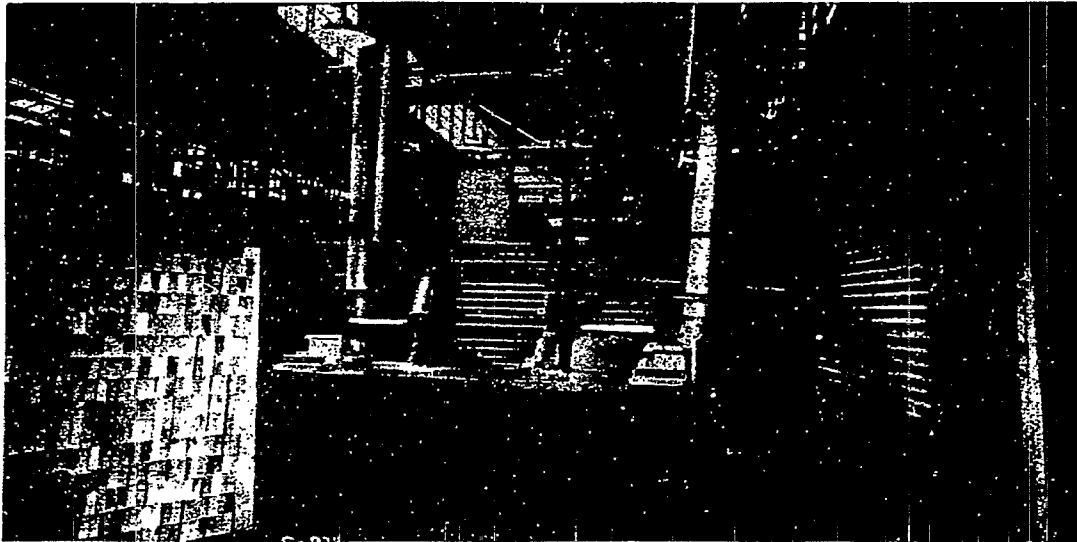
Slide No. 10—Shows a Band Saw. This is what we consider our best guarded band saw. We have designed a number of guards to cover the band saw blade below the wheel and the table, but, of course, on some of our older equipment it was also necessary to cover not only the exposed part of the saw between the wheel and the table, but also the front and back of the upper wheel. However, this part of the guarding is usually taken care of by the manufacturer of the new machines.

There is also provision for guarding the exposed saw blade between the wheel and table, but it is usually fastened with machine screws, and is not always adjusted to follow the saw guide bar. We, therefore, made a guard as shown, which covers the saw blade at all times without regard to the changes made in the height of saw guide bar. On the newer machines, the lower wheel is enclosed

in a solid box with an outlet on each side wall for the saw dust exhaust, and it appears to work out much better than the old method of removing the saw dust from the bottom of the machine.

Slide No. 11—Shows a Shaper equipped with "U" shaped sheet metal guards covering the heads above the cutting edge of knives. These are fastened to the post and are adjustable in a vertical line. Some of these guards were purchased on the open market and others are of our own make.

You will note that we have a box hung on the shaper for tools, as we found that tools were being left on top of the table between the heads and there is a chance of their crawling into the heads as a result of the vibration, and we therefore aim to keep tables clear.



Slide No. 11.

You will further note that the machine is entirely enclosed with corrugated metal partitions. These can be placed as shown, or can be made up of sheet metal, allowing proper clearance, and attached directly to the machine.

Slide No. 14—Shows a Planer with a kick-back device, and a sheet metal shield on the tail end of the machine. The shield reduces the hazard of accidents to eyes from flying chips.

Goggles. Employees in our mills are wearing goggles while engaged in any operations where there is possibility of eye accidents. Recently all persons employed around wood hogs were equipped with goggles containing special lenses, and shortly after this had been made effective a flying piece struck an employee's goggle, crushing the frame and shattering the lens. There is no doubt but what the goggles prevented a serious injury.

Education in Safety Work. We all know that education is an important factor in accident prevention work, and our efforts in this direction have been the placing of bulletin boards at the clock entrances and in conspicuous places throughout the plants, using National Safety Council posters and other bulletin service—changing the bulletins at frequent intervals. In addition to this we hold monthly safety meetings for all foremen which are of an inspirational nature, and in turn the foremen hold their own departmental meetings of all employees, where they give 5 to 7-minute talks and invite suggestions from the men. We also supply each workman with a pamphlet describing what we consider safe practices in the mills,



Slide No. 14.

and we set same up in the way of suggestions rather than rules, as we believe that reasonable persuasion is preferable to arbitrary dictation. Of course, this preference is kept within reasonable limits.

At periodical intervals, fire drills are held, and so far we have been successful in conducting same in an orderly manner in a minimum time.

As an additional incentive, we have installed what we call an "Accident Prevention Bonus Plan" payable to foremen on a quarterly basis, with a minimum of \$5.00 and a maximum of \$100.00 for any one foreman per quarter. The basis for establishing this bonus is a hazard rating applied against each machine or operation in the mills. These ratings are relative, ranging from 10 to 100—the most hazardous, such as shapers, mitre saws and jointers, carrying a rating of 100, while bench work is rated at 10.

I am just injecting this briefly at this time, but if you would like to have full details regarding our bonus plan, get a copy of the Proceedings of the Automotive Section of the 1927 Congress held in Chicago.

Further, as a part of our educational program, a first aid course, under the supervision of a trained instructor who is endorsed by the American Red Cross, is carried on. One or two classes of ten men each are running in each plant at all times, and we feel that this is of value to the individual receiving such instruction as it develops a sense of consciousness in the employee as to the serious effects of accidents. It is not our thought to have any first aid work done by these men, as we have a well-organized Medical Department—consisting of a main hospital and first aid stations in each plant. However, there are emergency cases, such as electrical shock, asphyxiation, etc., where the knowledge of first aid and quick action is essential to prevent a fatality.

In conclusion, we believe that employees in our mills realize the necessity of working safely, and this has been demonstrated to us by reason of the fact that some of our mills employing approximately 800 men, have gone through a period of from 3 to 6 months without a time-losing accident, while we have had 55 foremen in various departments of our mills, each with an average of 30 men, go through a period of one year without a lost time accident. A portion of these have gone through two years without a lost time accident.

I am very pleased to state that we have not had any great difficulty putting into effect any reasonable proposition we might have in the way of "Safety."

(Mr. Olsen's paper was illustrated with numerous lantern slides, some of which are reproduced in these pages.)

CHAIRMAN GRIER: Thank you, Mr. Olsen. That was another very good paper, I think, if I am permitted to express the opinion of the group.

Are there any questions at this time?

MR. PURDY (Hartford Accident Indemnity Co.): I would like Mr. Olsen to inform us here just to what extent are guards removed from these machines, and also goggles removed—the men failing to wear these goggles during hot, torrid weather?

MR. OLSEN: To my way of thinking, we are always going to have guards removed from machines, and we are always going to have the men forget to use their goggles. I don't think that we are going to correct the human element to the extent that we are going to have them 100 per cent functioning on wearing of goggles or keeping guards in place on the machines.

F. B. FIELDING (Western Electric Co., Kearny, N. J.): Mr. Olsen, do you have setup men for making the major setups on those machines?

MR. OLSEN: We do not classify them as setup men. We pick our best men to do that. That is, we pay a good shaper operator a fair wage, and he sets up his job. We have isolated cases where we have a foreman or a setup man but in our big mills it is done by our key operators.

We have put in an intensive campaign on accident-prevention in the last two years. We do not want to brag about disciplining men. After we have given them a reasonable time to accept our policies and our requirements, if they do not seem to want to accept them, we give them a layoff of two or three days—sometimes a week, and if that does not cure their trouble, we take a more extreme measure, but we are not so strong for that method of getting results. We expect the men to follow our requirements on safety, the same as they do in any other plant policy. I am not going to say that we do not discipline them, but that is only in exceptional cases.

In connection with guards we have had a number of serious accidents on jointers in back of the fence, so now we have arranged to have a guard placed in back of the fence as well as in front, so that when the fence is moved forward on

the table, the exposed part of head is covered. We have had a number of fellows (not supposed to be in the mill at all) walk along, and inadvertently put their hands on table to feel the bright surface which would result in the loss of the end of their fingers.

CHAIRMAN GRIER: If you have further questions, gentlemen, I will ask you to put them on the cards, and we will take them up at the end of the next paper. Our time is getting short, and we have another paper and some business this morning.

At this time, our program calls for the Election of officers for the coming year. As was explained yesterday at our Luncheon Meeting, early in the spring we appoint a Nominating Committee to look into this subject of officers for the coming year, and ask them to prepare a slate. This slate is not to be railroaded through, but it is a slate of active men who will accept the responsibility in case they are elected.

Officers of the Section are Elected

Mr. A. L. Jackson, Supervising Safety Engineer, of Aetna Life Insurance Co., New York, is Chairman of this Committee, and we will call upon Mr. Jackson for his report at this time.

(Mr. A. L. Jackson read the report of the Nominating Committee as previously given during the luncheon meeting.)

CHAIRMAN GRIER: Gentlemen, you have heard the report of the Nominating Committee. What is your pleasure?

Are there any other nominations?

L. GLAZER (Manager, Safety Dept., Dierks Lumber & Coal Co., Kansas City, Mo.): I move that the nominations be closed and the report of the Nominating Committee be accepted as a whole.

(The motion was seconded and carried.)

CHAIRMAN GRIER: I will instruct the Secretary, Mr. Goodspeed, to cast the unanimous ballot of this body in favor of those named.

(The Secretary announced that he had cast the ballot and the Chairman declared them duly elected.)

CHAIRMAN GRIER: I suppose, in the absence of Mr. Bissell we should call upon our newly-appointed officers to take charge of the meeting. Mr. Wallace and Mr. Orchard are in the room, and I will ask Mr. Wallace to come forward and take the place of his cohort, Mr. Bissell.

(Mr. Wallace assumed the Chair.)

CHAIRMAN WALLACE: Gentlemen, in undertaking to fill the position temporarily vacated by our able, efficient and much beloved chairman, it gives me a very great deal of pleasure, and the pleasure is lessened only by the fact that Mr. Bissell, who will be your chairman next year, was not able to be here. I have been closely associated with him for the last several years. I pledge him to you as able a chairman as you have had, one who has his heart and soul and his interest in the safety promotion, not only in the Woodworking Section, but in the world at large, and who will serve you to the extent of his ability. I ask that you pledge him, on your part, your cooperation and assistance.

On behalf of these newly-elected officers, we have already given our assurance that we are your servants, to do what is possible in any manner, shape or form, to answer any demands to try to make this Section what it should be—one of the most efficient and powerful in the National Safety Council.

The next paper on the program is by Mr. H. G. Wiberg.

Saws

By H. G. WIBERG

**American Mutual Liability Insurance Company
Boston, Mass.**

I suppose most of you wonder where I come from, in view of the fact that there is a different name on the program. I must confess that it is somewhat of a surprise to me to find myself here. I feel also that I am a sort of a casualty—not the sort of casualty that is discussed in these conventions, but a political casualty. I think Mr. Gernon, who was to give this talk, found that he had to go to Rochester, and so I am substituting in his place. I am sorry, in a way, because Mr. Gernon has had a great deal of experience and has had a great deal of opportunity to observe saws all over the State of New York, at least. I am quite convinced that he would have been able to give you a great deal of information from his experience.

Of course, those of you who have attended Congresses for the past four or five years, know that we have had a great deal of attention given to saws. That seems to be a perennial bloom with the Woodworking Section. For a couple of years, we turned over (as I recall it) an entire morning to saw guard manufacturers and had them come with their products, explain them, demonstrate them, point out the advantages that they claimed for them, and then the members of the Section fired questions at them, brought up their problems, and tried to get a great many of the difficult points in the operations of saws straightened out.

Then we had had, in addition to that, talks on saw guards by people from manufacturing plants, Safety Engineers, Safety Inspectors, and discussions by the representatives of the various manufacturing concerns at the Congress.

So, I was somewhat at a loss as to what to say about saws.

I don't know whether any of you recall the paper presented by a Mr. Fuller, of the National Council on Compensation Insurance, a few years ago. He presented quite a voluminous analysis of accidents in seven or eight woodworking industries, the principal industries, and he laid quite a bit of stress on saws in that analysis. I thought I would like to go back to that analysis and point out some of the principal facts which he brought out, which I think have a very important bearing on the question of the saw guarding and saw hazards.

This analysis of his covered a period of six years—1918 to 1923, inclusive, and involved payments for the accidents in question, of about \$16,000,000. He covered 3,038 accidents, including a total of 570 deaths and 30 permanent total disability cases.

Now, let's come down to saws right away. He found that rip saws alone, produced 422 accidents and that these accidents cost 14 per cent of the total cost of all accidents. He found furthermore, that the accidents in the case of all other types of circular saws, amounted to 22 per cent of the total cost of all accidents in the seven or eight woodworking industries which he was working on.

There you have saws producing or causing 36 per cent of the total accident cost of all injuries in these woodworking industries, which indicates at once, the importance of saw accidents and the necessity of concentrating and continuing to hammer away on the circular saw.

These percentages of cost varied in some slight degree with the different industries, that is, they were higher in sawmills, for instance, than in sash and door mills, and in the case of furniture plants, the rip saw accidents were more costly than in plants of other types.

Just for the sake of comparison, I want to indicate the comparative cost of some of the other machines. He found that planers caused only about 3 per cent of the total, joiners about 3 per cent of the total cost, shapers about 6 per cent, which

would again reinforce the statement that I have made as to the importance of concentrating on circular saws and giving them our first attention.

He also found that the principal cause of accidents in the case of the rip saws was due to kick-backs. He had a record of 120 kick-backs, 73 of them resulting in a fatality. In other words 61 per cent of the kick-backs killed somebody.

That indicates that the kick-back is certainly a deadly proposition, and that we can't attach too much importance for the use of spreaders, pressure bars, non-kick-back devices, or any other means which will prevent that particular type of accident.

As I recall it, I haven't seen an exhaustive analysis of the causes of kick-back accidents, but I recall several that relate to the question of housekeeping which was mentioned here this morning. Several of them were due (that I know of) to material being on the saw table, being brushed into the saw, picked up and thrown.

Later I would like to have someone—or a number of the gentlemen in the audience—discuss this question of kick-backs and give us the benefit of whatever steps they have taken to reduce that hazard. I, myself, feel that in case of rip saws, either hand-fed or self-fed, the hazard can be taken care of very well. There are rip saw guards on the market now which absolutely prevent a kick-back. There are undoubtedly a great many homemade devices which do the job just as well.

I have heard of kick backs on self-fed rip saws, but I must confess that they have been very rare, and it seems to me that it is almost an impossible thing to happen, if the self-fed device on the rip saw is in good working shape.

I think that we have made commendable progress in the guarding of most types of saws, either by homemade devices in the various plants, or through the ingenuity of insurance engineers, or through the methods adopted by manufacturers, and that brings me down to a question which I think is a very important one on the question of saws, if not on the question of all woodworking machines.

I don't know whether you have noticed it, but I have observed for the last two or three years, the woodworking machine manufacturers are beginning to put real guards on their machines. It seems to me that that has been a rather belated development. I have, several times, talked to manufacturers of woodworking machinery at these Congresses, and have found that they didn't know anything about standards. They tell me that they didn't know where to get them, they didn't know of any organization that had drawn up standards giving the requirements. I have been very glad in each case, to tell them where they could find code books put out by different organizations such as Labor Departments, insurance companies, and engineering committees, and I took the opportunity in each case, to tell them that I thought that they were certainly asleep at the switch—that when they put out a machine which is a dangerous machine, they certainly should put it out completely guarded in so far as possible, instead of trying to compete with some one else's simply on a question of a few dollars' difference in price.

I don't know whether any of you have seen or have noticed the swing saws recently. There are at least a half-dozen manufacturers that I know of that turn out a swing saw now which has the blade completely guarded as far as the upper half is concerned, and the arbor nut. You know, we used to have quite a bit of difficulty in getting anybody to do anything on the swing saw, because they said there was a piece of metal on the inside, and that kept a man's hand away when he pulled out the saw. But we did educate the employers and it seems that finally the machine manufacturers have taken it up and they have taken it up in good shape. You can very conveniently remove part of the guard and change the saw. The guards they put on are solid, substantial, and very good.

I think that employers, before buying machine equipment, should require the manufacturers, by contract, to furnish machines which will pass the safety requirements of the states, the labor departments or industrial commissions of the state

in which the employer is operating, the insurance companies and the American Engineering Standards Committee.

I know of a number of cases where they have done that with entirely satisfactory results. I know of one installation of 35 or 36 machines where four out of the 36 were all that had to be changed, and in those cases, entirely new guards had to be bought, without, however, costing the employer one cent of money, and when those machines were installed, they met the approval of every labor inspector that walked through the place; they secured him credit in his rates from his insurance people, and there was nobody, in fact, who could take exception to them.

It seems to me that that is where a great deal of progress can be made in the future. I recall that in the laundry industry, the employers got together at some convention of the Laundry Machinery Manufacturers and said to them, "We don't propose to buy any more machines unless they are guarded, unless they will meet the inspection of the state authority and the insurance companies." That happened several years ago, and the latest that I have heard from it is that the manufacturers got together and gave the employers 100 per cent cooperation, so that every machine that they turn out now, that is, the machine manufacturers who are in the Laundry Machinery Manufacturers' Association, is completely guarded, and there is nothing for the employer to do to meet the requirements of the state authorities or the insurance companies.

There is one other thing that I think enters into this question of saws and saw guards—in fact, it enters into the entire question of safety. It has been borne in on me more and more as I attend these Congresses. I wonder if some of the men who come to them don't get the same idea that I do—that we hear somewhat the same thing over and over again. That is true, but I have come to the conclusion that the biggest thing in this safety proposition is the continual and everlasting hammering and pounding away at it. You have got to be on the job every minute of the time that a machine or a device or a plant is in operation. I don't think that all of us give consideration to the fact that you have got the employee working on a machine, you expect him to turn out a certain amount of work, and he has got to, naturally, give the biggest part of his attention and his effort to getting out that work. We say, after an accident has occurred, because the man didn't think, that it was carelessness or thoughtlessness. Possibly it was, but still I think that there is some measure of excuse for the man being thoughtless, and the way to get away from that is to keep at him, keep reminding him of it, so that he will get into the habit of thinking safely and carefully.

CHAIRMAN WALLACE: Gentlemen, Mr. Wiberg's address, I feel sure, has been interesting, instructive, and I trust helpful to us, and as a pinch-hitter, I think his batting average is about a thousand. This question of saws and saw guards has been one of abundant prolific discussion, and I am sure that we would be glad to hear any discussion or any inquiries now that you may have.

H. W. GABOR (New York State Insurance Fund, N. Y. C.): I agree with Mr. Wiberg that the tendency today is for manufacturers to safeguard their machines whenever they can be sold that way to the users of those machines, but we must never lose sight of the fact that a machine manufacturer builds his machines, in the first place, to sell them, and if the purchasers of those machines specify a circular sawtable, a swing saw or other type of saw, without including in that specification, the necessary guards, the manufacturers will sell that machine to the purchaser, if he can. It is very often a matter of price with the purchaser of a machine, and naturally, if there is competition between two manufacturers, they are all glad to sell their product.

If there is a matter of a hundred dollars' difference in the price of a machine, very often the user of the machine will purchase the cheaper machine, even today, although it is true that that tendency has been overcome to some extent.

I want to say this: That if the purchasers of the machines would specify in all

cases, as Mr. Wiberg brought out, that the machine should be fully-guarded, the machine manufacturers, whether it be woodworking machines, metal machines, or others, would do precisely the same as they did in the case of the laundry machine and that is to build their machines with automatic stops, and so on, including all the necessary safety devices. I would like to hear Mr. Wiberg give us the benefit of some of his experiences with variety sawtables, that is, that type of rip saw which, because of the miscellaneous operations performed on it, is termed a variety saw, and the methods which he has seen and which we know he has recommended for safeguarding those saws for certain operations.

MR. WIBERG: Mr. Gabor has brought up a thorn in the side of most of us, in trying to get saws guarded. I have in mind, a few questions, or at any rate, one, that I was going to ask Mr. Olsen, but I don't want to turn off Mr. Gabor's inquiry in that way. I think the variety table is a question of education and continually hammering the man who is using the saw. There is only one way that I know of that you can guard a variety table for all of the various operations, and that is, to have a guard for each of the various operations. I don't know of any one guard which will take care of it—in fact, I know it is impossible, because if you are doing a ripping job, you have a splitter or a spreader or a riding knife, whichever you call it. Then if you are going to do dadoing on that machine, you have got to remove the splitter, so it is obvious at once that you can't use one guard for all of the operations that can be done on that table. But you will have separate throats provided with the splitter or with the entire rip saw guard mounted on it, for use when ripping. You have pressure bars for dadoing or grooving, or you can have a foot to use, if you are grooving a board in the center or some precise distance. Otherwise, it would be necessary to hold that board just by the main force of the hand, and you wouldn't have anything to stop it in case it started to come back.

I was going to ask Mr. Olsen whether those miter saws, for instance, are used on that particular job practically all of the time. I was very much interested in his guard and I am going to talk to him afterwards about it to see what we could do toward adapting it for variety table work.

MR. OLSEN: Well, Mr. Wiberg, I think you explained the story on guarding of variety or miter saws or table saws, fully, because it is a rather difficult thing to do, to design a guard that will cover all operations—I will say, we found that out. We have shown three different guards that we used on a variety saw, one is the metal shield and the other is the bar with the splitter or spreader, and the other is a kick-back finger pressure device. The dado head and cut-off saw guard that we use does not even cover all the operations of that nature in our mills. In our pattern mills—we use the standard type of circular sawguard that you can buy in the open market, but we did not think that they would be the thing to use in a production shop—they were too slow. So, that is why we tried to develop something of our own design.

M. B. GATHMAN (Plant Manager, Fisher Body Co., Detroit, Mich.): In regard to Mr. Gabor's question here on the matter of putting on the guarded equipment, I think that is only a matter of time. In the past, the manufacturer has attempted to supply guards and go out into the plants later on and found them thrown aside, and has become discouraged. But now, the efforts that are being made for safety at the present time, are eventually going to bring them in line. The manufacturer is working all the time to provide guards.

There is one point that Mr. Wiberg brought up that I think should be investigated and that is this: Sixty-one per cent of fatalities in rip saw accidents. I think that should be investigated, to find out whether the accidents occurred from old-time methods of operations or whether they occurred on machines of up-to-date manufacture. I think, in the old days say 15 or 20 or 25 years ago, there were more rip saw accidents due to the way rip sawing was done. Today, with the

power-fed machine, chain driven, and with kick-back devices on it, we have very few rip saw fatalities. In fact, I do not know of any in six years with the great number of rip saws that we operate, and I think the accidents referred to should be looked into and that we should find if they are using obsolete methods, so that we will know whether we are talking about something that has already been taken care of or whether it is something that still exists.

MR. WIBERG: I will be glad to answer that question, at any rate, in one particular; those accidents occurred during the years 1918, 1919, 1920, 1921, 1922 and 1923.

CHAIRMAN WALLACE: I think that almost answers your question.

MR. GATHMAN: That may have been on equipment and method of doing things that have been obsolete for ten or fifteen years.

MR. WIBERG: That brings up another question which I might have touched on. I believe it was mentioned here yesterday, and that is the fact that a lot of these kick-backs are due to the condition of the saws themselves, irrespective of any guards.

CHAIRMAN WALLACE: That is dull saws.

MR. WIBERG: At a meeting last week, the statement was made that the Underwriters Laboratories in Chicago had tried to produce a kick-back. They had a saw which was in first-class shape, properly sharpened, set and gummed, and they couldn't get a kick-back. The thing absolutely refused to come back. The wood went through without any trouble at all. So they finally got a dull saw and a piece of wood that had been soaked in water for about six days, and they immediately got a kickback.

Someone here yesterday, I believe it was, said that in their plant they had turned over the responsibility for the proper condition of saws to the flier, and the understanding was that he would not sit up in his room and wait for them to be brought to him, but that he was to go out through the plant and see that they were in proper shape while they were working and to stop any machine on which the saw was not in good shape, change it, put on a sharp saw, and bring the other one up in good shape.

It seems to me that that is a mighty good thing and will be a big step forward if everybody should adopt that practice in cutting out the kick-backs and probably other accidents.

CHAIRMAN WALLACE: Here are two or three questions that have been presented. One is: Is there a practical shaper guard on the market? Mr. Olsen, can you answer that?

MR. OLSEN: Well, there is a practical shaper guard on the market to cover a part of the shaper-head, but I do not know of any guard that you can purchase on the open market that will cover the entire head. There are some concerns that have been experimenting with the automatic shaper guard the same as ourselves, and they have been more or less satisfactory. If you want any information on our guard, we will be glad to give it to you. We think it is rather expensive.

CHAIRMAN WALLACE: Mr. Olsen, I have two other suggestions—both seem to have been propounded to you. Mr. Norton, of the U. S. Bureau of Standards, asks this question: What is the gauge of sheet metal which Fisher Body uses on dust exhaust hoods, on molders, and so forth?

MR. OLSEN: I am not in position to give you that. I could take a guess at it. I think it is about 16-gauge.

J. B. GRIER (Safety Engineer, American Car & Foundry Co., Wilmington, Del.): I wish to state that we use a heavy gauge metal in all our hoods for all of our woodworking machines, with the idea that it will at least break some of the force of the flying knives or cutters should they come out.

CHAIRMAN WALLACE: Through Mr. Gunn, of the Pullman Company, Chicago,

this question is asked: What protection or device do you use to hold knives on heads of planers?

MR. OLSEN: We try our best to get the best bolts and nuts that we can buy on the open market, and put them through a rigid inspection before we use them. I do not mean that we are going to inspect every bolt or nut, but if you have established a reliable source, they will probably take care of the job of inspection for you.

FRED THOMAS (Rossman Corporation, Beaver Falls, Pa.): I have a particular hazard in a plant I am at, that isn't directly a woodworking question, but we happen to use a considerable amount of sawdust and shavings that come from the different woodworking industries. We find that the man using that shaving is subject to irritation, something like eczema, on the hands. These men are sent to the medical men who, in some cases, have the men patched up, but that same eruption or eczema, always shows a recurrence, and we are having that as a real hazard among thirty or forty men. I just wondered if anybody else had had that experience and could tell me what might be the best procedure.

MR. GRIER: We have had some cases of eruptions such as you mention. We found it particularly in wood that had been exposed to a chemical of some kind, and not in a particular wood. We have not had much annoyance from that source, and I am wondering whether or not you have eliminated everything else but the sawdust? I don't believe that the recurrence of this eczema, or whatever you find, is due to the sawdust. We never have a recurrence of that eruption. It is always on a different employee, or we soon discover the cause of the eruption. One time (I might just deviate from that a bit) we had hemorrhages from our band sawyer's nostrils. We took the band sawyer off and put on another man. The same thing happened with him, and we found that in sawing the wood, teak, that sharp particles irritated the nose membrane and caused the hemorrhage. We eliminated that by putting a blower system over our band saw. We have found that teak is a very gritty wood, and in high-speed machinery, at times you can see sparks fly from the teeth of the saws or cutters as you are making a cut through this wood. A good bit of it grows under water, and it is full of grit.

CHAIRMAN WALLACE: I don't suppose there is any place in the world where there is more sawdust than in a real, sure-enough band sawmill. Now, you operate two or three band sawmills, Mr. Orchard—did you ever have anything of that kind occur in any of your operations?

H. R. ORCHARD (Supt., Marathon Lumber Co., Laurel, Miss.): No, sir; we have never had any trouble of that kind.

CHAIRMAN WALLACE: I am thoroughly in accord with what Mr. Grier says. I don't think it is inherent in the sawdust.

MR. WEILL: The only experience I have had—the only wood that seems to cause a lot of trouble is Brazilian Walnut. A lot of the furniture factories have discontinued the use of it.

CHAIRMAN WALLACE: That comes back to the same question. It may be some peculiar property in some kind of wood, but I don't think, generally, it is true.

S. L. KENNEDY (Royal Indemnity Co., New York): Just a word of general observation on today's and yesterday's discussion. A couple of days ago, I said to my wife, "Tomorrow I am going up to the Convention of the National Safety Council to see what they are doing toward preventing accidents." And she quickly rejoined in a rather naive way: "Why," she said, "I am doing as much to prevent accidents as they are. Every time I cross the street, I look this way and that way."

The point I wanted to bring out is that the consciousness of a person that there is an inherent danger impending, whether it is crossing a street or in the mill or factory, or on a saw bench, is important. One of the speakers yesterday brought out the fact that the superintendent of one particular mill purchased every safety device that was recommended to him, to prevent accidents, spending a total of about \$60,000, and when he had them all installed, he said, "Well, now, I guess

that will cut down or prevent accidents." That was the end of his progress. The following week, there were about three hands lost and several other serious accidents, which only goes to show that unless along with your mechanical guards, your safety devices on your various hazards, you organize a comprehensive educational program which will instruct the operators how to use these guards (which in themselves, may be an inherent source of danger) you haven't completed your safety program. In other words, it is my idea that it is a very important thing to get the operators to think in a conscious way, that there is always an impending danger in the operations that they are conducting at the time.

That organization that I suggest is a mental organization, an organization of the operator's mind, along safety lines.

CHAIRMAN WALLACE: Some of the papers tried to bring that out. One of the subjects we had was "Mental versus Mechanical Safeguards."

I have one other question here from Mr. Weill: What is the method you use to guard large circular saws for ripping logs? What method do you use for guarding the carriage? I might say before I propound that question that I know of no modern sawmill that uses circular saws. There may be such; I don't know one.

MR. WEILL: They use them out in the woods, and that is what I mean.

CHAIRMAN WALLACE: I know of no industry that rips logs in the woods. There are none in our operations.

MR. WIBERG: Of course, you still have the carriage saw used in a great many large lumber yards and large sash and door mills and large furniture plants. They don't have logs actually, but they get large timbers and they re-saw them, and a great many of them do that on a circular saw.

For instance, you take the cigar box industry; they always prepare their veneer on circular sawmills. They bought these Brazilian Cedar logs which came here squared up and then they cut them up on the circular sawmills with the carriage. As I recall it, they usually cut down thin stock right on that large sawmill. I don't know offhand how you could guard them, but that brings up a question with a great many of these guards. I might have touched on that before in speaking, and that is the inclination of the man toward guarding—does he really want to guard it, or does he just simply want to ask somebody here where he can purchase a guard that will come already prepared, that he can slip over that? We had that same thing with the swing saw—simple as that appears now. There was a great deal of objection to covering the outside of the circular saw blade. How can we do it? How can we do it without stopping production? We would have to take the guard apart and take five or ten minutes to do it when we want to change a saw blade. That problem was solved very simply when somebody came along with the determination to do it, and that same thing exists to a large degree, in guarding all types of saws.

I know the railroad saw, as some people call it, or the foot-treadle saw, that was considered impossible to guard, for a while, but now you have several guards being turned out by commercial guard manufacturers. It is a question over and over again, of whether the man is fully determined to guard it.

I recall that in the chemistry profession that, as you know, you have certain principles for combining substances and they are supposed to unite and give you a certain definite compound, and it is supposed to be impossible to do it any other way. Well, several very important, far-reaching discoveries have been made in chemistry by some young chemist who, as it was put later, was damn fool enough not to know that it couldn't be done that way, and so he went ahead and did it.

G. A. ORT (Chief of Safety Dept., American Car & Foundry Co., New York City): There is one statement I would like to make in connection with the operation of saws. In our 16 plants, we have over a thousand pieces of woodworking machinery. All of the machines are equipped with safety devices. We have spent

over a million dollars in 17 years, in the application of safeguards. We have, however, in our employ, men who sometimes refuse to use the guards, throw them back, or take them off. Now, to prevent injuries to these men who can not see safety, we dismiss them, explaining why we put on the floor, a rubber mat to prevent slipping. I also don't know whether any of you have accidents due to slipping. We have had some. We have had fingers cut off, and I just bring that up thinking that it might be a suggestion that you may want to adopt in your own plants.

CHAIRMAN WALLACE: I have known that to be used successfully.

WM. FINDLAY (E. I. DuPont DeNemours & Co., Portland, Me.): To go back to this question of the gentleman over here about the guard for a circular saw in the woods—if anybody knows of one, we want to get the information on it.

CHAIRMAN WALLACE: Let's put that this way: Does anybody know of one?

MR. FINDLAY: We don't use many of them, but we use them in the woods in Maine, and we would like to know a way to guard them.

CHAIRMAN WALLACE: Does anybody know of an efficient guard for a circular saw in the woods?

ROBERT TOMS (E. I. DuPont DeNemours & Co., Portland, Me.): The discussion this morning has always come back to the point as to the efficiency of a guard and whether the manufacturers should be compelled to place them upon the machines, and the fact that after the manufacturers do place them upon the machines they frequently find them discarded and not used. It seems to me that the burden of having those guards used is entirely upon the management of the mill. A guard is placed upon the machine, and a man is asked to use that machine, and quite frequently you expect him to use that machine with that guard and turn out the same amount of stuff immediately, that he did before. He sees in that guard, a hazard, or something that is in his way, something that prevents freedom of action, and it is absolutely necessary, it seems to me, on the part of the employer, to give that man sufficient time to learn to use that guard increasingly and well and to teach him that to use that guard is really part of his job, that he is getting paid to use that guard upon that machine, and if he learns to use that guard efficiently, he is considered a more efficient man and should be a better man for the company, and better paid, and that part of his compensation will depend upon the efficiency with which he uses that guard. It seems to me that is one of the things that should be stressed in using all mechanical guards.

I know the attitude of the men, as a rule, and you can't change it unless you give them some incentive to use that guard when they have it.

Regarding guards on saws, I really don't know of any efficient guard for a circular saw, but we had an accident (fortunately, nobody was hurt). A band saw broke, as they frequently do. I was sitting in the office at the time, about 150 feet or 200 feet from the mill, and I heard the crash. I knew something had happened. I went down there and everybody was standing with his mouth open and looking scared, and I didn't blame them, because that jagged, broken saw lay across the carriage, less than a foot from the man who was operating the shifting of the carriage, and had that carriage been a foot from its position, we would certainly have had a fatal accident.

That led me to devise, if possible, some guard to prevent that saw from throwing itself over the carriage when it broke. Anybody who has used band saws, knows that they run at a high speed and there is a lot of potential energy released there if that saw breaks. We built down not a cast guard, but a steel guard and suspended that from the frame of the saw, so that it came down, as we thought, to a point that would never be touched by any log passing under that carriage. It came down so far in this position, so that it came out from the saw, followed to a certain extent. While we have never had a similar accident, I feel sure that should that saw break again, it would give a measure of protection to the man who was on the carriage.

CHAIRMAN WALLACE: Gentlemen, it is getting a little late. Our attendance is diminishing. Is there anything else that we have to take up before adjournment?

JOSEPH HONSA, JR. (Aetna Life Insurance Co., N. Y. C.): I would like to know something of your method in the maintenance of your guards in your plant—what procedure do you take? Do you let the operators operate those saws while the guards are being repaired or do you shut the machine down?

MR. OLSEN: We are in the position that we do not have our equipment guarded 100 per cent, so, to give you a direct answer to your question, I will say that if it is out of commission, they will not operate the machine. You know, guarding is only a small part of the job, anyhow. It is having the man properly instructed, and if you have got him sold on the idea of safety, the guard is only a small part of the job. You know, talking about equipment being guarded as it comes from the manufacturers, I think, that the manufacturers have gone a long way in the guarding of equipment and this applies to guarding of equipment in the mill, too. The reason they do not have guards that cover it better is because no standard has been developed.

One thing that I thought was always necessary was a brake on a jointer. They have made a move in this direction on the new type machines. They have provided a mechanical brake. It is only a question of standardization, and of course, that is a pretty hard thing to maintain, too, because, as we go along, our processes change and we develop new ideas. It is a pretty hard matter to maintain a standard.

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SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Public Safety Division

October 1, 1928

HOMER E. NIESZ, Chairman

President, National Safety Council; Manager, Industrial Relations, Commonwealth Edison Company, Chicago

The first session of the Public Safety Division at the Seventeenth Annual Safety Congress was called to order at two o'clock by the chairman, Homer E. Niesz, President, National Safety Council, Chicago, Ill.

CHAIRMAN NIESZ: This is a general joint session of the Public Safety Division with Electric Railway, Public Utilities, Steam Railroad, and Taxicab and Fleet-Owners' Sections. Mr. Matthew S. Sloan, who is scheduled to preside at this meeting, was unable to be present, although he expected to be up until noon. Circumstances over which he had no control compelled him to be elsewhere this afternoon.

The first speaker on the program is chairman of the Public Safety Advisory Committee of the National Safety Council and is Vice-President of the Council for Public Safety. Mr. Miller McClintock, Director, Albert Russel Erskine Bureau of Street Traffic Research, Harvard University.

Facts vs. Guesses in Solving the Traffic Problem

By MILLER MCCLINTOCK

Director, Albert Russel Erskine Bureau of Street Traffic Research,
Harvard University, Boston

There are obviously very great differences between facts and guesswork, not only in the problem of traffic regulations but likewise in all human problems. Guesses are so easy that we fall into the habit of relying upon them. They come to us readily and we reach conclusions easily from casual observations. Sometimes guesses are right, and that further encourages us to do things in an easy sort of way. Guessing is easy. It is the principal way in the past in which traffic control matters have been handled, largely due to inherent laziness and the difficulty men have in forcing themselves to go to the trouble to acquire facts.

Facts afford a basis, not for casual conclusion but for accurate conclusion. They do not come easily. In any problem, as soon as one makes up his mind that he is going to find out what underlies that problem he is immediately confronted with the necessity to spend energy, time, and frequently money in obtaining those facts. When a problem becomes sufficiently important in economic and social aspects to justify the expenditure of time, energy and money, then the collection of facts as a basis for the solution of that problem becomes justified, and I submit to you,

that if there is any problem confronting American cities today which justifies time and energy, it is the traffic problem with its congestion, delay, economic loss, and the tremendous social aspects which result from the killing of citizens.

The National Safety Council has gained a position of importance and has come to have a position of leadership in industrial safety, because it has been unwilling to draw conclusions on the basis of guesswork and has insisted that careful organization and adequate funds be provided to make possible the investigation of the conditions which it attempts to solve.

I am sometimes impatient, as I go over the United States, to hear people say the matter of public safety, the solution of the traffic problem, is, after all, only a problem of education. It is obvious that education is no better than the facts on which education is based. It does little good to jump to conclusions and run to the press to gain some immediate publicity. That is too frequently done in the United States and, as I say, the National Safety Council and those associated with it have gained a reputation for themselves because they have looked at the problem as one which deserves the taking of pains.

I want, without being critical, to illustrate some of the facts that have come to my attention in the past few years of traffic activity in the United States which show the necessity of having sound control methods. This aspect of the problem invades all factors of the traffic situation. I will only pick out the two most generally interesting to illustrate this subject. In the first place there is the matter of the use of automatic traffic signals.

Signals are installed in American cities in many cases without consideration for the need of stop and go control, without consideration as to the need of signals at particular intersections, or the type of control and timing which will best relieve the situation.

It has come to my attention through studies, before and after signal installation in several cities widely separated in the United States that they did not, in fact, improve safety at all, but increased accidents. Yet I can assure you that the persons who installed those signals would have told you without the slightest question that those signals had improved the accident situation at those intersections.

It was my duty some years ago to undertake the study of traffic conditions in one of the largest American cities. I was informed by important merchants that the matter of parking must not be considered for legislation. I asked why and was informed that parking along curbs was so important from the standpoint of retail business that any change in the status of free or unlimited parking would be detrimental to business. I asked these business men who were thoroughly informed on their business how much patronage came from curb parking. The replies varied from 25 per cent to 50 per cent. Some months later I asked these men to cooperate with the agency I was serving and they were amazed to find that instead of 25 per cent to 50 per cent, they could only attribute 1½ per cent to this source.

Naturally, the question arises, how can we get facts? How can we organize agencies sufficiently intelligent and responsible to get the facts and when obtained to analyze them and draw from them logical conclusions? After you have facts you can guess about conclusions, in which case your facts are valueless.

There has been a movement in the United States during the last five years which promises to put the problem as it relates to accidents on our streets on a sound engineering and scientific basis. Two types of agencies have been used during the last five years which were intelligently financed and supported and have given valuable results.

The traffic survey is a temporary affair. It is an organization of the traffic agencies in the city who have decided that they need to take an inventory of their situation. A traffic survey is an inventory of traffic conditions designed to show

the city what are the facts in all aspects and ramifications of the problem and to build on the basis of those facts a fundamental system of traffic control. That is all that a traffic survey can be and all that it ought to purport to be in the beginning. Where properly conditioned it gives the community a new idea of what can be done in the way of sound engineering practice. It is temporary and, of course, of no value unless the methods used in solving problems of this kind are perpetuated in that community.

I wish I had time to tell you of the splendid work being done in a dozen cities by the street traffic engineers. I will mention two or three to show you how they are organized. San Francisco has a traffic engineer, a member of the Department of Public Works. That traffic engineer has been in office for one year. He went into a political situation, the kind in which you would think facts would not prevail. Today no action is taken in San Francisco without referring it for investigation to this engineer.

Chicago has Mr. Leslie Sorenson, and conditions from a political point of view have not been entirely favorable. This agency has made substantial progress and there again few things are done without a reference to this agency for investigation. I might go ahead and mention several similar agencies which are thus solving our problems on the basis of facts and not on the basis of guesswork.

CHAIRMAN NIESZ: Mr. McClintock's presentation of this subject is now open for discussion.

E. K. EASTHAM (St. Louis Public Service Co.): Mr. McClintock spoke of some particular study made with reference to parking in which it was shown that merchants derived about 1½ per cent of their business from customers who utilized parking space in front of those places of business. I wonder if Mr. McClintock could tell us whether that would be a fair general average.

Mr. McClintock: I am fearful it would not hold true for all cities. The studies reveal a wide variation. The percentage of trade varies according to the automobile characteristics of the retail district and the size of the city. In Boston we find that 8 per cent of the total patronage could be attributed to curb parked cars. No two cities would be alike.

MR. EASTHAM: Have you struck any cities where the percentage has been greater?

MR. MCCLINTOCK: Yes, San Francisco. The curb parking patronage was 11 per cent. The total amount of automobile patronage ran, as I recall, about 16 per cent.

CHAIRMAN NIESZ: Any further discussions on Mr. McClintock's address? Then we will proceed with the next speaker, who is Mr. Ernest W. Corn, Field Representative, National Safety Council, Chicago.

Community Safety Leadership

By ERNEST W. CORN

Field Representative, National Safety Council, Chicago

If it were possible to adequately map or diagram the organization structure of the average municipality, it would be found to possess an interesting mosaic of interlocking and overlapping community organization structure, a large portion of which is ineffective and to a certain degree unnecessary. This has allowed the initiated to cry "over-organized" both in season and out of season. It is my conviction that the average community is not so much over-organized as it is wrongly organized, and the reason for this is very frequently due to the type of leadership that has inspired the organizations.

In every community there are various forces assuming leadership either in or-

ganization work or in the molding of public sentiment. Some of these forces are constructive, and, if properly put together in a community set-up, would add materially to the well-being of those living in the community; but many of them make use of their leadership powers for selfish purposes or for ill-conceived ends. The faddist finds a fertile field in most communities. It has been said that you can organize anything, or sell anything, at least to a certain portion of the gullible public in the average city. This is the fertile field for the fanatic and the crank and frequently brings organization efforts into disrepute.

Then we cannot overlook the social or political climber who finds in the promotion of an organization the opportunity to place him or her before the people in the hope that such recognition will give additional community prestige that may be used either socially or politically, as the case may be, in the furtherance of their own particular selfish end. There is, of course, also the copyist who in the course of his or her travels finds some new type of organization, some new problem being solved or some new group attempting to solve a problem and feels that in view of the fact that this is being done in some other community it should be done in their old home town.

We could illustrate at length the results of such sentiment in the average community. I am of the opinion that there are a good many traffic lights installed in the United States without any particular knowledge as to the need but largely because they seem to be the proper thing in Pumpkin Corner or Penobscot. But, fortunately, in all of this mosaic of ill-advised community organization, we have the cropping up from time to time of organizations which are the product of careful study and well-defined ends. It can almost universally be said that these organizations are the ones that have been inspired by business men, promoted by business men and in the final analysis of their program financed from the same sources.

In the matter of community safety, there need be no question in the minds of anyone relative to the need of some kind of concerted community action in this field. Preventable accidents are prevalent everywhere. While street and highway accidents may vary with congestion and the number of cars registered in a particular area, and while industrial accidents may naturally be commensurate with the importance of the industrial community, at the same time it can very safely be said to follow reasonably well the per capita ratios of the whole country. But this is even more nearly true in the case of home accidents. The home is a home. The hazards of the household are substantially the same whether it be the farmhouse standing individually and alone on the plantation or the ranch, or whether it be tucked in, in the midst of apartment houses, paved streets, hotels and factories in the center of our great industrial population. It is entirely a reasonable conclusion that the prevalence of home accidents varies but slightly. So we do not need to study the accident situation to establish facts, but rather to adjust the program for accident prevention to the picture of the general community, and to locate its most important field of activity.

There are three things that we can always add to the fact of the universality of accidents; they are always costly in life, limb and human suffering; they are always preventable, and we have proven through years of experience that they are always amenable to organized effort. With this experience back of us, it would seem that we are justified in the conclusion that whatever may be the mosaic of organization of the average community, it is not over-organized nor completely organized until some concerted effort is being made toward the reduction of preventable accidents.

The history of the organized safety movement in the United States under the leadership of the National Safety Council appears to justify the conclusion that a year-round program of organized propaganda and education as well as engineering can be justly expected to have a very definite effect upon the frequency of

preventable accidents. The National Safety Council is an organization of national scope. When it serves industrial plants, it has the industrial organization as the medium through which it can function. Very early in the development of the program of the National Safety Council there grew a recognition of the need for a certain association of National Safety Council members in the large cities. Representatives of these various firms got together, exchanged their ideas and began to interest themselves in the general problem in their communities. These were called local safety councils.

At this time there was no idea of the larger function of the safety council as we see it today but these groupings began naturally to evolve certain community programs, with the result that in a few years we had the demand for a community organization that would function under expert management and would address itself to the entire problem of accident prevention wherever it happened to lie, whether in the shops or plants, on the streets and highways, in the homes or in other public places. This program has met with considerable favor and in sixty cities in the United States to a greater or less degree it has been worked out. City administrations have welcomed such organizations; Chests and Chambers of Commerce have frequently incorporated them in their general budgets and programs of work and in many places, due to particular local situations, the community has been willing to support them independent of all other organizations and give them a free hand in their accident prevention work.

The question has frequently been asked whether this form of organization is applicable to a small community or not. Many of the smaller cities do not feel the need of such an organization due to the comparatively small number of people who are killed by accidents each year. While this number may be just as large per capita as in the larger cities, it does not loom as important when evaluated in cities of from 25,000 to 50,000 as when looked upon in cities of 500,000 to 1,000,000. It has been a serious concern of the National Safety Council just what form of organization might be used in these smaller municipalities to at least impress the need for this kind of service. In the smaller cities the organization structure is very much more apparent, due many times to the fact that only a few men and women can be relied on to head up the various organizations necessary in their community set-up. The addition of a new organization in a city of this kind immediately meets with opposition. Additional financial campaigns or financial obligations are also met with opposition and it is a serious question in the minds of a good many whether a full-time executive is needed to handle the comparatively limited program that would be possible in a city of less than 75,000. In spite of the fact, therefore, that we contend that many cities are wrongly organized rather than overorganized, it is a fact that a saturation point of community organization is more easily reached in the smaller than in the larger city, and any additional groups organized find considerable difficulty in maintaining a healthy, active program that will keep them from being a drag on the community and more or less of a reproach upon the service which they undertake.

It has occurred to us that there is one group of business men in every community who should be intimately and vitally interested in accident prevention in all of its phases. This group of business men is comprised of those who head up the service corporations very largely and such community associations as really get the vision of the value of accident prevention as a community function.

In many ways the service organization is a very specialized form of business. Service is a perishable commodity. The handling of the business of this kind is a day-to-day program depending for its success upon community confidence and the repeated willingness of the constituency to buy the service. We sell electricity by the KW hour, gas by the 1,000 cubic feet, transportation by the ton mile or the man mile, telephone and telegraph by the word or minute and even do the family washing by the pound or piece. The life of any of these companies and many more

of a similar nature depends upon a continuous purchase of the public. In practically every instance their capital investment is comparatively worthless except as it is operated for the services of the public. This is unlike a store of goods which, if the public refuses to buy, might be resold and remerchandised. A gas plant is not worth much except when it is in operation and even a laundry becomes a building with a bunch of junk when there are no clothes to wash. Public relations, therefore, and public confidence are very essential to the success of the service corporations. Anything that tends to build this up is of direct and important concern.

Aside from inefficiency in delivery of service or a general spirit of discourtesy to the community, I can think of nothing so potent in breaking down this willingness on the part of the people to purchase continually and repeatedly as a feeling on the part of the public that the service is a hazard. Electrical and gas hazards have set up resale resistance. Delivery systems have been almost barred from certain parts of cities because of the hazardous driving of their automobile operators. Anything in the way of a devil-may-care attitude upon the part of a service corporation will immediately militate against its ability to properly sell its commodity. On the other hand, there is a certain human interest in accident prevention, and the service corporation that not only privately but publicly allows it to be known that it is interested in not only the safety of its own employees and its patrons but that it is interested in the safety of the public; that its operations are courteous; that it has the proper public attitude, will find this attitude very effective in turning public sentiment toward such a corporation.

In safety council cities, almost without exception service companies, both utilities and others, are our staunchest supporters. They support our programs with their finances, with their staff and with the prestige of the company in the community. In many instances our councils owe their inception to the leadership of just such corporations. It seems to me that in the smaller cities and in a relatively smaller way the same type of corporations should assume the leadership and that it would mean much to them as business institutions as well as render a much needed service in the community in which they do business.

Why not crystallize in the non-council city, even from a few thousand population up, all of the service corporations into a community committee? Why not get them together, talk the problems of preventable accidents over and see what sort of a community approach could be had by bringing the forces of the existing organizations face to face with the problem? I would call into such groups the utilities, the transportation companies, both rail and others, the insurance companies, the dairies, the laundries, the dry cleaners, and I would not forget that in a very definite sense the chamber of commerce, the automobile club, and the women's organizations are service corporations.

Diagnose the problem, see where its greatest need lies, secure the volunteer secretaryship of some interested employee of one of the corporations whose boss will give him the time to devote to this form of community activity. Then divide the field and allocate the leadership of the various types of accident prevention work to either individual corporations or classes of corporations and let them assume as their own program the action in that particular field. Do not forget, of course, that some of this work can be done by the automobile club, chamber of commerce, the women's organization or any other of the community associations already existing.

Then, under the leadership of the National Safety Council, lay out this field, so organize it and engineer it that each one participating stays in his own back yard and have the results clear through a common secretaryship to avoid overlapping, and we have not a new organization but a community function with activities allocated to existing organizations that should in the large do much for the prevention of accidents. It will be found in certain communities that the chamber of commerce will be willing to add at least the part time of an additional staff man

to function as the secretary and the director of such activities. My suggestion would be that in such instances, due to the technique involved in accident prevention leadership, this man should be chosen because he is a safety man and then have him do some chamber work rather than a chamber man to do safety work. In many instances, it has been our experience that the work has been sloughed by chamber staff men and has not been given the interest and enthusiasm that it deserves. I am convinced that no community of any size can afford to be without some type of accident prevention organization. It will not do the job of a large, well-financed Class A safety council but it will do something and that is more than is being done in many of our cities today.

In the above discussion I have not mentioned the industrial corporations as such. I would leave these organizations out of any community picture. Many of them, in fact, are members of the National Safety Council and many who are not have ample safety organizations and are doing a strong accident prevention job in their plants. Most wide-awake industrial corporations are now interested in community welfare. They are members of the chamber of commerce, they subscribe to the community chest, they give to the capital fund campaigns and many of them have their own welfare departments that follow the sick or injured employee to his home, advise him relative to economic maladjustments and in every sense of the word endeavors to tie him in to an industrial community in fact as well as in name.

These corporations are interested in accident prevention as it affects their employees outside the shop hours as well. Certain research work that we are making now confirms the opinion that in well organized safety plants it is not uncommon that three to four times as much time is lost due to preventable accidents outside of the plants as from those occurring inside the plants. These accidents occur on streets and highways going to and from work; they occur in the homes and in public places during the recreational hours of the employees. The man is just as dead, whether he is killed on the streets and highways or in the shop. The hole he leaves in the working gang has to be filled just the same. Labor turnover costs the same and the disruption of gangs and intensive operation results in the same loss whether this lost time is due to an accident in the industrial plant or whether the man is run down by an automobile on his way home. And so these corporations are interesting themselves in public safety, and rightfully so, the community will find them ready to cooperate and they, too, should be tied into the picture as described above.

And now just what do we expect to get out of a thing of this kind? Where do we come in? Must it be set down as a matter of philanthropy upon the part of the service corporations or industrial companies or even the associations in the community? Or is it possible for us to realize when we look at the situation more carefully that it is merely another expression of good business? I am convinced that it is not unreasonable to enumerate among the values to be expected from a program of this kind better public relations for the cooperating companies. Public relations is an asset, a reduction in sales resistance to certain commodities, from the installation of gas in the home to a feeling of safety upon the part of the man who buys his transportation by the mile in a taxicab. We might add to this a profitable protection of employees and their families whether during the hours of employment or while they are off duty. The experience of the safety councils has been that intensified community action under proper organizations and leadership results in a substantial reduction of preventable accidents in the average community.

Accidents are no particular respecters of persons and the innocent as well as the guilty are often the victims. Anything that increases the chance of protection and safety of the employee of any concern or his family is playing directly into the hands of that corporation. If I were in the executive offices of some large corporations I have known I would seek by any means under the sun to protect my corpo-

ration from the odium of the reputation of public carelessness. I would certainly see to it that a very radical change took place at once and I am sure that the executives of these companies would do the same if it were possible to hear the criticism that is directed at them many times by the general public. The cost of this change may never show on their books for they have never realized the advantages of such a reputation, so they cannot figure the loss, but it is there just the same.

Granting that a corporation is willing to do such things as I have described above, if they were to go out and undertake to discharge their obligation to the community, but to discharge it over their own men instead of through the medium of a community organization they would find the effectiveness of their program discounted due to the prejudices of the public who would contend that it was purely a selfish movement in behalf of public favor. The same results can be had and an increased preventive effected through a community movement without being discounted. And so we have the values of proper community relationship and in addition we have a very definite accrual in financial returns due to the reduction of preventable accidents. It, therefore, does not need to be classed in the category of the philanthropic but rather as a forward step in good business for any corporation that depends for its success financially upon the good wishes of the general public.

This brings us to the perfect analogy with the relationship of the National Safety Council and its service contact with its corporation members. When we get ready to do a job of accident prevention leadership for an industrial corporation, the first thing we will want to find out is who will be our representative in that organization, who will receive our material, who will put it across and who will help to crystallize into shop sentiment the ideas and suggestions that go out from our office. This has been comparatively simple because all corporate bodies are organizations. There is a natural crystallization of leadership here and, therefore, an increased efficiency in the relationship of the national organization with such concerns. But how shall we reach the community? Who shall we write to? Who will function by proxy for us in getting over the program we recommend for the reduction of accidents in a city? The only answer to this question is the formation of a community group which will assume the leadership and direction of an accident prevention program related to the community just as the personnel men or safety engineer of an industrial concern assumes the leadership for the accident prevention work in a plant. The program will always be more indefinite. It will be harder to make it 100 per cent efficient. It will be more difficult to get the cooperation of all of the elements of the city than it has been to get the cooperation of industrial employees. But be that as it may, if we are to do our job and if we are to render the service that we wish to give to cities of all sizes and in all locations, it must be either through the addition of this particular function to the present program of an association, community in scope and unselfish in purpose, that already exists, or the crystallization of a community group which will take the responsibility and discharge this leadership in an adequate manner.

This approach must necessarily be flexible. We have consistently refused to state a national policy upon it due to the very great variety of existing community organizations. In some cities we can confidently lay this obligation upon the Chamber of Commerce and realize that it will be efficiently discharged. In others, the Community Chest will be glad to make it one of its many duties. The automobile club is interested in street and highway safety especially, and relating its work to all ages from the school child to the adult driver, functions efficiently in certain fields of accident prevention, and it is not uncommon for a manufacturers' association to be very much interested in the work of its own plant's members. But relating the program to the individual community in whatever manner may seem feasible and wise, it still is the function of the community and if the provision for accident prevention in all of its phases does not exist and cannot be made to exist

through the present organization, then such a community has not fulfilled its entire obligation to guarantee, in so far as possible, life, liberty and the pursuit of happiness to every man, woman and child in its bounds until it has done something sincerely and unselfishly to protect them from the hazards of modern life and to preserve them whole in body, unhampered by economic maladjustments due to preventable accidents, and free from the worries and uneasiness caused by community hazards, by reducing in so far as possible those risks which are incident to modern society.

CHAIRMAN NIESZ: Mr Corn's paper is now open for discussion.

NORVIN E. GREEN (Louisville Car Wheel & Ry. Supply Co., Louisville, Ky.): Mr. Corn has told us about getting cooperation of street railways, public utilities, etc. We did that in Louisville and ran into great trouble because the general public thought we were a cat's paw for the taxicab company, gas and electric and street railway. We had for our first president, the president of the taxicab company and today we have the lowest rates on taxis in the world but the people were still suspicious. We could not get along without the financial cooperation of these organizations but I would suggest that they be kept in the background if possible.

CHAIRMAN NIESZ: The next talk is to be presented by Mr. Robert I. Catlin, Secretary of the Aetna Life Insurance Company, Hartford, Conn.

Why Insurance Companies Are Interested in Automobile Accident Prevention Work

By ROBERT I. CATLIN

Secretary, Aetna Life Insurance Company, Hartford, Conn.

I consider it a privilege to address you on this subject, as I believe the attitude and interest of insurance companies concerning this particular matter may be underestimated as well as misunderstood. Insurance companies are, I believe, doing far more toward promoting the saving of lives and property than the public realizes and I wish I had the time to tell you of some of the things which the Life, Casualty and Fire Insurance companies are doing in this direction.

Why are insurance companies, like the Aetna, which I represent, interested in automobile accident prevention work? Primarily for two reasons; first, they want to be, and, second, they must be. On the one hand, it is a matter of choice; on the other, a matter of compulsion.

Using a word recently popularized by President Coolidge, we "choose" to be interested in automobile accident prevention work because, recognizing the seriousness of the situation and appreciating to what extent our organizations, scattered over the length and breadth of this country can help, we desire to put our shoulder to the wheel along with other agencies, such as the National Safety Council, in order to see what can be done toward solving a serious problem; and, believe me, it is a serious problem.

When one stops to consider that during 1927 over 26,000 persons were killed and approximately 800,000 seriously injured through automobile accidents, and that the showing for the first six months of 1928 indicates at least 27,500 persons will be killed during this year, or approximately 100 people killed or seriously injured every hour of 1928, it can readily be seen the situation is not only serious, but that automobile fatalities and non-fatal injuries continue to climb at an alarming rate.

It is rather significant that 1927 is the first year that the number of deaths and injuries caused by automobile accidents increased faster than the number of cars

registered. The population of the country increased approximately $1\frac{1}{2}$ per cent, the number of automobiles registered increased 5 per cent and the number of motor casualties, 8 per cent. I believe these figures speak for themselves.

While I feel much can be said in commendation of the quality of work being done towards improving the automobile accident situation, certainly there is much room for improvement in the direction of quantity of work. Without, in any way, impairing the quality of work, we should bend our united efforts towards placing both the quality and quantity of work on a higher level and, in this direction, here are some of the things to be striven for:

- 1—A keener appreciation of the value of human life.
- 2—More efficient and courteous operators of automobiles.
- 3—More interest on the part of owners in keeping their automobiles in good operating condition.
- 4—Adoption of uniform laws and ordinances regulating the use and operation of automobiles.
- 5—A stricter enforcement of motor vehicle laws.
- 6—Education of the public, especially children, as to the effect of a growing congestion of automobiles.

Speaking of increasing the quantity of work, I should like to see the press of the country encouraged to give greater space to the presentation of facts and figures concerning automobile accidents, especially those occurring locally. If this data is presented in such a way as to attract attention, it is bound to create interest and, possibly, a determination to improve the situation. Legislative bodies should be encouraged to adopt much measures as have been suggested by the Hoover Conference on Street and Highway Safety and especially does this apply to the matter of the proper examining and licensing of *all* automobile operators.

Only twelve states: Arizona, California, Connecticut, District of Columbia, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, Pennsylvania, Rhode Island and Vermont require an examination of drivers before granting a license to operate an automobile. In six other states: Delaware, Maine, New York, Washington, West Virginia and Wisconsin, the examination is optional. I believe that considering the matter from all angles, it can be truthfully stated we have been very lax in the enactment of proper legislation which would require *all* operators to pass an efficient examination before obtaining a license to operate an automobile.

Lastly, there is the matter of more adequate information concerning automobile accidents. Aside from the States of New York, Connecticut and Massachusetts, very little is being done toward procuring and compiling data which show under what conditions automobile accidents are occurring. If we are to tackle the problem efficiently, we should have the necessary detailed information on which to base the attack.

As I have already stated, we are interested in safety work because, through compulsion, we must be. However, I am pleased to say the chief reason for our interest is a matter of choice.

Selling automobile insurance as we do, it is our desire as well as our duty to sell insurance protection to as many owners of automobiles as possible. To accomplish this, it is only reasonable to assume the more attractive we make our charges for insurance, the more easily the coverage can be sold.

Not over 25 per cent of the automobiles operated in this country are insured, i.e., from the standpoint of insurance affecting personal injuries and property damage. Furthermore, most of the automobiles insured are those located in cities and the territories immediately adjacent. Entirely too few automobiles in the smaller centers and rural districts are insured. Undoubtedly, the present cost of carrying adequate insurance protection is causing many to attempt to get by without it.

Now, what effect is the increase in motor casualties having on the cost of insurance? There can be only one answer, i.e.,—it is forcing the cost upward. In order to show you why this is true, I shall outline as briefly as possible the plan followed in the making of automobile rates or premiums.

Automobile rate making is essentially a problem in cost accounting. It consists in accurately measuring those elements which make up the rate. Generally speaking, the automobile rate is made up of two elements, one of which may be designated the loss and expense element, and the other, the overhead and profit element. The loss element represents that part of the premium dollar necessary to defray losses incurred under the policy contract and the expense of investigating, defending and settling claims. The expense element, sometimes referred to as "overhead loading," is necessary to defray the cost of acquiring the business, the administration of the business, the expenses of taxes and, at the same time, provide a profit to the company. It may be well to state that the profit allowance in the automobile rate is but $2\frac{1}{2}$ cents of the premium dollar.

The loss element of the rate, which is commonly referred to as the pure premium is determined from the detailed statistics of the insurance companies. For rating purposes, the United States is divided into approximately 250 territories and statistics are maintained along the following lines:

First, a separate experience is kept for every city in the United States with a population of 100,000 and over and for certain areas suburban to the larger cities.

Second, a group experience is kept on cities of 25,000 to 100,000 population in each state.

Third, a group experience is kept on all towns and villages of less than 25,000 population in each state and this is what is commonly known as "Remainder of state" territory.

It has been determined that a city ought to develop an annual exposure of 5,000 cars with attendant losses of about \$100,000 before its individual experience can be given any credence. Communities developing less than this minimum exposure are grouped together with other communities of proportionally the same hazards, so that a dependable volume of experience may be used for establishing rates. Separate statistics are maintained for each line of automobile insurance and within each line, a statistical division is made for the type of car insured, be it private, passenger, commercial, public or dealer or garage. Under each of these divisions a record is kept of the number of cars insured, the premiums received, the losses paid and outstanding and the number of claims arising in connection with the operation of those cars.

The pure premium or the loss element to which I have already referred, is really the foundation of the rate and is obtained simply by dividing the sum total of the losses incurred, inclusive of all claim expenses, by the number of cars exposed to risk. In calculating pure premiums, the experience for four years is usually taken into account, modified, however, by such trends as may be evident.

A knowledge of local conditions is invaluable to the rate maker. Local business conditions, the political situation, the existence of public safety activity, the legal situation, the prevalence of ambulance chasing and other things of a kindred nature, are particularly valuable in the interpretation of the available statistical data. Specifically, they give concrete meaning to upward and downward trends that may be indicated by the experience.

After pure premiums have been calculated for various territories and classifications, the next step is to work out the rate, which is done through adding a reasonable loading for the overhead or expense element.

It is hard to conceive of any other business that analyses its costs so minutely and which is willing to have the result of that minute analysis publicly known.

Now that I have sketched briefly the basis on which automobile rates are made,

I want to emphasize this particular point, i.e., the fact that individual communities with a dependable spread of experience are rated on their own individual experience. Therefore, in a very large measure, such communities have in their own hands the power of making their insurance rates. It naturally follows that if the number of automobile accidents increases, the rates must naturally show an upward trend. On the other hand, if such communities get back of an efficient safety program and thereby improve their automobile accident situation, lower rates may be anticipated.

According to information recently released by the National Automobile Chamber of Commerce, twenty-five of our larger cities show more than a 10 per cent increase in motor fatalities for the first seven months of 1928 as compared with the same period for 1927. Considering the amount of safety work being done in some of these cities, the showing, I feel, is rather discouraging.

What are some of the things the insurance companies are actually doing to improve the automobile accident situation?

First, through the establishment of Safety Engineering Departments, a great deal of study is being given to an analysis of the causes of accidents, especially those applying to risks insured.

Second, at every opportunity company employees, agents and other representatives are being encouraged to tie in with the work of local Safety Councils or any other safety movements and appreciating that these representatives are scattered throughout the cities, towns and rural districts of the whole country, it would seem that much might be accomplished through this medium.

Third, through the National Bureau of Casualty & Surety Underwriters, effort is being made, especially along educational lines, to assist in the plans laid out by the National Safety Council.

Fourth, through the rendering of accident prevention and safety engineering service for motor fleets. Usually, this safety service is so flexible that whatever conditions surround a particular risk, it can be readily adapted to fit the situation. Among the features which have been designed to assist fleet owners in carrying on a regular campaign for safe driving are the following:

- Safety slogan cards for installation in each automobile.
- Drivers' lessons to inculcate the principles of safe driving.
- Safety bulletins for posting on garage bulletin boards.
- Drivers' meetings with talks by experts and round-table discussions.
- Accident report forms.
- Vehicle defect report blanks for the convenience of drivers in reporting any repairs that may be needed.
- Accident analyses charting any accidents that may have occurred, showing cause and nature.

Recommendation on personnel, based on our records and specialized experience.

Routing so as to avoid danger zones and increase efficiency.

When urging owners of motor fleets to tie in with accident prevention and safety engineering service, we point to the fact that considering the matter purely from a selfish standpoint, they cannot afford to disregard the issue. Here are at least nine reasons why accidents involving the fleet owner's automobiles affect his pocket-book and business:

- 1—An abnormal depreciation of the equipment.
- 2—Increases in monetary investment through the necessity of procuring extra equipment.
- 3—Cost of making repairs to damaged automobiles.
- 4—Damage to merchandise transported.
- 5—Loss of trade caused by unreliable deliveries.
- 6—Loss of the advertising value of well-kept and operated equipment.

7—Adverse effect of damaged equipment on drivers.

8—Loss of good will which is so essential to any well-run business.

9—Increased cost of proper insurance protection.

It is indeed gratifying to be able to report that through each of the four mediums which I have mentioned, satisfactory results are being obtained and the outlook is promising.

In closing, I should like to refer briefly to compulsory automobile insurance concerning which there is much discussion today. Time will not permit my saying more than this.

The chief concern and effort of the public should be directed towards the elimination of automobile accidents, rather than towards providing a monetary compensation for those affected by the effect of automobile accidents. In other words, placing first things first, let's tackle the cause of automobile accidents and I am sure the effect will take care of itself.

While there is much to be said for and against compulsory automobile insurance, I believe that wherever and whenever the subject is considered, first attention should be given to ways and means of eliminating automobile accidents. Then, that problem has been properly attended to—careful study should be made as to the proper way of compensating innocent parties whose person or property has been injured or damaged through an automobile accident.

It is far more important to save a life than to compensate for one.

CHAIRMAN NIESZ: Any discussion or question on Mr. Catlin's paper?

HARRY RAINES (Director, Washington Auto Driving School of Brooklyn, N. Y.): Have you ever made any studies of a group which is not insured and a group that has been insured?

MR. CATLIN: I do not believe that the carrying of insurance increases accidents. I believe a relatively small proportion of automobile owners become more careless when they carry insurance. That has been borne out in Massachusetts by the experience under their compulsory automobile law. We try to eliminate those persons whom we insure if we find they are irresponsible or careless.

MR. RAINES: Does insurance check up the driver to see what experience he has?

MR. CATLIN: Our Company spends \$100,000 a year investigating prospects for automobile insurance. We investigate them as far as we can.

MR. RAINES: I think they should investigate the driver to show proof of his experience before his insurance is issued. Under my experience when they enter our school, a fellow says, "I want a few lessons, how long will it take?" We tell him it will take so long and he says, "Oh, I only want a few lessons, I am insured."

MR. CATLIN: I do not think it is our duty or responsibility to weed out the irresponsible drivers. I think that is a duty that belongs to the State. (Applause.)

PERCY C. ABELL (Mgr., British Columbia Safety League, Vancouver, British Columbia, Canada): May I ask what is the fate of the widows and orphans of people suffering from irresponsible automobile drivers?

MR. CATLIN: I believe a study should be made as to proper compensation to those who are hurt through no fault of their own but this is certainly not the right way to approach the accident problem as I see it. Let's get at the cause. I believe all of you realize that it is only right and fair that those who do suffer through no fault of their own, a personal injury or damage to their property, should receive compensation and therefore we are urging owners to carry insurance protection so that when it comes to a matter of compensating someone they will get it.

F. H. WYSE (Canadian National Safety League): What results have been obtained by compulsory automobile insurance in Massachusetts?

MR. CATLIN: It is too early to state definitely the effect of the Massachusetts Law. We have not seen sufficiently the effect of that law to comment very intelli-

gently upon it. However, I believe that persons sustaining personal injury in Massachusetts are receiving compensation in many instances even though they were contributory in causing the accident. We know that the number of accidents, the number of fatalities, the number of non-fatal personal injuries have increased but whether or not these are caused by the law I cannot say.

LOUIS MCBRAYNE (Massachusetts Safety Council): For personal injuries under compulsory insurance I think there are no legitimate unpaid claims. There are pending a great many cases where the motorist did not carry property damage and claimed under \$100 personal injury. When it is difficult to prove that anyone suffered, we investigate. An investigation brought out the fact that there was a downward trend in fatal accidents as against last year; a downward trend in injuries to pedestrians and an increase, apparently, to occupants of the cars. The motorist did not hit as many pedestrians but apparently injured more people in cars.

MR. WYSE: I would like to ask if there is any better reason for compensation for the industrial worker hurt in an accident than for compulsory automobile insurance?

MR. CATLIN: Several plans are being tried out: the Massachusetts plan, the New Hampshire plan, the Connecticut plan, all of which have in mind the same purpose and I feel that it is entirely too big a problem to jump at conclusions. Some of those states that have enacted compulsory laws are now already inclined to believe that they acted too hastily. I personally feel this way: Instead of following the Massachusetts plan I believe that the logical plan is the one being tried out in New Hampshire and proposed in New York and Pennsylvania which plans were passed by both legislatures and were not signed by the Governor for certain reasons. That law provides that anyone causing a personal injury or damage to property shall either compensate that person or surrender the operator's license pending a disposition of that claim. That is the most economical and practical way to go at this problem. I do think it is wrong for us to go into a plan of this character with such far reaching effects without first analyzing and studying the effects in those places where it is being tried out and fairly tried out.

CHAIRMAN NIESZ: This subject is a very interesting one and might be carried on for some time. It will be necessary to proceed with the next paper on the program, which was to have been presented by Mr. John W. Lieb, Vice-President and General Manager of the New York Edison Company, New York City. Mr. Lieb was unavoidably detained on account of having to attend another convention this same week. His paper will be presented by Colonel J. P. Jackson of the New York Edison Company, New York City.

The Contribution of the Electric Light and Power Industry to the Safety Movement

By JOHN W. LIEB

Senior Vice-President, The New York Edison Company, New York City

The electric light and power industry has been a dominant influence in the United States in promoting safe living and working conditions, by having provided the means for effective lighting, relatively safe industrial working conditions, and the reduction of heavy muscular labor.

After the early scientists and discoverers, Volta, Ampere, Oersted, our own Joseph Henry, Michael Faraday, Benjamin Franklin, and a long line of distinguished investigators and inventors, had wrested from Nature a sufficient knowledge of electricity and its practical applications, electric lamps, arc and incandescent, were invented and made easy the lighting of pitfalls and dangerous or dark places.

Largely because of the availability and knowledge of electricity, the application of the electric motor and electric drive has resulted in the creation of the labor-saving machines and appliances of today. These machines, through the medium of ingenious, power driven, materials handling contrivances, constitute the modern facilities for the orderly, economical, and relatively safe chain of operations from raw material to finished product required for America's enormous mass production.

The contribution of the industry to the safety movement also includes active service in the development of safe practices in the generation, distribution, and utilization of electricity for the protection of its own workers and the public; cooperation with the medical profession in studies of the effects of electrical shocks, methods of resuscitation, and other needed treatment for those who have been shocked; and aid through its electrical service in the effective equipment of hospitals and sanatoria with ultra violet light, X rays, fluoroscopes, etc., and in the use of a large number of electrical instruments which now form part of the resources of the medical profession.

Attitude of the Industry

The attitude of the electric light and power industry toward the safety of its employees, and of the public which it serves, was well set forth in an address by your chairman, Mr. Matthew S. Sloan, delivered before a group of safety experts at a recent meeting of the Empire State Gas and Electric Association in Albany, New York. He said:

"In considering accident prevention or safety work, there are two points of view which come to any public utility executive. The first, and to my mind the dominant one by long odds, is the moral obligation involved. I hold that we are morally obligated to do everything possible within our companies and within our industry to prevent accidents and to assure the safety of life and limb of our workers on the same basis as we are morally obligated to be honest in our business transactions. A basic human relationship is involved. It is our responsibility, and it is our privilege. In an industry which has ideals such as ours, and which serves the comfort and happiness of human kind, we could not evade if we would this responsibility for saving the flesh and blood of our own people.

"We have also a responsibility in this respect to the general public—a responsibility as companies to safeguard members of the public as well as our own people so far as our operations carry or tend to carry any hazard affecting the public; and a responsibility as an industry to do our part with other community agencies in general safety movements."

The electric companies of the United States have accepted the obligation and responsibilities to which Mr. Sloan referred, and are giving to them the same intelligent attention that is applied to problems relating to engineering equipment, good service, continuity of operation, and economy in electrical production and distribution.

Electric Illumination

Probably the greatest single step in the direction of safety was taken when Thomas A. Edison invented a practical, flexible, and portable electric incandescent lamp, and shortly thereafter started operation of the first central station for the generation and distribution of electrical energy for light and power purposes, in Pearl Street, New York City, in 1882.

The combination of the generating station and a practical system for the general distribution of electricity which rendered the incandescent lamp commercial, made possible the introduction of safe lighting units in the workshop and the

home, and made available their application in widely varying sizes and adaptation to all possible situations. The effects of this have been almost revolutionary in nearly every phase of life.

In the home the electric lamp has promoted the prevention of accidents by making unnecessary the use of the candle, kerosene lamp, the fish tail gas burner, and other open flames used for lighting, and its ready use for illuminating stairways, cellars, attics, closets, and other dark places.

In the factory and shop the application of electric lamps has made possible industrial production in pleasant environments with adequate general illumination, with effective local illumination over the machine tools, and with portable lamps for close inspection of delicate processes, all of which are contributory not only to better safety conditions for the worker but result in greater output and better quality of product.

In the days before electric service had become common, the large and usually dull and unattractive interiors of shops were difficult to light; today, good lighting is the rule in all properly equipped industrial establishments. The localized intense illumination needed for safety and efficiency in industrial operations requires not only intensity and concentration of light on the work, but lamps which can be placed at any point and moved around to any position, with appropriate shades and reflectors to project the light and protect the eye. Electric light is particularly well adapted for such service, especially in the units provided by incandescent lamps. Railroad or shop yards, and other work places not under roof were relatively unilluminated before the electric arc light became available. Kerosene lanterns carried by workmen were almost the only form of lighting, with the result that such places were often quite hazardous. Today, in the yards of establishments where work is carried on at night electric illumination of high intensity furnished by arc lamps or now usually by large gas filled incandescent lamps is the rule. In underground work in mines and quarries use of the electric lamp in drifts, shafts, mine "rooms," etc., has proven particularly valuable as a safeguard to life and limb through avoidance of the terrible explosions of mine gases. Mine haulage by electric locomotives and trains has contributed not only to the more efficient handling of coal and ores but has produced safer and more satisfactory conditions for the mine worker.

Those who have studied the subject state that many industrial establishments have failed as yet to obtain the full advantages of electric illumination for promoting production and safety. This is a weakness that should be quickly rectified, for the cost of adequate illumination is so moderate compared to the total cost of the product that a small improvement in lighting brings most abundant returns in improved production.

The immeasurable advantage in the prevention of accidents by the use of electric lights on the streets of our cities needs no argument or illustration; it is self-evident. Those who can remember the conditions existing before the days of electricity, or those who were compelled to go about in the darkened cities of Europe, during the great War, must have a vivid conception of the improvement in safety which has been gained by efficient, modern systems of street lighting. The need of light where traffic is heavy, is rapidly causing roads to be lighted for long distances out into suburban territory, and it seems likely that this practice will gradually be extended until all important, heavily travelled, through roads have been covered. With the rapid networking of the country with electrical transmission and distribution lines, this result is yearly becoming more easy of accomplishment.

The Illuminating Engineering Society, the American Institute of Electrical Engineers, the National Electric Light Association, lamp manufacturers, and others have given much study to the best illumination for different purposes.

Thus, as an illustration, in shops good lighting intensities may be found to vary between 1 to 20 or more lumens per square foot at the point of use, depending upon the character of work to be done; in outside construction, from $\frac{1}{4}$ to about 5 lumens per square foot may be needed on the work; on streets it may vary from a few hundredths to one or more lumens per square foot at the road surface, depending upon the kind and character of the thoroughfare. The lumen is the amount of light that will fall on one square foot of a sphere one foot in diameter with a unit candle at its center. Each lighting project, however, must be carefully studied separately to obtain the best results required for local conditions. Of course, shading, reflection, absence of glare and quality of light, as well as volume, enter into such studies.

Incidental to safety on the highway, rail or water, electricity has been fundamental to the development of effective signal systems and satisfactory head lights for moving vehicles. Modern lighthouses, with their extremely strong lights, channel buoys, and automatic colored street signals are developments resulting from the extended use of electric power. Undoubtedly, signalling and high power beacons for landing fields required in the air service will be equally dependent upon it, making night flying safe and expeditious.

The sessions of the International Congress on Illumination held at Saranac Lake during the week just closed were largely taken up in the discussion of signaling systems for streets and highways, standardization of signal colors, head-lights for passenger automobiles and trucks, illumination of streets, highways, and factories and relation of lighting intensity to output and avoidance of fatigue.

Power in Industry

The electric light and power industry has contributed greatly to the safety of industrial work by making it possible to substitute electrical power for mechanical power and human brawn.

In a plant driven and operated by mechanical means alone, the power must be transmitted and applied in the individual machines through the use of rope-drives, shafting, pulleys, belts, gearing, clutches, or other mechanical transmission and speed changing contrivances. Many accidents have occurred because of these mechanical devices. The substitution of the direct connected electric motor permits the transmission of the necessary power through insulated and protected electric wires; and the finest changes of speed of electrically driven machines can usually be made without the use of cone pulleys or gears, or at least a substantial decrease in their number is possible. The result of this has been that the production hazards in American factories, when electrically equipped, have been much reduced. Any attempt to use mechanical power alone for the huge mass production, as developed in the last few years largely through the practicability, flexibility, and convenience of application of electrical power, would be found impracticable from the stand-points of operation and economy and would also offer hazards to the life and limb of the worker which would prove a serious if not prohibitive obstacle.

One of the most useful characteristics of electrical power, for promoting safety, is its easy control and flexibility. Thus, in a train of operations, such as in paper making or newspaper printing, it is possible through electrical control to shut off the power at many points. By this means a workman may protect himself by cutting off the power instantly from the place where he is at work and preventing its being turned on elsewhere. In handling materials, the ease of control and ready application of electricity to cranes, hoists, conveyors, industrial motor cars, etc., has been especially useful. Handling materials is the greatest source of accidents in most industrial plants. Nevertheless, the number can be kept down. Thus, an organization of about 800 men, which stores large quantities of light and heavy

machinery and other supplies, had an accident frequency of only 8.54 per million man-hours during the first six months of this year. This excellent record must in part be attributed to the work of an active safety organization in the works, but a large part is due to the equipment of easily controlled, electrical, materials handling apparatus.

Often the possibility of remote control of electrical machinery is of substantial value in the prevention of accidents. Such control is to be found in the use of electromagnets in connection with a crane for handling scrap iron by an operator placed far out of danger. The handling of hot metals in foundries and steel mills is another illustration of such control. The extent to which remote control may be carried is shown in the newly opened, automatic sub-station, the so called Robot Sub-station at Spuyten Duyvil, New York City, which is sufficiently large to serve as a center of electrical distribution to cover a large city. In this automatic plant the numerous operations of switching and control are performed by operators located at a distance of several miles.

The reduction of fatigue among workmen is another salutary source of accident prevention resulting from the application of electric power for industrial operations, handling and conveying materials, etc. Today many of the most burdensome duties, earlier done by hand, are performed by electric power. This makes the workman, to a much greater extent than has ever been the case before, a controller of power rather than a producer of power. Parallel with this, therefore, is a reduction of over-fatigue, which dulls the senses, induces inattention, and is considered a prolific source of accidents.

The Extent of Electric Utilization

The extent to which the safety features, accompanying the use of electricity, have been made available in the United States, are indicated by the following figures:

Generation of power by the central stations in this country, as tabulated by the Electrical World, for the year 1927, was approximately 75,600,000,000 kilowatt hours or a little over 100,000,000,000 horse power hours. The same authority states that there were, during that year, about 17,600,000 domestic lighting customers of the power companies, who received power from the central stations, and it estimates that 63 per cent of our population had the advantage of electric service in their homes. In addition to this, practically all of the residents of the United States are, more or less, incidentally and indirectly protected from accidents by means of electric light through its use by commercial and industrial establishments and on our streets and highways.

The amount of electric energy consumed per capita in the United States far exceeds that in the three largest nations of Europe as indicated by further figures from the Electrical World, given below for the year 1925.

United States	680 kilowatt hours per capita
Germany	320 kilowatt hours per capita
Great Britain	220 kilowatt hours per capita
France	220 kilowatt hours per capita

The National Industrial Conference Board has tabulated data from the United States Census of Manufacturers which give the following significant information in regard to the large and growing use of electricity in American industrial production:

1899	Total electric power used in manufacture, 493,000 horse power
1925	Total electric power used in manufacture, 26,000,000 horse power
1899	Per cent of electrical power in manufacture, 4.9
1925	Per cent of electrical power in manufacture, 73.0
1899	Per capita horse power per wage earner in manufacture, 2.11
1925	Per capita horse power per wage earner in manufacture, 4.27

The trends indicate continued increase in the electrification of industry, and in the amount of power placed at the service of each worker.

This availability of electric power at the beck and call of the worker, by the simple pressure of a button, lies at the very foundation of the economic efficiency of labor and this great advantage is undoubtedly one reason for the high production per worker and the possibility of paying high wages, which constitute one of the great advantages possessed by American industry.

Safe Practices

Electric power itself, as supplied by the electric light and power industry to its customers, is undoubtedly safe when properly installed and used. However, like any other power, such as a moving fly wheel, grinding machine, or motor truck, it is dangerous if wrongly used.

From the early days of the Pearl Street station much attention and concern was given to the proper installation of electric wires and equipment. At first, however, efforts were largely confined to promoting good service and preventing hazards from fires. As voltages have increased for transmission, and the distribution and utilization of power have become more wide-spread, greater consideration has been given to the development of safe practices and safeguards designed to protect the worker in the electrical industry and the general public.

These safe practices are recorded and published in printed codes. Thus, very early in the history of the industry, in fact at its very inception, it joined with the Fire Underwriters in building, and keeping in pace with the times, a safe code of good wiring practice. This code, called the National Electrical Code, has become generally recognized and is commonly accepted as representing safe practice. Though it has been directed primarily toward the prevention of fire, it has served admirably also, in most cases, as a guide for the maintenance of good service and the protection of life. In about 1914, especially for the purpose of protecting against personal accidents from electricity, the industry joined with the United States Bureau of Standards in developing the National Electrical Safety Code, which supplements the National Electrical Code, spoken of above. These two codes taken together furnish an excellent compendium of safe practices, which, if followed carefully, may be depended upon largely to eliminate hazards and prevent accidents in the nature of electric burns or shocks; they have both been approved as American Standards by the American Engineering Standards Committee.

The electric light and power companies, in addition to providing the safe practices and guards called for in these codes, and as otherwise found desirable, often at large expense, have fallen into line with the safety movement of the country through the medium of effective safety education and organization. This phase of activity is beginning to be quite fruitful and some of the electric companies are making safety records within their organizations which are highly commendable. In fact the electric light and power industry can justly lay claim to having been a pioneer in the safety movement and a leader in the introduction of safety devices, protective devices, and the promotion of effective company safety organizations.

Safety for Central Station Employees

In dealing with high voltages, probably the most difficult problem the electric light and power industry has had to meet is that comprised in human proneness to carelessness, abstraction, and inattention.

Thus, to protect the workman from his own weaknesses it has been found necessary in power plants to have each high voltage switch (often called a circuit breaker), and each of the other pieces of high voltage equipment, installed in an individual fireproof compartment. These compartments are placed in locked switch

galleries. (This excepts the cables which are in protected tunnels or ducts.) Each compartment in a switch gallery is closed in front by doors and is carefully numbered and marked with danger signs. The high voltage switches are operated from "control boards." On these boards are low voltage, hand operated, switches for operating motors or other appliances, by remote control wires, which in turn close or open the high voltage switches in the compartments.

Before a workman is permitted to remove a door of a compartment containing a high voltage circuit breaker or other apparatus, he must receive written authority from the operator in charge, with information that the apparatus on which he is to work has been cut off the circuit and is "dead." The authority is given only after the operator at the control board has blocked open and tagged the control switches on the control board, which open such main switches in the compartments as are necessary to isolate the high voltage apparatus to be uncovered, and any other steps necessary to safety have been taken. The control switches cannot be closed without removing the blocks.

In taking off doors to apparatus it has been found desirable to have two experienced men sent together in order that they may check each other. These men both follow the written instructions of the operator in charge. For further protection they make such additional tests, while in the switch galleries, as are necessary to prove the circuit dead upon which work is to be done. One of the common tests used, for ordinary generating station voltages, is by means of a "test stick." This consists of a fuse and proper resistance or reactance, one end of which is directly connected to a ground, the other end connected through a flexible wire to a metal piece at the end of a long insulated handle, which the workman may safely use to touch the apparatus to be tested.

When the workmen open the doors of a compartment in accord with instructions, and after the tests have been made, they block the switching mechanism, if the apparatus in the compartment is a switch, so that it cannot be closed even from the control board. They then, as required, place ground connections, for further protection, in such a way that it is impossible for the equipment to be made alive even if the switch should be accidentally closed. They also attach tags to the apparatus, after it has been made safe for workmen, which show it to be dead and, if such is the case, that men are working upon it. Workmen wear rubber gloves in all operations involving high voltage equipment.

In spite of the careful procedure set forth above, the safety numbering and markings, and the use of two men, mistakes now and then occur due to the failure of the human element. The power companies are thus finding it desirable to use locking systems on their high voltage compartments, whereby an employee can only get into the compartment for which he has a key and, by means of interlocking arrangements, into others in the right order of progression.

The New York Edison Company is at present installing a system of interlocks, controlled by radio appliances, so that a compartment cannot be opened, if apparatus contained within it is alive, even though the workman has the right key.

The industry has been equally thorough in developing safe procedure for working upon high voltage distribution circuits both underground and overhead. It has also given much thought and attention to developing and supplying safeguards, such as rubber gloves, rubber protectors for covering wires, asbestos blankets for protecting workmen from cable explosions, especially designed protective tools, etc. The safeguards are periodically tested and inspected. It is seldom that wires carrying more than the commercial distribution voltage are worked upon when alive, and then only when urgent necessity demands and with the exercise of very great precaution. Nevertheless, when working on disconnected or dead apparatus, many of the same precautions are taken as though it were alive to protect against danger should the apparatus be made alive accidentally.

The principal requirements of this safety procedure are set forth in detail in the National Electrical Safety Code, referred to earlier, and it is included, in addition, in the detailed written or printed safety rules of the individual companies. Employees must learn and follow these rules. They are taught to understand them by individual instruction and through the medium of formal, scheduled classes.

The result of all this safety work has been that fatality rates in the industry among electric light and power employees have been reducing steadily.

Asphyxiation

The industry has been deeply interested in methods of resuscitation for application in cases of electric shock. In 1911 the National Electric Light Association arranged for a commission of eminent physicians and scientists to study the subject.

The result of this and later studies has been the general adoption, by those interested, of the prone pressure method of artificial respiration, such as originally devised by Sir Edward Sharpey Schaefer. The method is quite simple and applicable for reviving cases of drowning, gas asphyxiation, and electric shock. It is recommended that the employees of all industries should learn this method. Indeed everybody should be familiar with it. The following figures show the field for its use:

Fatalities in the United States in 1924 as given by the United States Census are,	
By drowning	7,158
By carbon monoxide gas	4,166
By electricity	975

The electrical and gas companies are very generally teaching their employees the method. The New York Edison Company, with an employee enrollment of 13,234, gave instructions in the prone pressure method to the extent of 35,541 employee-instruction hours in 1927.

As in the Consolidated Gas Company and its other Allies, the teaching is done by trained employees in classes of about 20 men each.

Despite past studies, but little is known of the physiological effects of electricity in cases of electric shock. To promote further study of the subject, a National Research Committee has been organized under the general direction of Dr. Simon Flexner of the Rockefeller Institute consisting of eminent medical and scientific experts to carry on research concerning electric shock, electric accidents, and resuscitative and preventive measures. This committee in addition to other activity has already advanced its research signally, by having developed in the laboratory a method which gives hope of ultimately being able to restore a fibrillating human heart to normal movement. Heart fibrillation is one of the frequent consequences of electric shock and has heretofore been considered a fatal condition. The work of this committee, already advanced on animals, leads to the hope that we may obtain the knowledge necessary to save human life in accidents of this kind.

The National Electric Light Association awards the Insull Medal to the employees of the electric light and power industry for saving life by the prone pressure method of resuscitation; the American Gas Association awards the McCarter Medal for similar service by employees of the gas industry; and the National Safety Council gives a medal for the successful use of the method, to persons who are not eligible for other resuscitation medals. The first makes awards in cases of electric shock, the second for cases of asphyxiation, and the third for any saving of life by the prone pressure method. These awards have proven to be an aid and inspiration in life saving.

From the foregoing, the members of the National Safety Council will recognize that the electric light and power industry, by the nature of its business, its resourcefulness, and its progressive spirit has contributed largely to improved safety conditions in the United States. Also that it has been an active agent in accident preven-

tion through education, study, and development of safe methods for using and controlling electricity, and by cooperation with the medical profession, the police, fire departments, and other interested bodies.

The cost of accidents is high: an insurance organization reported in the case of a group of rather hazardous occupations, for an annual payroll of over \$76,000,000, that the compensation costs, based on the New York law, amounted to slightly over three per cent of the payroll. Another study by an insurance expert indicated that total costs of accidents were about four times the compensation payments. The activities of the industry, however, so far as they relate to accident prevention and safety, have not been carried on so much for the immediate economic advantage they secure, as for the purpose of meeting the high ideals the industry has set for itself, the discharge of its moral obligation toward its own workers and the general public, the doing of its part toward the advancement of the general welfare, and the furtherance of the comfort and happiness of mankind.

CHAIRMAN NIESZ: We were fortunate in having this paper printed and distributed to those attending this meeting. We will now have an opportunity for discussion or any questions you may wish to ask Colonel Jackson. If there is no discussion of the paper, I would like to express as Chairman on behalf of those represented at this meeting our grateful appreciation for their presentation of the subjects on which they have spoken and the very interesting contributions and valuable material they have given us for this meeting of these sections jointly.

ADJOURNMENT

October 2, 1928

Accident Facts—How to Get Them

LOUIS I. DUBLIN, PHD., Chairman

**Chairman, Statistics Committee, National Safety Council; Statistician
Metropolitan Life Insurance Company, New York City**

The session was called to order at ten o'clock by the chairman, Dr. Louis I. Dublin, Chairman, Statistics Committee, National Safety Council.

CHAIRMAN DUBLIN: It has always seemed to me that the National Safety Council was to be commended because it was one of the few service organizations that realized, very early in the game, that there was a place for the gathering of facts in the development of their program. I think the characteristic of most workers that serve the public—the so-called welfare agencies—is that they are moved more by considerations of goodwill than by considerations of knowledge and direction by fact. But the Safety Council is not one of those. At the very beginning in its campaign against the industrial accidents, it realized that if it were to get anywhere in the development of a campaign, it would have to gather facts, and so facts were gathered as to the number of industrial accidents and the time and the place and the how of those accidents, and it was an inspiring fact to see how under these auspices industrial accidents came very largely under control. It is to the everlasting credit of the Safety Council that it started that campaign that way. So when the proper time came to take notice of the equally important situation with regard to public accidents, it was necessary to organize a campaign first for the gathering of facts, and, so, some seven or eight years ago a committee of this section was appointed, a Statistics Committee, whose business it was to not only gather facts, but to develop methods for the proper gathering of them.

I have been associated with this committee some five or six years as the chairman. It has been a joy to me to be so associated with a group of men who have given unstintingly of their time to develop a methodology for the gathering and the analysis of facts with regard to the public accident situation.

Year after year we have reported to you an annual statement covering the situation as best we could. We have developed a system by which the facts of public accidents can be gathered. We have developed that system by constant agitation and change as the situation showed it necessary. We have also propagandized, developing interest on the part of the authorities, both state and municipal and federal, in the adoption of this system, and I am very glad to say to you that at the present time a registry corresponding to fifty millions of people are covered by the system which this committee has evolved.

This thing is no longer an experiment. A very simple and effective method for the gathering of the facts with regard to public accidents has been developed; one hundred cities and some seven or eight States are following this system, and it is our hope that before very long the entire country may see the wisdom of this method, and we shall have then a unified and comparable and simple method of gathering the facts as these accidents occur, and have these facts sent to a central agency—at the present time the central agency is the headquarters of the Safety Council—where these facts will be tabulated, analyzed, and the essence of them developed into a series of precautions for the prevention of accidents.

That has been the history of your committee. It feels so good about its work and the urge has been so great for it to expand these efforts, that it has seemed wise for this committee to take on the form of a Section, and at the session this afternoon we shall have more to say to you about the desirability of this expan-

sion; that is, the development of a Section to be called a Statistics Section of the Council, whose business it will be to coordinate the statistical work of the various sections of the Council, but more especially at the present time to engage in the gathering and analysis of public accident facts.

More particularly this morning we are to consider how these facts may be obtained; how to get them. It is very logical that we should begin with the organization of a City or State Accident Statistics Bureau. No State in the Union has gone further probably than the State of New York in the gathering of these facts, and Mr. Aronowitz, who has done more than anyone for the development of a methodology, will present to you the work of his office.

Organization of a Statistical Bureau

By **LEON ARONOWITZ**

Statistician, Bureau of Motor Vehicles, Albany, N. Y.

A Statistical Bureau of a Safety Division has three functions: first, securing data; second, compiling and analyzing that data; and third, suggesting safety practices in conformance with the knowledge so obtained. I will briefly discuss how the first two of these duties can be performed by a motor vehicle bureau.

Statistics become valuable only when they present a true picture of conditions as they exist, and indicate the magnitude of the problem which is to be studied. Lack of complete information leads to erroneous conclusions which seriously impair investigation and solution of the problem. Dangerous conditions will continue to exist in localities where the accident cause is not known, and no aid in eliminating these accidents can be offered when information is lacking.

It has been the experience in New York State that to secure complete reporting of all accidents, it is necessary first to secure legislation requiring the filing of accident reports by the operator of the motor vehicle involved and by those officials (police officers, justices of the peace and coroners) to whom the accidents are reported. This legislation should provide a penalty for failure to report accidents. In New York State, failure to report an accident is the basis for the suspension of a license; and a conviction for this offense is a misdemeanor. Such penalties for failure to report have a most salutary effect.

Preliminary to the law becoming operative, a campaign of publicity should be inaugurated to advise all motorists and public officials of the provision of the law and also of the safety uses for which these reports are to be used. The accident problem should be presented to enlist the sympathy and aid of the motoring public, and the necessity of accident reports as a basis for studying the problem should be stressed. The law requiring merely the reporting of accidents is not sufficient, as many persons are unfamiliar with its provisions and fail to comply, not intentionally or through contempt of the law, but due to ignorance of this requirement. This publicity should stress the importance of complete, accurate information if the loss of life and property is to be lessened—rather than merely compliance with the law to avoid the penalty for failure so to do.

Publicity can be obtained in many ways; first, through the press; second, from talks at safety rallies before commercial and civic organizations; third, by obtaining the cooperation of the school authorities and having them devote a brief period each day to teaching safety to the children, who will in turn repeat these safety warnings to their parents; and fourth, by printing the provision of law requiring the reporting of accidents on driving licenses, or by issuing pamphlets of instructions to operators when they secure their license plates.

Accident report blanks should be clear, simple, and concise so that the person filling out the report will clearly understand what information is wanted. Involved

blanks have a tendency to puzzle to such an extent that the owner or operator becomes discouraged or bewildered as to how to complete the report. Wherever possible, the information which it is necessary to obtain from the report, should be set forth on the accident report in tabular form and the applicant requested to check those items which apply to the particular accident in which he was involved. Thought must be also given to the size of the form so that it will be convenient for public officers to carry in their pockets. If the form is involved, long, or bulky, police officers will refuse or purposely forget to carry them. In many instances persons who are desirous of complying with the law, will be at a loss as to how the report is to be filled out, and will be so discouraged that they will not file a report unless the blank is easily understandable.

To determine if reports are being filed in accordance with the law, special investigations must be made. One of the most effective means of determining this fact is to subscribe to a newspaper clipping service, which furnishes items of all accidents occurring in the jurisdiction. Another method sometimes employed is to delegate one or more employees to read the newspapers and check all references to motor vehicle accidents against the records in the bureau to determine whether reports are being received. If no report is found, a letter should be written to the operator or operators involved, advising them of the requirements of the law with respect to filing reports and requesting them to fill out the blank report enclosed. If a reply is not received within a week or ten days, a follow-up letter should be written, advising the operator that failure to report an accident is an offense which may result in the suspension or revocation of his license, and also that conviction of this offense is a misdemeanor.

It is most important to compare the fatal accidents which have been reported to the motor vehicle bureau with those reported to the bureau of vital statistics, or the health department. This check will be of great value to both bureaus, and will result in each department conducting investigations to secure these reports. In New York State for the year 1927, the Motor Vehicle Bureau checked monthly with the Health Department, and at the end of the year the records of the Motor Vehicle Bureau disclosed 2,424 deaths resulting from motor vehicle accidents, whereas the Health Department disclosed 2,435 deaths, a difference of eleven. This difference is accounted for by those injured in accidents occurring outside New York State, being brought into the State, where death occurred. In other instances death resulted from heart trouble or some other illness while the person was riding in an automobile, and was not the result of an automobile accident. Publishing the number of deaths is not effective unless the records of these two bureaus agree.

Wherever possible, the statistical section should establish contact with police units, safety directors, or other organizations interested in accident prevention, and obtain reports from them of accidents occurring in their communities. This affords an additional course of information and, in many instances, will assist the bureau to obtain reports which otherwise would have been unknown.

The proper agency to receive these reports is the one delegated by the statute to administer the law. In states, this is usually the bureau of motor vehicles, or a similar bureau, while in local communities it is the police department. Upon receipt of these reports they should be so filed as to be accessible when needed. Reports may be filed alphabetically under the name of the operator involved in the accident, or geographically according to the street intersection. The method adopted depends, to a great extent, upon the use to be made of the reports and the authority which the bureau receiving them possesses. If the bureau has the power to suspend or revoke licenses, it is perhaps desirable to have the records filed alphabetically, so that the record of all violations and accidents which are filed against a particular individual, will be in one folder. If, however, the records are not used for the purpose of removing reckless drivers from the streets, and the

primary purpose is to use these records as a basis to determine dangerous hazards in the city, the second method of filing by street intersection is suggested.

The reports, then, will quickly indicate those locations where particular hazards exist, and enable investigations to determine if there are any conditions existing at this point which should be remedied or corrected. This study may reveal the fact that traffic lights should be installed, traffic officers stationed at this point, left turns eliminated, parking banned, or some such similar remedy. The hazard of the locality will be brought to mind and a remedy can be suggested through study.

Having discussed the methods and means of obtaining accident reports, I will now turn to the internal organization of the statistical section, and explain the procedure of analyzing, tabulating, and filing of reports.

The first step is to determine what information is to be studied. This will vary from year to year. Experience may indicate that one group of facts is more valuable than another, or that certain types of information have no value from a safety point of view. Only data of possible use should be collected.

In determining the classes of information to be tabulated, your attention is directed to the following tables suggested by the National Safety Council:

1. Type of accident, which sets forth the object with which the motor vehicle came in contact; such as, motor vehicle with motor vehicle, motor vehicle with railroad train, motor vehicle with pedestrian, etc.

2. Circumstances surrounding the occurrence of accidents, which table is subdivided into:

- (a) Direction of travel, that is, turning right, turning left, going straight.
- (b) Act of motorist, such as exceeding the speed limit, wrong side of road, without right of way, etc.
- (c) Physical condition of the driver.
- (d) Sex of the operator.
- (e) Condition of vehicle, this table indicating whether there were any mechanical defects.
- (f) Acts of the pedestrian, such as crossing against signal, crossing diagonally on street, etc.
- (g) Condition of pedestrian.
- (h) Road condition—This table sets forth whether the roadway had defects or was under repair, or contained an obstruction which was not lighted.
- (i) Road surface—Indicating whether the pavement was dry, wet, snowy, muddy or icy.
- (j) Weather conditions.
- (k) Light conditions.
- (l) Railroad crossings.
- (m) Road location.

3. The type of vehicle involved. This table classifies accidents as to commercial cars, taxicabs, motorcycles, busses and passenger cars.

4. Day of week.

Having determined upon the matters concerning which it is desirable to secure data, it is necessary to prepare a code for each type or table to be tabulated. For example: if it is deemed important to know the day of the week on which the accidents are occurring, each day will be given a separate code number. This information is entered on analysis sheets, which contain headings corresponding to the type of information being coded. Under the proper heading on the analysis sheet the code number of the item analyzed will be entered. These analysis sheets are then sent to a key punch section, where tabulating cards are punched with the information entered on the analysis sheets. These cards are then run through a tabulating machine and totals are obtained. These totals are entered on charts and complete information is available with respect to the reports which have been analyzed.

The method which has just been described applies primarily to those bureaus where the volume of work warrants the use of tabulating machines. If the volume is not sufficient to procure such machines, the analysis can be obtained by tallying by hand each item of the report under its proper heading.

The report is now ready for study to ascertain the various circumstances surrounding accidents, and to indicate the line of safety work which should be undertaken.

It is not my intention to discuss how these statistics may be used for safety purposes, as this topic will be covered by another speaker later in the day.

Throughout the discussion of the organization of a statistical section of a motor vehicle bureau, I have refrained from discussing minutely the organization of the bureau, and also I have eliminated special problems which apply only to New York State. I realize that the accident problem is one which affects cities as well as states, and for this reason I have eliminated detailed information and attempted to explain the outlines of a practical statistical bureau, rather than outline in detail the plan which is in effect in New York State.

TABLE I

Deaths and Death Rates per 100,000 Population from Specified Types of Accidents and from All Other Causes: New York State, New York City, and Rest of State, 1915 and 1927

Cause	Deaths		Rate per 100,000 Population		Per cent of Change of Rate
	1915	1927	1915	1927	
NEW YORK STATE					
Accidents (total)	7,343	9,333	74.1	81.4	+9.9
Automobile accidents	677	2,555	6.8	22.3	+227.9
Accidents (except automobile)	6,666	6,778	67.3	59.1	-12.2
All causes (other than accidents)	139,549	131,673	1408.1	1148.4	-18.4
NEW YORK CITY					
Accidents (total)	3,558	4,604	68.1	77.1	+13.2
Automobile accidents	346	1,095	6.6	18.3	+177.3
Accidents (except automobile)	3,212	3,509	61.5	58.8	-4.4
All causes (other than accidents)	72,635	65,826	1390.3	1102.5	-20.7
REST OF STATE					
Accidents (total)	3,785	4,729	82.8	86.1	+6.6
Automobile accidents	331	1,460	7.2	26.6	+274.6
Accidents (except automobile)	3,454	3,269	75.6	59.5	-19.3
All causes (other than accidents)	66,914	65,847	1427.9	1198.2	-16.1

CHAIRMAN DUBLIN: This paper is now open for discussion. There must be a host of questions that you want to put to Mr. Aronowitz as to the details of his method. We shall be very glad to hear from anyone.

HOWARD BROWN (Detroit Automobile Club): I would like to ask the speaker whether or not that information is open to people facing civil liability suits.

MR. ARONOWITZ: So far in New York State the reports are confidential. We have given out information with respect to the name and address of the parties

involved, the license numbers; but how the accident has occurred has been considered private material and not divulged. There is a case in the courts now, going through two courts, and they have ruled against the Commissioner. They claim this information is a public record and must be given to the public, but he has taken an appeal to the Court of Appeals, and until that is decided, we are ruling that the information is confidential; his basis being that if this information is made public, people will not give complete reports, not state the true facts, and the purpose of having the statistical information recorded would not be attained.

DR. L. W. CHANEY (Bureau of Labor Statistics, U. S. Dept. of Labor, Washington, D. C.): Does New York forbid the use of all accident reports in court?

MR. ARONOWITZ: No, but the Bureau does not produce the report. In case of a subpoena, the Bureau has appeared in court, but not with the record.

G. C. HUBBELL (Registry of Motor Vehicles, Boston, Massachusetts): I would like to ask our friend, Mr. Aronowitz, what experience you have had in New York in getting reports from the police as compared with the reports from the operators.

MR. ARONOWITZ: We found in New York State that in the larger cities we have very good success. In New York City I should say that we get pretty near one hundred per cent, and also in Buffalo. In the smaller towns it is a question of educating the police, and they are gradually coming to the point where they are beginning to make fairly complete reports.

MR. BROWN: Does the operator also make a report when the police officer makes a report? Is that in duplicate?

MR. ARONOWITZ: No, our law provides they must report to a police officer, and also to the Commissioner of Motor Vehicles. The law further provides that any police officer to whom an accident is reported must file the report with the Bureau, and in those cases resulting in death, the Coroner must also report the death. So in some instances we get reports from four sources; from the operator, from the State police, from the local police, and from the Coroner, if it results fatally.

CHAIRMAN DUBLIN: How do you manage to get the material down to the locality where the accident occurs? I am thinking of the cities of the first class, and even down to the smaller cities. Is there any attempt to get the facts out to those cities, so that they may use them?

MR. ARONOWITZ: We have adopted a plan of supplying every city having a population of ten thousand or over with a complete report for the year, and if at any time they want special reports for the month, we tabulate them. The Commissioner at one of his talks before the Mayor's Conference, offered the services of the Bureau to prepare a spot map for any city requesting it, in the solution of their traffic problems, and in the past year we have probably made twenty-five spot maps in cities ranging from ten thousand to one hundred thousand, showing where the accidents happened. Our reports monthly are not only the State reports, but they are sub-divided into up-State, and all cities of ten thousand or over.

CHAIRMAN DUBLIN: Would you tell us, Mr. Aronowitz, what your Bureau costs?

MR. ARONOWITZ: Well, in the statistical section there are eight employees, a stenographer and myself. I should imagine the total cost of the Bureau would be around \$35,000. That would count printing, equipment, rental of space and everything else.

CAPTAIN A. J. MURRAY (Milwaukee): I would like to ask in reference to the accident reports, if those accident reports include all accidents, property damage, or just where someone is injured?

MR. ARONOWITZ: In New York State the law provides they only have to include accidents resulting in death or personal injury. We have no report of property damage.

L. E. McBRAYNE (Massachusetts Safety Council): The statement was made in one of our sessions that there were only three States which had an adequate analysis of accident information, and while that figure may be small, certainly

seven would be the maximum. I had occasion in Virginia in the spring to go into the capitol at Richmond and see how their experience compared with that of Massachusetts. On the books they had apparently a law which required them to report all these accidents. I found they had no information. They were receiving only a very small number of accident reports, and yet they were assuming that that was their accident experience, because they could not prove otherwise.

I wish we might have from the States that have no adequate information their point of view on how they know what's happening and whether they have any true basis for carrying on a campaign for accident reduction.

FRANK MATSON (Minnesota Safety Council): We have just organized a Safety Council in Minnesota. We have had in our three principal cities systematic accident reporting more or less by voluntary action. We are now working through a committee on a plan for state-wide accident reporting. The committee have not got to the point yet of deciding whether we will have to do it by legislation or whether we can accomplish it voluntarily. I would like to hear from some of these experts as to whether we can hope for any success from voluntary reporting, or whether we will have to work through a law.

CAPTAIN EUGENE CASEY (Supervisor of Traffic, New Orleans): We have in the State of Louisiana a State act that compels the driver of a motor vehicle in the case of personal injury, to report to the nearest police station; also to make a report of collision damage to the extent of \$25 or over. We have not a great number of large cities in the State of Louisiana. In the city of New Orleans our reports are almost 100 per cent, because every police officer will have charges preferred against him if he fails to report an accident or the condition of property damaged over \$25, and if there is no police officer present in a collision, no matter how trifling, the drivers must exchange names and addresses. In the event of personal injury he must report to the nearest police station. The State law, just passed by the last session of the legislature, makes that compulsory all over the State of Louisiana.

Of course, in the absence of police officers, I do not know how well that law is going to be observed and enforced. It is rather difficult to enforce a law of that kind in rural communities. In cities I think it is possible to do it. There is no excuse why it should not be done in the larger cities of the country.

MR. ARONOWITZ: I doubt if a voluntary registration system would be effective. Unless you have a law requiring it and also some penalty which is going to be inflicted unless they comply with the law, you are not going to get reports. It has taken us in New York State four years with the law, and we are still not getting complete reports. Every month when we check with the Health Department we find over twenty fatal injury accidents that they have which we have never received. We do not even get it through the newspapers. At the same time we have some reports they do not have. So unless you have a strong law requiring the reports, I doubt if you would be very successful.

CHAIRMAN DUBLIN: I will assume that the subject has been carefully discussed and we will proceed with the second item.

Now, long before it was conceived necessary to organize a State Accident or City Accident Statistics Bureau, the State and City Health Departments were reporting accidents, but only of the fatal type. Every death that occurred was registered in the States and cities that were in the registration area, and as a result we have had for a great many years a fairly complete record of deaths that resulted from accidents. Now, that's a very important item at the present time in the campaign for the development of a national accident reporting system, for we have an agency which is engaged in doing that very thing, but of course for fatal accidents.

Another point is this: that the method of analysis used by these State and Municipal Health Departments is of a type little different from that which seems to have grown out of the necessities of the accident prevention campaign. The system of classification used by the Health Departments has emphasized the type of accident; that is, whether the accident that resulted in death was due to a fall or was due to a poison; or was due to a collision in a railroad wreck, or whatever it might be, emphasizing the type of accident, but giving no information, or rarely, with regard to the location of the accident or the circumstances that resulted in the accident.

In other words, we have recognized that while we have a system of accident reporting in the Health Departments, the method used is not exactly adapted to the best uses of the material, and so there has been developed an attempt to so coordinate the methods of the Health Departments with those of the Accident Bureaus that information can be exchanged and information obtained which can be used in the campaign for prevention.

One of those who has been most active in this attempt to coordinate the two sets of agencies is our next speaker, Dr. DePorte, the Director of the State Bureau of Vital Statistics. He has on various occasions in meetings of the Vital Statisticians of the Health Departments, discussed this subject, and I know he comes to you with a good many excellent suggestions.

What State and City Health Departments Can Do in Gathering Accident Statistics

By J. V. DePORTE, Ph. D.

Director, Division of Vital Statistics New York State Department of Health,
Albany, N. Y.

Any effort to reduce mortality from a specified cause must be based on accurate information regarding the loss of life ascribed to it and an analysis of its death rate according to time, place, and other pertinent factors which vary with each cause. Deaths from accidents are, of course, no exception to this postulate. Here, we should know the volume of mortality in the area with which we are concerned, its movement in terms of the population over a sufficiently long period of time, and the type and circumstances of these deaths.

The sub-title of this paper tells us indirectly that the statistics made available by health departments are inadequate for accident prevention work. In order to learn in what respects these statistics are, at present, wanting, we must acquaint ourselves with their scope, learn about other official sources of information, and then attempt to suggest a procedure which will make the facts gathered by health departments more satisfactory. Since my knowledge of this subject, limited as it is, pertains to conditions in the State of New York, I shall concern myself in this paper with the situation in this State.

Movement of Mortality from Accidents in New York State, 1915-1927. Fourteen years ago, in 1915, accidental deaths in the entire State numbered 7,343; last year the total was 9,333. The corresponding death rates per 100,000 population were 74.1 and 81.4, an increase of 9.9 per cent. Among the several types of accidents, the greatest rise was recorded in mortality from automobile accidents—the deaths under this head numbering 677 in 1915 and 2,555 in 1927, the death rates being 6.8 and 22.3 respectively and the increase in the rate equalling 227.9 per cent. The death rates from all other types of accidents were 67.3 and 59.1. In other words, in 1927 the rate from the last group was less than in 1915 by 12.2 per cent. This reduction, however, was not so great as that recorded in mortality from all other causes. In 1915 the death rate in the entire State from all causes other than

accidents was 1,408.1 per 100,000 population, in 1927 it was 1,148.4—a drop of 18.4 per cent. The situation in the entire State and its two main subdivisions is summarized briefly in the accompanying Table, No. 1:

TABLE No. 1

Deaths and Death Rates, per 100,000 Population, from Specified Types of Accidents and from All Other Causes: New York State, New York City, and Rest of State, 1915 and 1927

Cause	Deaths		Rate per 100,000 Population		Per cent of Change of Rate
	1915	1927	1915	1927	
NEW YORK STATE					
Accidents (total)	7,343	9,333	74.1	81.4	+9.9
Automobile accidents	677	2,555	6.8	22.3	+227.9
Accidents (except automobile)	6,666	6,778	67.3	59.1	-12.2
All causes (other than accidents)	139,549	131,673	1,408.1	1,148.4	-18.4
NEW YORK CITY					
Accidents (total)	3,558	4,604	68.1	77.1	+13.2
Automobile accidents	346	1,095	6.6	18.3	+177.3
Accidents (except automobile)	3,212	3,509	61.5	58.8	-4.4
All causes (other than accidents)	72,635	65,826	1,390.3	1,102.5	-20.7
REST OF STATE					
Accidents (total)	3,785	4,729	80.8	86.1	+6.6
Automobile accidents	331	1,460	7.1	26.6	+274.6
Accidents (except automobile)	3,454	3,269	73.7	59.5	-19.3
All causes (other than accidents)	66,914	65,847	1,427.9	1,198.2	-16.1

In New York City the death rate from all accidents in 1927 was higher than in 1915 by 13.2 per cent. The automobile rate increased by 177.3 per cent while the death rate from all other accidents decreased by 4.4 per cent. The decline in the death rate from all causes other than accidents amounted to 20.7 per cent. In the Rest of State the 1927 death rate from accidents was only 6.6 per cent higher than in 1915. The increase in the automobile rate, 274.6 per cent, was considerably greater than in New York City. At the same time, the reduction in the death rate from all other accidents, 19.3 per cent, was more than four times the corresponding figure in New York City. In 1915 the rate for this group of accidents was 73.7 Upstate, or 20 per cent higher than in New York City, while in 1927 the two rates were practically equal. In fact, in the State, exclusive of New York City, the drop in mortality from accidents other than automobile was greater than from all other causes.

The estimates of population employed in this table and in all other tables in this paper were computed on the following bases: for New York City we employed the returns of the 1910 and 1920 federal censuses, since the City Health Department did not accept the figures of the State Enumeration of 1915. For the Rest of State we used the returns of the federal censuses and of the State Enumeration of 1915. The figures for the entire State were obtained by adding those for its two main subdivisions.

We shall now trace in some detail the movement of the accident death rate in 1915-1927 according to the basic factors involved—age of decedent and type of accident. In the following tables and diagrams, for the sake of simplicity, we deal with the initial and terminal years of this thirteen year period. Detailed tables for the years 1915, 1920, 1925, 1926, and 1927 appear as an appendix to this paper.

TABLE No. 2

Deaths and Death Rates, per 100,000 Population, from Accidents, by Age:
New York State, New York City, and Rest of State, 1915 and 1927

	Deaths		Rate per 100,000 Population		Per cent of Change of Rate
Age at Death	1915	1927	1915	1927	
NEW YORK STATE					
All ages	7,343	9,333	74.1	81.4	+9.9
Under 5 years	866	687	89.3	62.1	-30.5
5-14 years	838	988	47.5	46.8	-1.5
15-24 years	917	996	51.5	57.9	+12.4
25-34 years	1,053	1,107	59.1	54.4	-8.0
35-44 years	986	1,328	68.0	77.0	+13.2
45-54 years	892	1,227	84.4	91.7	+8.6
55-64 years	647	1,157	102.3	136.2	+33.1
65-74 years	501	896	152.5	224.1	+47.0
75 years and over	641	935	466.4	555.5	+19.1
NEW YORK CITY					
All ages	3,558	4,604	68.1	77.1	+13.2
Under 5 years	503	371	93.9	64.8	-31.6
5-14 years	493	527	51.8	47.6	-8.1
15-24 years	374	430	37.6	44.9	+19.4
25-34 years	544	575	53.8	49.6	-7.8
35-44 years	522	721	67.0	77.5	+15.7
45-54 years	464	699	89.8	105.0	+16.9
55-64 years	303	593	112.3	158.8	+41.4
65-74 years	212	416	180.6	284.9	+57.8
75 years and over	143	272	358.7	526.6	+46.8
REST OF STATE					
All ages	3,785	4,729	80.8	86.1	+6.6
Under 5 years	363	316	83.8	59.2	-29.4
5-14 years	345	461	42.6	45.8	+7.5
15-24 years	543	566	69.2	74.2	+7.2
25-34 years	509	532	66.0	60.8	-7.9
35-44 years	464	607	69.1	76.4	+10.6
45-54 years	428	528	79.3	78.5	-1.0
55-64 years	344	564	95.0	118.5	+24.7
65-74 years	289	480	136.9	189.0	+38.1
75 years and over	498	663	510.4	568.2	+11.3

In New York City the mortality curve according to age starts with a slight peak in the group "under 5 years," declining to a minimum at 15-24 years, rising with age to an absolute maximum in the oldest group "75 years and over."

While the curves for the two years 1915 and 1927 are of the same general form, the rates in the three age groups "under 5 years," 5-14, and 25-34 years were lower in 1927 than in 1915, while the death rates in the other age groups were higher (see also Diagram 1). The greatest reduction was recorded in the youngest age group, "under 5 years," whose rate was less than in 1915 by almost one-third. The maximum increase, 57.8 per cent, occurred in the group 65-74 years, followed by a rise of 46.8 per cent in the oldest group, "75 years and over."

In the Rest of State the curves of mortality also have a slight peak in the youngest age group, "under 5 years," with a minimum point in the next group, 5-14 years, and, with the single exception of the group 25-34 years, rising to an absolute maximum at "75 years and over." Here, too, three reductions were recorded among the several groups: "under 5 years," 25-34, and 45-54 years. As is the case in New York City, the reduction "under 5 years" was greatest—about 30 per cent. We find that an 8 per cent *decrease* in the death rate of the group 5-14 years in New York City corresponds to an *increase* of almost equal size Upstate, while a 17 per cent *increase* in the 45-54 years' group is coupled with a 1 per cent *decrease* in the Upstate rate. It is particularly interesting to note that while in New York City the 1927 rate at "75 years and over" was higher than in 1915 by 47 per cent, the corresponding increase in the Rest of State was only 11 per cent. We may say, in general, that in New York City the changes in the rates of the various age groups were more accentuated than in the Rest of State.

We have also expressed, according to age, the mortality from accidents in 1915 and 1927 in the State and its two subdivisions in terms of the deaths from all causes.

TABLE No. 3

Deaths from Accidents, per 100 Deaths from All Causes, by Age: 1915 and 1927

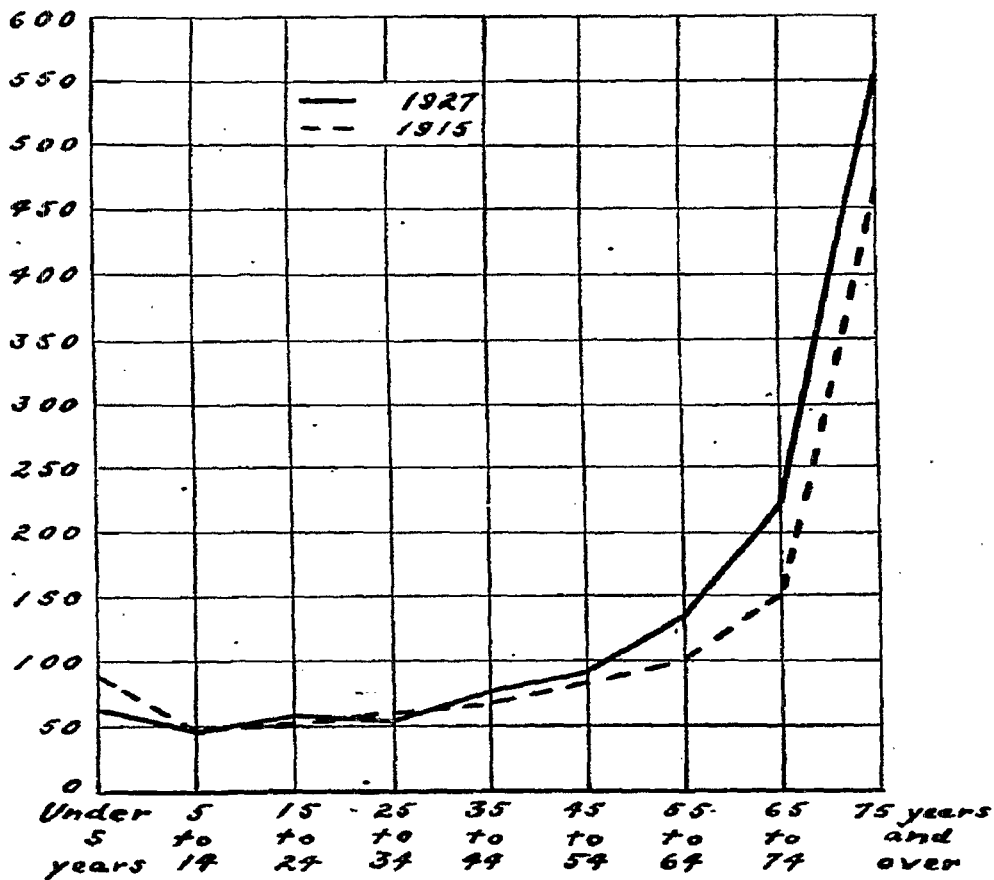
Age at Death	New York State		New York City		Rest of State	
	1915	1927	1915	1927	1915	1927
All ages	5.0	6.6	4.7	6.5	5.4	6.7
Under 5 years.....	2.6	3.8	2.5	3.7	2.7	3.9
5-14 years	18.6	23.7	18.0	21.9	19.4	26.1
15-24 years	12.3	16.0	8.9	11.9	16.7	21.4
25-34 years	9.4	12.4	8.2	10.8	11.3	14.6
35-44 years	7.0	10.3	6.1	9.4	8.6	11.5
45-54 years	5.3	6.8	4.7	6.8	6.0	6.9
55-64 years	3.4	4.9	3.1	4.7	3.7	5.1
65-74 years	2.5	3.4	2.5	3.7	2.4	3.3
75 years and over.....	3.3	4.1	2.5	3.7	3.6	4.2

We shall call attention to several important facts brought out by the preceding figures. First, the relative mortality from accidents was highest in the group 5-14 years. In 1927, in New York City, one in five deaths in this group was ascribed to some accident while Upstate the ratio was one in four deaths. The proportion was lowest in New York City in the two oldest age groups 65-74 years and "75 years and over;" Upstate, in the group 65-74 years. In calling attention to these figures we must, at the same time, keep in mind the fact that the general death rate in the

group 5-14 years is, of course, lower than in any of the other ages, while at the farther end of life the general mortality is highest.

The figures for 1927 were, without exception, higher than in 1915 which means that the trends of accidental mortality did not follow those of the general mortality

DIAGRAM 1-A
Death Rates, Per 100,000 Population from Accidents, by Age—1915, 1927:
New York State



curves and even in the several instances where the specific death rates from accidents declined, the reductions were less than in the general death rates.

We shall now compare the mortality in 1927 and in 1915 from the several types of accidents specified in the International List of Causes of Death. (See also Diagram 2.)

TABLE No. 4

Deaths and Death Rates, per 100,000 Population, from Specified Types of Accidents: New York State, New York City, and Rest of State, 1915 and 1927

Type of Accident	Deaths		Rate per 100,000 Population		Per cent of Change of Rate
	1915	1927	1915	1927	
NEW YORK STATE					
Accidents (total)	7,343	9,333	74.1	81.4	+9.9
Poisoning (gas excepted)	222	176	2.2	1.5	-31.8
Conflagration	115	161	1.2	1.4	+16.7
Accidental burns (conflagration excepted)	689	548	7.0	4.8	-31.4
Accidental mechanical suffoca- tion	*	108	*	.9	*
Accidental absorption of irre- spirable, irritating, or poi- sonous gas	514	817	5.2	7.1	+36.5
Accidental drowning	1,010	941	10.2	8.2	-19.6
Accidental traumatism by fire- arms	83	92	.8	.8	—
Accidental traumatism by fall	1,727	2,082	17.4	18.2	+4.6
Accidental traumatism by ma- chines	158	138	1.6	1.2	-25.0
Accidental traumatism by other crushing:					
Railroad accidents	740	443	7.5	3.9	-48.0
Street-car accidents	167	110	1.7	1.0	-41.0
Automobile accidents	677	2,555	6.8	22.3	+227.9
Other vehicles	288	120	2.9	1.0	-65.5
Landslide, other crushing	229	206	2.3	1.8	-21.7
Excessive heat	77	35	.8	.5	-37.5
Other accidents	647	781	6.5	6.8	+4.6
NEW YORK CITY					
Accidents (total)	3,558	4,604	68.1	77.1	+13.2
Poisoning (gas excepted)	89	66	1.7	1.1	-35.3
Conflagration	62	66	1.2	1.1	-8.3
Accidental burns (conflagration excepted)	422	289	8.1	4.8	-40.7
Accidental mechanical suffoca- tion	*	56	*	.9	*
Accidental absorption of irre- spirable, irritating, or poi- sonous gas	355	683	6.8	11.4	+67.6
Accidental drowning	458	475	8.8	8.0	-9.1
Accidental traumatism by fire- arms	11	15	.2	.3	+50.0
Accidental traumatism by fall	925	1,020	17.7	17.1	-3.4
Accidental traumatism by ma- chines	58	51	1.1	.9	-18.2

*Data for 1915 not available, included in "other accidents."

TABLE No. 4—(Concluded)
Deaths and Death Rates, per 100,000 Population from
Specified Types of Accidents

	Deaths		Rate per 100,000 Population		Per cent of Change of Rate
Type of Accident	1915	1927	1915	1927	
NEW YORK CITY					
Accidental traumatism by other crushing:					
Railroad accidents	104	112	2.0	1.9	—5.0
Street-car accidents	85	75	1.6	1.3	—18.8
Automobile accidents	346	1,095	6.6	18.3	+177.3
Other vehicles	135	22	2.6	.4	—84.6
Landslide, other crushing	144	151	2.8	2.5	—10.7
Excessive heat	49	35	.9	.6	—33.3
Other accidents	315	393	6.0	6.6	+10.0
REST OF STATE					
Accidents (total)	3,785	4,729	80.8	86.1	+6.6
Poisoning (gas excepted)	133	110	2.8	2.0	—28.6
Conflagration	53	95	1.1	1.7	+54.5
Accidental burns (conflagration excepted)	267	259	5.7	4.7	—17.5
Accidental mechanical suffoca- tion	*	52	*	.9	*
Accidental absorption of irre- spirable, irritating, or poi- sonous gas	159	134	3.4	2.4	—29.4
Accidental drowning	552	466	11.8	8.5	—28.0
Accidental traumatism by fire- arms	72	77	1.5	1.4	—6.7
Accidental traumatism by fall ..	802	1,062	17.1	19.3	+12.9
Accidental traumatism by ma- chines	100	87	2.1	1.6	—23.8
Accidental traumatism by other crushing:					
Railroad accidents	636	331	13.6	6.0	—55.9
Street-car accidents	82	35	1.7	.6	—64.7
Automobile accidents	331	1,460	7.1	26.6	+274.6
Other vehicles	153	98	3.3	1.8	—45.5
Landslide, other crushing ..	85	55	1.8	1.0	—44.4
Excessive heat	28	20	.6	.4	—33.3
Other accidents	332	388	7.1	7.1	—

*Data for 1915 not available, included in "other accidents."

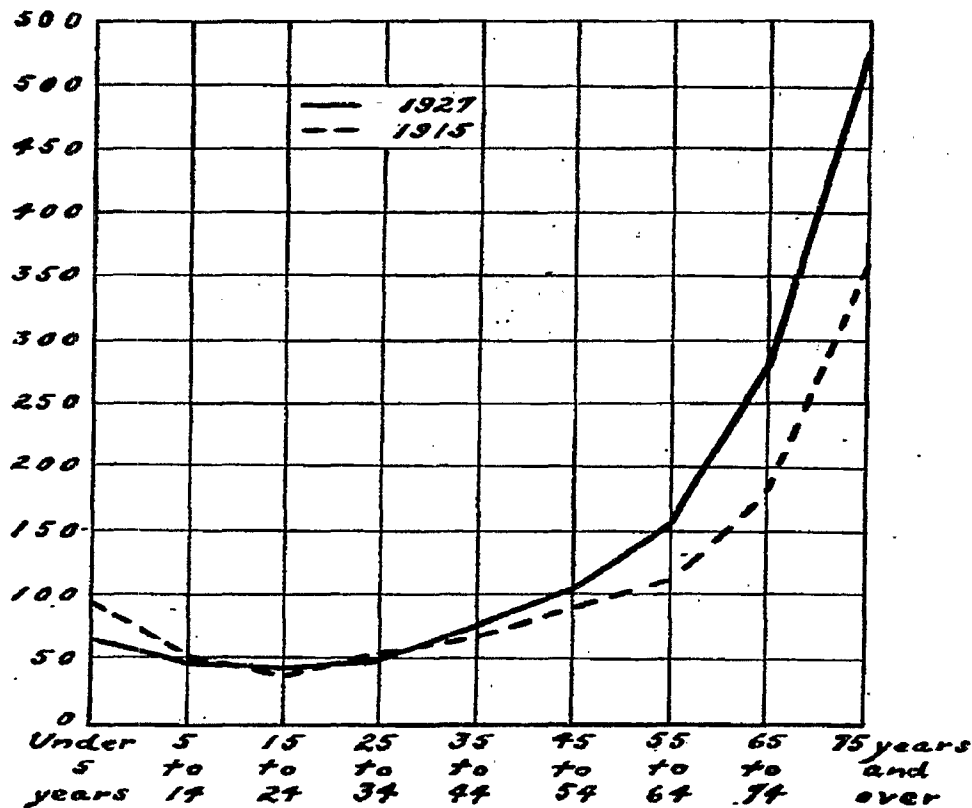
In New York City the death rates from three groups of accidents were higher in 1927 than in 1915 by the following percentages: accidental absorption of irrespirable, irritating or poisonous gas—67.6 per cent, accidental traumatism by firearms—50 per cent, and automobile accidents—177.3 per cent. The second group was numerically unimportant, the deaths increasing from 11 to 15. The deaths under

the first rubric rose from 355 to 683, while those from automobile accidents increased by more than 700—from 346 to 1,095. The rates under the other heads were lower in 1927, the reductions ranging from 3.4 per cent under accidental traumatism by falls, to 84.6 per cent in mortality from accidents involving "other vehicles." The numerically largest decrease was recorded in mortality from accidental burns, from 422 in 1915 to 289 in the later year.

In the Rest of State we also note three increases—in the death rates from conflagration, 54.5 per cent; accidental traumatism by fall, 12.9 per cent; and auto-

DIAGRAM 1-B

Death Rates, Per 100,000 Population from Accidents, by Age—1915, 1927:
New York City



mobile accidents, 274.6 per cent. The numerically largest increase was under automobile accidents, from 331 to 1,460. Deaths from falls increased from 802 to 1,062 and those from conflagration, from 53 to 95. The recorded decreases ranged from 6.7 per cent in the death rate from accidental traumatism by firearms to 64.7 per cent in mortality from street-car accidents. The numerically largest drop occurred in fatalities from railroad accidents, which totalled 636 in 1915 and 331 in 1927.

The outstanding differences in the changes recorded in the two main divisions of the State may be summed up as follows: the death rate from conflagration and falls increased in the Rest of State, while in New York City decreases were recorded. On the other hand, an increase of two-thirds in the death rate from accidental absorption of gas in New York City was coupled with a decrease of

DIAGRAM 1-C

Death Rates, Per 100,000 Population from Accidents, by Age—1915, 1927:
Rest of State

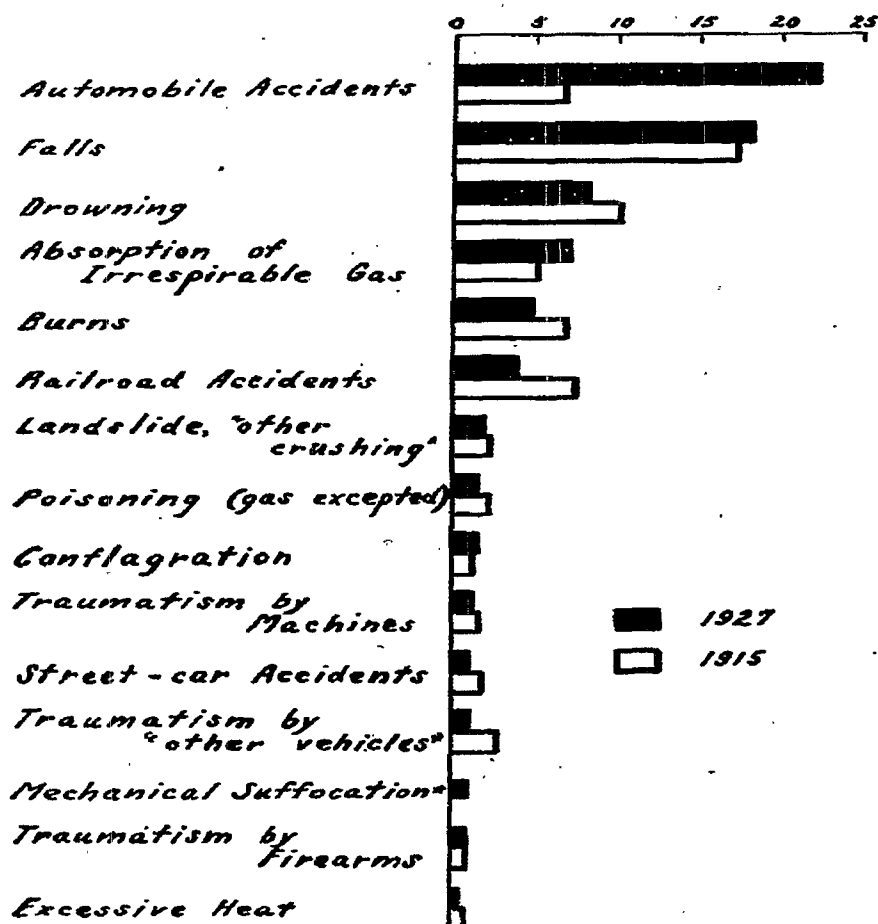


about 30 per cent in the corresponding rate Upstate. And again, as already mentioned earlier, the rise in mortality from automobile accidents was much higher Upstate than in New York City—the rates of increase being 274.6 per cent and 177.3 per cent.

In 1927 automobile accidents held first place among the several specified causes of death in both divisions of the State, followed by falls. Next in numerical

DIAGRAM 2-A

Death Rates Per 100,000 Population from Specified Types of Accidents—
1915, 1927: New York State



* Rate for 1915 not available

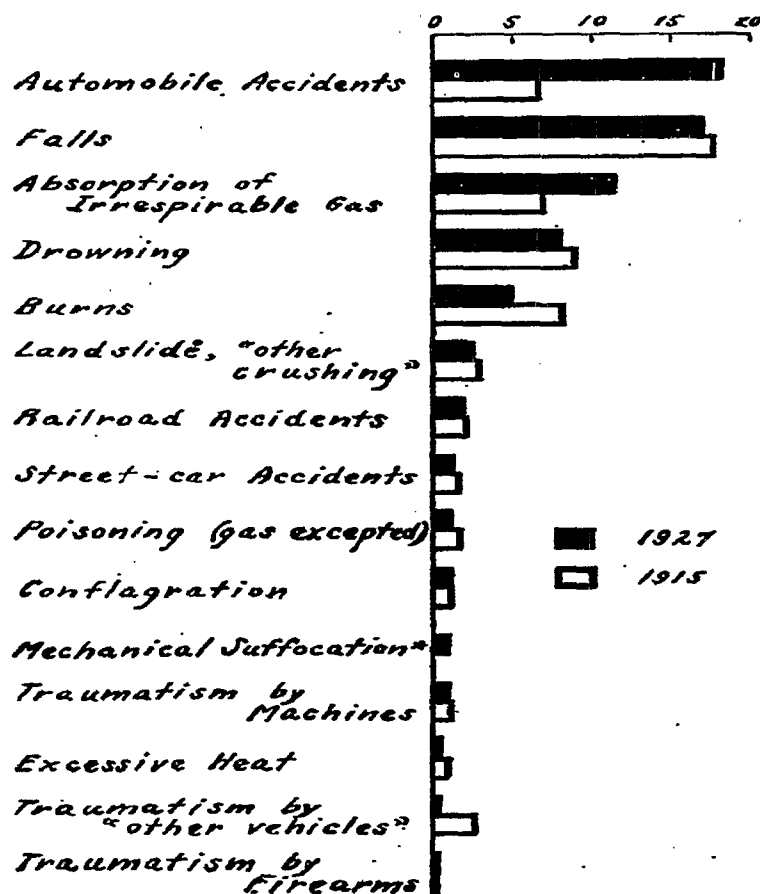
importance were, in New York City, accidental deaths from the absorption of irrespirable gases, while, Upstate, the third place was held by accidental drowning.

Official Sources of Accident Statistics

The State Health Department has the custody of all certificates of death in the territory under its jurisdiction, i. e., the State, outside of New York City. The certificates for New York City are filed with the City Health Department.

DIAGRAM 2-B

Death Rate Per 100,000 Population from Specified Types of Accidents—
1915, 1927: New York City



* Rate for 1915 not available

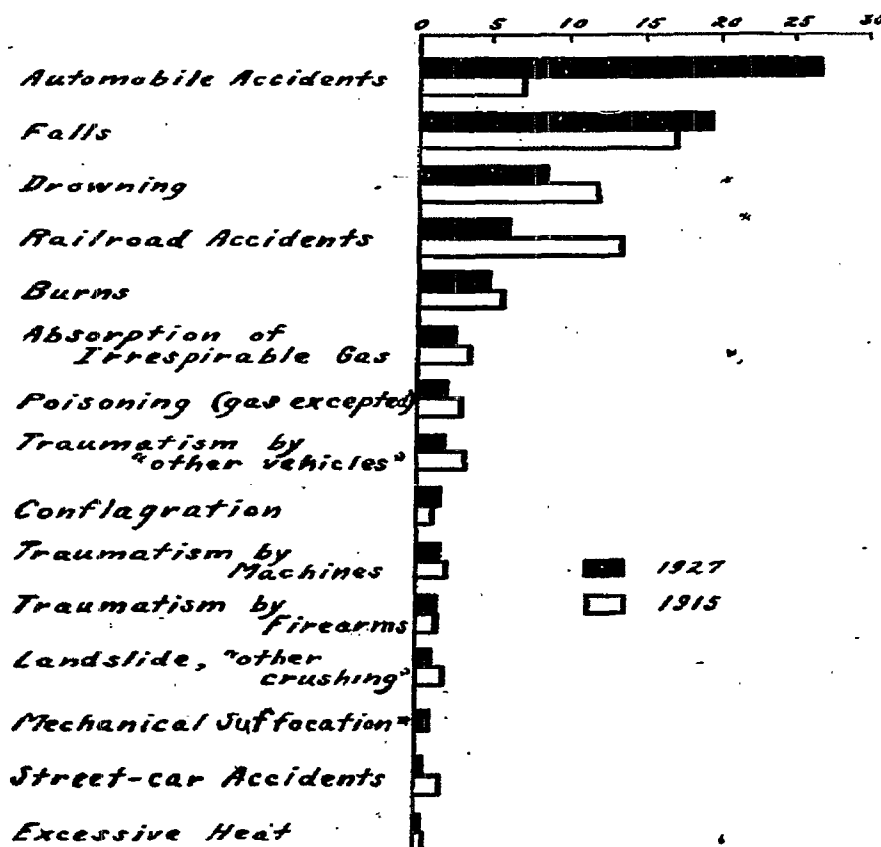
Other State Departments collect statistics of mortality from specified types of accidents—the range of these activities, in brief, follows:

Industrial Accidents. All deaths occurring in industries in New York State for which workmen's compensation is paid are reported to the Department of Labor. These reports are made by the employer and the necessary additional information is also supplied by the dependents of the person killed.

The facts furnished to the Labor Department include the place and time of accident, age, sex, occupation, wages, length of service, the circumstances of death as described by the employer (if medical report is required, a doctor's description of the nature of the injury), hospital, if any, and physician.

DIAGRAM 2-C

Death Rates Per 100,000 Population from Specified Types of Accidents—
1915, 1927: Rest of State



* Rate for 1915 not available

There were 1,042 compensated deaths during the year ending June 30, 1927. This figure undoubtedly includes some accidents reported to the Motor Vehicle Bureau and to the Public Service Commission.

Motor Vehicle Accidents. Every motor vehicle accident which results in the death of a person must be reported within twenty-four hours to the Commissioner of Motor Vehicles by: (1) the operator of the motor vehicle if he is able, or by some other participant, (2) the police officer who investi-

gated the accident, and (3) the coroner or medical examiner. The sum of information from these sources includes the date, place, and time of the accident, character of road and road surface, traffic and weather conditions, names, sex, and age of persons killed and injured and of the operator and owner; also nature and extent of injury together with a clear account of the accident. In 1927, deaths in motor vehicle accidents numbered 2,424. Some of these may possibly have been included in the Labor Department's total of compensated accidents.

Railroad Accidents. Reports of railroad accidents are made by the corporations involved to the Public Service Commission in Albany if the accident occurred outside of New York City, and to the Transit Commission in New York City if it occurred within the limits of the City. The reports show, among other items, the date, time, and place of accident; weather conditions; cause of accident; name and address of the victim; and the nature and extent of his injuries. Accidents occurring in railroad shops are reported to the Labor Department. During the year ending June 30, 1927, deaths in railroad accidents numbered 474 in the State, outside of New York City, while during the calendar year 1927 the Transit Commission reported 248 deaths within the limits of Greater New York.

The three State Departments mentioned above—the Labor Department, the Bureau of Motor Vehicles, and the Public Service Commission have, therefore, detailed information regarding all fatal accidents which occur in industries or through the operation of motor vehicles, steam and electric railroads. The facts regarding all other types of accidents are available only in the limited compass of the records of the State Health Department. In order to learn how these records could be made more comprehensive, we shall review briefly their content and the several important factors involved in their compilation.

The certificate of death employed by the State Department of Health is of the standard type used in all States of the Registration Area. The Public Health Law places the responsibility for the recording of this certificate upon three persons: The *undertaker or person in charge* of the burial is responsible for the actual filing of the death certificate. He obtains the personal items on the certificate from some member of the decedent's family, then presents the certificate to the *physician, health officer, or coroner*, who fills the medical part. The undertaker files the certificate with the *local registrar*, who, in turn, forwards it to the State Department of Health on or before the fifth day of the following month.

In accidental deaths, if a physician was in attendance and there were no suspicious circumstances which might point to the possibility of a homicidal or a suicidal act, the medical part of the death certificate is entered by the attending physician. If no physician was in attendance at the time of death, the Public Health Law (Section 378) prescribes that "it shall be the duty of the undertaker or other person to whose knowledge the death may come to notify the local health officer of such death. When so notified the health officer shall immediately investigate and certify as to the cause of death; provided that if the health officer has reason to believe that the death may have been due to unlawful act or neglect he shall then refer the case to the coroner or other proper officer for his investigation and certification." When the certificates are received in the State Department of Health they are carefully examined for possible omissions, incomplete or inaccurate entries. Requests for necessary additional information or corrections are sent to local registrars. If no replies are received within two weeks, in the case of places with a population over 10,000, second and third requests are sent to registrars while in the smaller places and rural communities, these requests are addressed directly to the persons responsible for the particular item—the undertaker, physician, health officer, or coroner.

A large proportion of the certificates of accidental deaths are quite unsatisfactory for statistical analyses. Last year, for example, in 21 per cent of them the information given regarding the cause was too fragmentary for purposes of mere classification, while the corresponding proportion of unsatisfactory certificates of death from all other causes was only 2 per cent. I hasten to add, however, that the physicians and coroners to whom requests are sent for additional information are most cooperative, and satisfactory replies are received in practically all cases. Those physicians who failed to supply the necessary facts in the first instance apparently did not know what constituted an acceptable statement. In the eyes of some medical men the type of injury is the important matter, the circumstances of the accident being of secondary significance. In July, 1927, for example, forty-two death certificates gave one or another type of fracture as the cause. Our query in each case asked for the manner in which the fracture was sustained. From the replies we learned that in thirty-one cases the fracture was caused by a fall and these deaths were, therefore, classified as No. 185 of the International List, "accidental traumatism by fall." In eight cases an automobile was involved and these deaths were placed under 188c, "automobile accidents." Two fractures were caused by falling trees and were entered under 188g, "accidental traumatism by other crushing;" and one person was struck by a train, which was a "railroad accident," No. 188a. Our aim in making these inquiries was to learn enough about the cause of death to permit us to classify it according to the International List. This tabulation, particularly as regards the major group of falls, clearly, is not sufficiently comprehensive to form the ground-work of accident prevention activities. There are falls and falls. Let me list in greater detail the additional information given to us regarding these thirty-one cases:

Fall on floor.....	7
Accidental falls.....	7
Fall downstairs.....	3
Fall from chair.....	3
Fall in home.....	2
Slipped and fell on floor.....	2
Fall from stoop.....	2
Fall from bed to floor.....	1
Fall from ladder.....	1
Decedent blind—stumbled and fell.....	1
Slipped on rug in home.....	1
Fall on sidewalk.....	1

The details shown in the preceding outline were, of course, entirely lost in our tabulation.

A health department is obliged, in the nature of things, to limit its additional inquiries to a few essentials. We cannot ask a busy practicing physician or a local registrar, whose compensation in many instances amounts to only a few dollars a month, to take the time that would be necessary to fill a long questionnaire. We have, therefore, prepared a concise form which, I believe, will enable us to obtain a necessary and sufficient minimum of information regarding deaths from accidents. In this connection, it is a pleasure to acknowledge my indebtedness to Mr. E. W. Kopf, Assistant Statistician of the Metropolitan Life Insurance Co., for many helpful suggestions.

**NEW YORK STATE DEPARTMENT OF HEALTH DIVI-
SION OF VITAL STATISTICS, ALBANY, N. Y.
SUPPLEMENTAL INFORMATION FOR DEATHS FROM
EXTERNAL VIOLENCE**

For all deaths resulting from external violence, please fill out this form, supplementing data required in items 17 and 18b of medical certificates of death.

Name of decedent	Date of death	Place of death
_____	_____	_____
Was death due to accident..... Suicide..... Homicide.....		
If an accident, what was decedent doing when injured:		
At work in factory or workshop..... in office..... at work elsewhere (specify).....		
At home..... on the street..... on railroad..... elsewhere (specify).....		
How did accident happen?.....		
If any vehicle was involved, state whether motor vehicle.....		
horse-drawn vehicle..... common carrier—railroad: steam..... electric		
Nature of injuries sustained.....		
If burns were involved, state whether through conflagration of buildings.....		
The questions above are applicable also to all instances of septicemia or infections following injuries.		

The business of securing this additional information could be carried out best through the agency of state and not city health departments because city health departments are often dissociated from the offices of local registrars. In this State twenty-two registrars are also city clerks and in some cities their offices and those of the local health departments are in different buildings. The health officers, therefore, often have no convenient access to the vital records; besides, the average health officer has neither the time nor sufficient clerical help to take up any additional functions.

Commencing with January, 1929, these blanks will be put into use in the State, exclusive of New York City. The local registrars will be instructed to secure the indicated items whenever a certificate of an accidental death is filed with them and to attach the blank to the corresponding death certificate.

Accidents differ from most of the other causes of death in one important aspect; namely, that they are all, at least theoretically, preventable and that within practical limitations they can be controlled to an effective degree. The need of more light on the circumstances of various accidents is axiomatic and we hope that our more comprehensive statistics will be of service to safety workers in their great task.

Numbers (Revision of 1920)	TYPE OF ACCIDENTS	NEW YORK CITY					REST OF STATE				
		1915	1920	1925	1926	1927	1915	1920	1925	1926	1927
175-196						ALL AGES					
201-203	Accidents (total)	68.1	64.1	81.4	80.1	77.1	80.8	77.5	88.6	86.5	86.1
175-177	Poisoning (gas excepted)	1.7	1.7	1.4	1.1	1.1	2.8	2.6	2.3	2.2	2.0
178	Confagration	1.2	1.3	1.3	1.5	1.1	1.1	.9	1.9	2.4	1.7
179	Accidental burns (confagration excepted)	8.1	7.7	5.4	5.1	4.8	5.7	6.8	5.6	4.9	4.7
180	Accidental mechanical suffocation	*	*	.9	.8	.9	*	*	1.0	1.4	.9
181	Accidental absorption of irrespirable, irritating, or poisonous gas	6.8	8.9	12.0	14.3	11.4	3.4	2.7	2.9	3.0	2.4
182	Accidental drowning	8.8	5.9	7.1	7.9	8.0	11.8	8.2	8.4	8.8	8.5
183	Accidental traumatism by firearms	.2	.3	.2	.3	.3	1.5	1.6	1.8	1.6	1.4
185	Accidental traumatism by fall	17.7	13.5	17.0	16.7	17.1	17.1	17.3	19.8	20.0	19.3
187	Accidental traumatism by machines	1.1	1.5	.7	1.0	.9	2.1	1.8	2.3	1.9	1.6
188	Accidental "traumatism by other crushing"		13.5	17.4	18.0	18.3	7.1	14.0	21.8	23.4	26.6
	c Automobile accidents										
	a Railroad accidents						13.6	9.0	6.7	6.4	6.0
	b Street-car accidents	15.6	5.5	6.6	6.9	6.0	1.7	1.5	1.4	1.2	.6
	def Other vehicles						3.3	2.2	2.1	1.3	1.8
	g Landslide, other crushing						1.8	1.8	1.0	1.2	1.0
194	Excessive heat	.9	.2	6.3	1.3	.6	.6	.1	2.0	.7	.4
	Other accidents	6.0	4.3	5.2	5.1	6.6	7.1	7.0	7.7	6.2	7.1
175-196						UNDER 5 YEARS					
201-203	Accidents (total)	93.9	88.3	76.2	65.1	64.8	83.8	79.4	72.7	72.6	59.2
175-177	Poisoning (gas excepted)	2.6	2.0	2.5	2.1	1.7	11.5	8.8	6.5	5.4	4.9
178	Confagration	2.2	1.6	2.1	3.3	1.9	2.5	3.7	2.9	5.7	3.7
179	Accidental burns (confagration excepted)	38.8	36.9	23.2	19.6	19.4	26.1	28.1	21.6	17.4	14.6
180	Accidental mechanical suffocation	*	*	4.4	4.4	5.9	*	*	7.8	10.3	5.8
181	Accidental absorption of irrespirable, irritating or poisonous gas	10.6	7.1	2.8	1.6	2.1	11.1	8.6	1.0	3.3	.....
182	Accidental drowning	1.3	.9	1.1	1.1	.5	11.3	5.9	4.5	6.5	4.5
183	Accidental traumatism by firearms	.2	.2	.....	.....	.....	.5	.2	.6	1.0	.7
185	Accidental traumatism by fall	17.7	14.6	10.4	10.7	14.1	5.8	5.7	4.1	3.8	2.8
187	Accidental traumatism by machines	.....	.2	.....	.....	.2	.....	.....	.4	.2	.2
188	Accidental traumatism by other crushing										
	c Automobile accidents										
	a Railroad accidents	.....	15.8	15.8	14.5	13.3	1.8	9.7	11.4	12.3	15.6
	b Street-car accidents	14.6	3.6	2.5	2.1	2.3	3.0	1.1	1.2	.8	.7
	def Other vehicles	.....	.....	.....	.....	.....	1.2	.4	1.0	.4	.6
	g Landslide, other crushing	.....	.....	.....	.....	.....	2.1	.9	1.4	.6	.6
	Excessive heat	1.3	.5	7.6	3.5	1.4	.7	.2	.4	.2	.2
194	Other accidents	4.5	5.0	4.0	2.3	1.9	5.5	5.7	4.7	3.6	4.1

Int. List Numbers (Revision of 1920)	TYPE OF ACCIDENTS	NEW YORK CITY					REST OF STATE				
		1915	1920	1925	1926	1927	1915	1920	1925	1926	1927
175-196,						5-14 YEARS					
201-203	Accidents (total)	51.8	59.7	51.3	52.0	47.6	42.6	47.7	45.4	44.4	45.8
175-177	Poisoning (gas excepted).....	.3	.2	.6	.5	.2	.7	1.1	.3	.3	.5
178	Conflagration	.9	.9	.6	1.1	.5	.7	1.1	1.4	1.4	1.3
179	Accidental burns (conflagration excepted).....	8.6	7.6	5.3	4.5	3.7	3.7	3.5	3.3	2.8	3.2
180	Accidental mechanical suffocation	*	*	.3	.2	.2	*	*	.1	.....	.5
181	Accidental absorption of irrespirable, irritating or poisonous gas.....	.6	1.3	2.0	1.1	1.4	.7	.6	.5	.7	.4
182	Accidental drowning	5.8	5.2	5.2	4.9	3.9	14.6	12.7	10.0	10.4	9.8
183	Accidental traumatism by firearms	.3	.2	.4	.3	.5	2.6	2.2	1.7	1.3	1.3
185	Accidental traumatism by fall	10.4	8.4	5.9	7.7	6.4	2.0	1.4	1.9	3.3	2.4
187	Accidental traumatism by machines	.4	.5	.....	.4	.3	.5	.2	.3	.1	.....
188	Accidental traumatism by other crushing.....	.....	28.9	27.0	28.3	26.9	7.8	15.6	18.4	18.3	21.8
	c Automobile accidents .....	.....	.....	.....	.....	.....	.....	2.7	2.1	1.5	1.1
	a Railroad accidents .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	b Street-car accidents	22.1	3.8	2.8	2.8	1.9	1.1	.7	.3	.5	.2
	def Other vehicles .....	.....	.....	.....	.....	.....	2.0	2.8	1.9	.9	.7
	g Landslide, other crushing.....	.....	.....	.....	.....	.....	.6	.2	.3	.3	.2
194	Excessive heat .....	.....	1.1	.1	.2	.....	.1	.....	.2	.....	.....
	Other accidents	2.3	2.8	1.1	1.0	1.7	3.2	2.9	2.7	2.5	2.5
175-196,						15-24 YEARS					
201-203	Accidents (total)	37.6	37.0	42.2	40.9	44.9	49.2	63.1	72.6	76.7	74.2
175-177	Poisoning (gas excepted).....	2.1	.7	.7	.4	.3	1.5	.9	1.3	1.4	.8
178	Conflagration	1.5	.3	.3	.5	.6	1.0	.....	.9	1.4	.8
179	Accidental burns (conflagration excepted).....	2.0	2.8	1.9	1.6	1.1	2.0	3.4	3.0	2.4	1.2
180	Accidental mechanical suffocation	*	*	.2	.3	.....	*	*	.3	.1	.3
181	Accidental absorption of irrespirable, irritating or poisonous gas.....	2.6	3.8	5.9	4.7	5.5	1.5	.5	2.4	2.6	1.8
182	Accidental drowning	8.5	7.4	8.2	7.0	8.6	17.6	15.4	14.4	16.6	15.7
183	Accidental traumatism by firearms	.4	.7	.4	.6	.3	3.2	3.5	3.8	3.3	3.7
185	Accidental traumatism by fall	7.0	5.5	7.0	6.4	7.8	4.3	3.5	3.6	3.8	4.1
187	Accidental traumatism by machines	1.2	1.8	.9	1.0	1.1	2.8	2.1	2.0	2.2	1.6
188	Accidental traumatism by other crushing.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	c Automobile accidents .....	.....	5.1	7.8	9.6	8.4	5.9	11.8	23.8	27.4	29.8
	a Railroad accidents .....	.....	.....	.....	.....	.....	.....	10.6	4.9	5.0	4.5
	b Street-car accidents	8.0	5.2	4.3	4.1	4.3	1.0	.8	.5	.8	.1
	def Other vehicles .....	.....	.....	.....	.....	.....	3.9	2.6	2.9	1.7	2.9
	g Landslide, other crushing.....	.....	.....	.....	.....	.....	2.4	1.1	.9	1.1	.8
194	Excessive heat	3	.....	.2	.1	.1	.3	.....	.3	.1	.3
	Other accidents	3.8	3.6	4.2	4.6	6.6	5.9	6.8	7.7	6.7	6.0

Int. List Numbers (Revision of 1920)	TYPE OF ACCIDENTS	NEW YORK CITY					REST OF STATE				
		1915	1920	1925	1926	1927	1915	1920	1925	1926	1927
		25-34 YEARS									
175-196, 201-203	Accidents (total)	53.8	41.6	48.2	49.9	49.6	66.0	55.2	56.4	59.4	60.8
175-177	Poisoning (gas excepted)	2.1	2.5	1.8	.8	.5	2.2	3.1	1.4	1.5	1.7
178	Conflagration	.8	1.2	1.4	.5	.9	.6	.3	.7	1.0	.8
179	Accidental burns (conflagration excepted)	2.5	1.8	1.4	1.5	2.2	3.1	3.7	2.2	2.8	2.4
180	Accidental mechanical suffocation	*	*	.3	.3	.3	*	*	.2	.6	.2
181	Accidental absorption of irrespirable, irritating or poisonous gas	4.3	5.7	7.2	10.0	6.8	1.8	1.0	1.9	2.2	2.5
182	Accidental drowning	8.7	6.4	5.6	7.7	7.2	11.4	5.9	6.0	7.4	6.2
183	Accidental traumatism by firearms	.2	.2	.....	.3	.3	1.3	1.7	2.1	1.3	.7
185	Accidental traumatism by fall	12.6	8.2	8.3	7.7	9.1	4.7	3.8	4.7	3.6	4.3
187	Accidental traumatism by machines	1.9	1.9	.9	.9	1.2	3.4	2.2	1.9	3.3	2.5
188	Accidental traumatism by other crushing .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
194	c Automobile accidents .....	.....	4.8	7.6	7.8	9.0	6.2	12.0	18.4	19.4	23.0
	a Railroad accidents .....	.....	.....	.....	.....	.....	17.5	10.6	6.0	7.3	6.5
	b Street-car accidents	12.7	3.8	6.1	6.0	5.1	1.6	.9	.9	.5	.1
	def Other vehicles .....	.....	.....	.....	.....	.....	2.7	1.8	1.4	1.9	2.1
	g Landslide, other crushing .....	.....	.....	.....	.....	.....	2.1	1.9	1.3	1.0	1.0
	Excessive heat	.9	.1	1.5	.5	.3	.1	.....	.4	.1	.....
	Other accidents	7.5	5.0	6.1	5.9	6.6	7.3	6.3	6.7	5.6	6.7
175-196, 201-203	Accidents (total)	67.0	52.7	78.5	79.7	77.5	69.1	59.2	79.3	70.1	76.4
175-177	Poisoning (gas excepted)	1.9	2.3	1.6	1.2	2.0	2.2	2.0	3.0	3.5	2.0
178	Conflagration	1.2	1.6	.9	1.3	1.5	.4	.6	1.2	1.2	1.3
179	Accidental burns (conflagration excepted)	2.2	3.3	2.1	2.7	2.8	1.9	5.5	2.6	3.5	2.9
180	Accidental mechanical suffocation	*	*	1.1	.3	.4	*	*	.3	.6	.6
181	Accidental absorption of irrespirable, irritating or poisonous gas	7.3	9.1	13.1	14.3	12.3	1.9	2.6	3.3	3.1	2.9
182	Accidental drowning	10.8	7.2	10.7	13.1	10.9	9.5	5.4	9.5	6.5	8.2
183	Accidental traumatism by firearms	.3	.1	.3	.3	.1	.7	1.0	1.0	1.5	1.3
185	Accidental traumatism by fall	19.6	12.0	16.3	16.0	16.3	8.2	5.6	10.2	8.3	10.9
187	Accidental traumatism by machines	1.7	.8	1.0	2.2	.5	3.0	2.3	4.4	2.7	2.1
188	Accidental traumatism by other crushing .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
194	c Automobile accidents .....	.....	5.6	10.9	11.5	12.9	6.0	11.3	21.3	20.8	24.0
	a Railroad accidents .....	.....	.....	.....	.....	.....	18.6	10.8	9.5	8.6	7.5
	b Street-car accidents	13.6	6.6	10.1	8.2	8.2	2.5	1.9	.8	.8	.4
	def Other vehicles .....	.....	.....	.....	.....	.....	2.5	1.4	1.0	1.2	1.6
	g Landslide, other crushing .....	.....	.....	.....	.....	.....	2.4	2.5	.8	1.4	1.9
	Excessive heat	.4	.1	4.2	1.6	.4	.6	.....	1.6	.6	.4
	Other accidents	8.1	4.0	6.3	6.8	9.1	8.5	6.4	8.8	5.9	8.3

Int. List Numbers (Revision of 1920)	TYPE OF ACCIDENTS	NEW YORK CITY					REST OF STATE				
		1915	1920	1925	1926	1927	1915	1920	1925	1926	1927
175-196,						45-54 YEARS					
201-203	Accidents (total)	89.8	76.3	108.7	112.3	105.0	79.3	63.7	88.6	86.3	78.5
175-177	Poisoning (gas excepted)	1.0	2.7	1.6	2.6	1.8	2.8	1.2	2.3	2.7	2.4
178	Conflagration	1.2	1.7	2.0	2.6	1.4	.4	.5	1.9	2.7	2.7
179	Accidental burns (conflagration excepted)	4.6	3.7	2.5	4.6	3.2	2.8	2.3	3.6	2.6	2.8
180	Accidental mechanical suffocation	*	*	.5	.3	.5	*	*	.3	.5	.4
181	Accidental absorption of irrespirable, irritating or poisonous gas	11.0	15.9	24.3	26.1	20.3	3.5	3.3	3.6	3.7	3.1
182	Accidental drowning	16.4	7.1	10.1	11.9	16.1	8.0	4.9	8.1	6.1	5.5
183	Accidental traumatism by firearms	.2	.2	.3	.2	.2	1.3	.5	1.6	1.7	1.3
185	Accidental traumatism by fall	27.7	14.9	25.0	24.1	20.6	15.9	8.3	14.5	15.1	10.6
187	Accidental traumatism by machines	1.7	3.2	1.6	1.1	1.2	2.2	2.6	3.4	2.1	2.1
188	Accidental traumatism by other crushing										
	c Automobile accidents		13.7	16.7	19.1	17.4	9.4	15.8	23.5	26.8	25.4
	a Railroad accidents						17.6	11.4	10.6	9.4	10.7
	b Street-car accidents	18.2	8.0	8.2	11.9	10.4	2.6	1.4	2.0	1.7	.7
	def Other vehicles						3.0	1.8	1.4	.8	1.6
	g Landslide, other crushing						2.2	3.7	1.2	2.0	1.6
194	Excessive heat	1.0		9.5	.6	.9	.6		2.3	.9	.6
	Other accidents	6.8	5.2	6.5	7.3	11.3	7.0	6.0	8.3	7.6	6.8
175-196,						55-64 YEARS					
201-203	Accidents (total)	112.3	101.3	172.4	172.2	158.8	95.0	92.1	119.2	99.2	118.5
175-177	Poisoning (gas excepted)	2.2	2.8	1.7	.8	2.4	2.2	2.0	2.7	2.6	3.8
178	Conflagration	.7	2.2	2.0	1.6	1.9	1.4	.5	2.4	2.4	2.1
179	Accidental burns (conflagration excepted)	7.0	6.9	5.6	7.1	7.2	5.0	5.1	4.7	4.3	5.0
180	Accidental mechanical suffocation	*	*	.6	1.9	1.3	*	*	.4	.4	.4
181	Accidental absorption of irrespirable, irritating or poisonous gas	18.2	20.6	36.5	48.1	37.5	4.4	3.3	5.3	3.2	4.6
182	Accidental drowning	12.6	5.0	10.3	12.6	10.4	8.6	4.6	4.2	6.0	9.0
183	Accidental traumatism by firearms		.6		.3	.3	.6	1.0	.9	1.3	1.3
185	Accidental traumatism by fall	32.2	25.9	38.8	33.6	37.8	20.4	22.2	25.7	21.6	25.2
187	Accidental traumatism by machines	.4	3.1	1.1	1.6	1.6	1.7	2.8	5.5	2.2	2.9
188	Accidental traumatism by other crushing										
	c Automobile accidents		20.6	36.0	34.2	35.6	11.0	15.6	29.9	28.9	35.9
	a Railroad accidents						19.9	14.0	11.5	10.6	9.7
	b Street-car accidents	24.5	9.4	13.7	14.7	9.9	1.9	3.3	2.9	3.5	1.9
	def Other vehicles						4.1	2.0	3.8	2.2	2.5
	g Landslide, other crushing						1.9	2.6	1.8	1.9	1.1
194	Excessive heat	4.1	.9	17.6	4.6	.8	1.7	.5	3.1	.9	1.1
	Other accidents	10.4	3.1	8.6	10.9	12.1	10.2	12.5	14.4	7.3	12.0

Public Safety Division

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TYPE OF ACCIDENT'S	NEW YORK CITY					REST OF STATE				
	1915	1920	1925	1926	1927	1915	1920	1925	1926	1927
175-196, (Revision of 1920)										
Accidents (total)	180.6	202.3	339.3	312.4	284.9	136.9	165.6	191.6	190.1	189.0
Poisoning (gas excepted)	3.4	.8	3.5	2.1	3.4	1.9	4.6	2.9	2.4	2.4
Conflagration	9	3.0	3.5	4.9	.....	2.4	1.4	5.7	3.6	2.0
Accidental burns (conflagration excepted)	15.3	14.4	12.0	6.9	11.6	7.6	7.3	10.3	7.2	11.4
Accidental mechanical suffocation	*	*	1.4	2.1	2.7	*	*	.8	.4	.8
Accidental absorption of irrespirable, irritating or poisonous gas	29.0	53.0	57.7	93.7	56.9	9.0	5.5	9.0	7.2	5.1
Accidental drowning	15.3	5.3	9.2	9.7	8.9	5.2	4.1	6.2	6.8	5.1
Accidental traumatism by firearms .....	.....	.8	.....	.7	.....	.....	.9	2.1	.8	.4
Accidental traumatism by fall	69.0	59.9	97.2	89.6	89.7	56.8	67.5	67.3	72.7	73.3
Accidental traumatism by machines .....	.....	2.3	.7	1.4	1.4	4.3	3.6	2.9	2.8	1.6
Accidental traumatism by other crushing .....	.....	40.2	68.3	60.4	81.5	10.4	27.4	37.3	45.4	48.8
c Automobile accidents .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
a Railroad accidents .....	.....	12.1	19.0	27.1	17.8	3.3	4.6	4.9	4.0	2.8
b Street-car accidents	31.5	.....	.....	.....	.....	5.7	5.5	4.5	2.0	2.0
def Other vehicles .....	.....	.....	.....	.....	.....	2.8	2.7	2.5	4.0	2.0
g Landslide, other crushing .....	.....	.....	55.6	4.9	1.4	1.4	.....	5.3	2.0	1.2
Excessive heat	6.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other accidents	10.2	10.6	11.3	9.0	9.6	9.0	16.0	16.4	14.1	18.5
194										
175-196, (Revision of 1920)										
Accidents (total)	358.7	404.7	648.2	538.9	526.6	510.4	552.0	599.4	602.3	568.2
Poisoning (gas excepted) .....	.....	2.2	2.0	2.0	.....	6.1	5.9	3.6	.9	1.7
Conflagration .....	.....	4.4	8.0	11.8	3.9	8.2	2.0	10.7	14.9	2.6
Accidental burns (conflagration excepted)	22.6	15.3	42.0	31.5	17.4	22.5	28.7	20.5	16.6	20.6
Accidental mechanical suffocation .....	*	*	.....	2.0	.....	*	*	.9	2.6	.....
Accidental absorption of irrespirable, irritating or poisonous gas	65.2	94.1	80.0	102.3	98.7	12.3	13.8	13.4	14.9	12.9
Accidental drowning	5.0	2.2	6.0	2.0	7.7	9.2	4.0	4.5	1.7	6.0
Accidental traumatism by firearms .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Accidental traumatism by fall	175.6	203.4	254.1	263.7	244.0	364.9	415.5	437.1	456.3	419.9
Accidental traumatism by machines .....	.....	.....	.....	2.0	1.9	1.0	4.0	.....	1.7	2.6
Accidental traumatism by other crushing .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
c Automobile accidents	37.6	52.5	86.0	100.4	92.9	13.3	27.7	40.1	49.0	61.7
a Railroad accidents .....	.....	.....	.....	.....	.....	17.4	15.8	13.4	4.4	11.1
b Street-car accidents .....	.....	17.5	18.0	23.6	34.8	3.1	5.9	7.1	5.2	3.4
def Other vehicles .....	.....	.....	.....	.....	.....	16.4	3.0	3.6	1.7	6.0
g Landslide, other crushing .....	.....	.....	.....	.....	.....	1.0	4.9	.9	.9	.9
Excessive heat	10.0	4.4	130.0	11.8	15.5	5.1	1.0	25.9	8.7	1.7
Other accidents	42.6	8.7	22.0	5.9	9.7	29.7	19.8	17.8	21.9	17.1
194										

*Data not available.

CHAIRMAN DUBLIN: I would like to draw your attention to a few items on this blank. You see it says, about half way down: "If an accident, what was decedent doing when injured? Was he at work in a factory or work shop, in an office, at work elsewhere, at home, on the street, on a railroad?" The point of that is to bring out the very deficiency that heretofore existed in the records of Health Departments. They gave us their best information on the type of accident; they did not tell us where those accidents occurred. It is obviously of the first importance, from the prevention standpoint, to know where the accidents occurred—Were they industrial—that is, did they occur while the man was at work?—Were they home accidents?—Were they vehicular accidents?—Public accidents on the streets?—Railroad accidents?

By this very simple device we are enabled to obtain a fund of information State-wide, which is of tremendous importance to the accident prevention campaign. It would be so important to have the State Health Departments and State Registration Departments do this work, as Dr. DePorte suggests he will do in his State, because until systems like Mr. Aronowitz's are established, we shall have to rely on the Health Departments for any information that we have.

I sincerely hope, moreover, that Dr. DePorte will develop this system so as to include serious injuries as well as fatal accidents. I don't know what the chances of that are, but it would be of tremendous importance for the Registration Divisions to include that type of information. I don't mean trivial accidents, but very serious ones.

Is there any other comment?

JOHN V. LONG (Pittsburgh Better Traffic Committee): There is one type of accident that I imagine you are going to find rather hard to discover: That is, where the certificate recites the cause of death, which occurred after possibly two or three months, but was superinduced by an automobile accident. We find we have not been able to trace anything back in Pittsburgh, and it is a subject which I believe will have to be taken up through the Medical Society to get that information.

MR. KELSEY (Boston): Don't you also want to know what the decedent's state of mind was; whether he had his full faculties about him while he was in the place where he got injured, or whether he was asleep at the switch?

CHAIRMAN DUBLIN: There's lots of information we should like to have. I wonder whether we could get that. Was there someone else who would like to ask a question?

MR. HUBBELL (Massachusetts): In glancing at this report sheet, I was wondering if Mr. DePorte would be interested in deaths by carbon monoxide gas. We have found in our Motor Vehicle Bureau that we have quite a few of those.

DR. DEPORTE: October 1st we began classifying deaths from carbon monoxide gas, as a special study of our own.

E. W. KOFF (Metropolitan Life Insurance Co.): Do you expect to send this form to the coroner or doctor or the local registrar?

DR. DEPORTE: Just the local registrar. The local registrars are directly responsible to us, and that's why we want to concentrate the work through them, because we have the power to force them to supply the information, whereas a coroner will or will not just as he pleases.

CHAIRMAN DUBLIN: Do you pay them anything extra for the report?

DR. DEPORTE: No, but accidental deaths average about five per district per registrar; so the average registrar in the average district probably will not have more than five a year, and even though they are very poorly paid, we can expect them to obtain information in detail for these five deaths, one death in two months on the average.

CHAIRMAN DUBLIN: We will now proceed to the third and last paper which will be presented by Mr. Burnham, the Research Director, Motor Vehicle Department, State Board of Public Roads of Rhode Island.

Can the "Probable Cause" of an Accident Be Deduced from Accident Reports?

By **HARRY C. BURNHAM**

**Research Director, State Board of Public Roads, Motor Vehicle Department,
Rhode Island**

There is no question but what it is possible to do so if the accident report is so designed to secure complete information.

The foundation of a successful analysis to determine the fundamental cause of a highway accident is an accident report blank in the form of a complete questionnaire so laid out as to provide for the checking of one answer against another.

A most important item is to secure from the person making the report the full story as to his impressions of the occurrence.

The next important consideration is that the analyst be a person who uses every day "horse sense," who is a practical and experienced motor vehicle operator, who has a good understanding of human nature and has, at least, a rudimentary knowledge of physics.

The analyst should also be a student of highway conditions. This knowledge can easily be obtained by the establishment of observation posts at points of varying locale. Here, first hand knowledge can be had as to the habits of humanity awheel and afoot. In fact, the knowledge obtained by actual traffic studies and observations will be found to be of the utmost value.

Observing traffic, we shall find that highway users have a certain few bad habits. These will be noted in the so-called "near accidents" which can be seen anywhere on the highway.

We shall see motor vehicle drivers failing to slow at intersections; at points where their view is obscured, and at curves; trying to outguess the other traffic, cutting corners, attempting to beat pedestrians to a passage or endeavoring to move the pedestrians out of the path of the motor vehicle by nervous blasts of the horn. We shall also observe innumerable drivers who are not paying the slightest attention to their job of the moment.

Pedestrians will be seen to enter the street or path of traffic from behind obstructions such as parked cars, street cars and other vehicles. Some pedestrians will be noted who run into the street suddenly or who use the street in such a manner as to indicate no realization as to the danger incurred.

We shall see a composite picture of human carelessness, egotism, ignorance and thoughtlessness.

Finding these conditions to generally exist, we shall have no difficulty in tracing the brilliant thread of carelessness through the warp of fact and fancy of our accident report.

The analyst's knowledge of human nature brings the realization that rarely ever does a human being deliberately proceed to endanger his or any one's life or limb. We have to admit that whenever actual danger is definitely known to exist we stop and think it over.

Therefore, we must consider as our first point the fact that no highway accident is ever deliberately brought about by any of the parties involved.

We shall soon find in our quest for a cause that the average person feels that he or she is an expert driver. We shall quickly separate expertness from overconfidence. Our driver will tell us that so many years of driving experience

rest to his credit. We shall, reflecting on our own experience and knowledge of human nature, know that this experience has bred bad driving practices that have become automatic habits. We must look for these in analyzing our accident reports.

Our participants will be found to blame everybody but themselves for the accident, or will state that it was caused by the weather, or street corners or something else. Never will they incriminate themselves if they can help it. And the peculiar part of it is this: You will find that in the majority of cases they honestly believe their statements to be entirely truthful. More human nature.

Our driver will state on the accident report that he did everything to avoid the accident. He was going slowly, or slowed down, blew his horn, put on his brakes, swerved his vehicle, in fact we soon find that our driver was indeed a superhuman person. He did several more things than he actually had time to do.

The analyst knows that at any certain speed a motor vehicle travels a certain number of feet per second; that it takes a definite time interval for registration of an item in the human mind and to secure a motor reaction; that it requires a certain time interval to stop a motor vehicle; that pedestrians have certain average rates of movement whether walking or running, and will apply these sharp, cold facts in dissecting the truth from the statements in the accident reports.

Surrounding every highway accident are factors which are easily checked; the weather, locale, time of day, volume of traffic, course of vehicles or pedestrians, condition of highway, etc. We can call these our common factors. They are present in every accident.

We must not forget however, that none of these factors actually caused the disasters. In digging out our real cause we must consider them as merely corroborative factors only.

Perhaps it is well to drag our "corpus delicti" into open at this point. We must remember that there is no such thing as an accident being caused by an inanimate object. Disaster only comes with the entrance of the human factor with its almost incalculable capacity for errors. There must be conscious thought directing anything inanimate.

The motor vehicle is not a motor vehicle until we have consciousness at the wheel or some conscious act to set it in motion. Our common factors enter into the accident only to the extent that the human factor failed to take notice thereof and guide his course or actions accordingly.

For instance, to aver that a blind corner caused an accident is patently absurd. The same thing applies to skidding and a host of other fallacious beliefs as to accident causation.

Our trail is approaching its goal. We study our accident reports and dig out therefrom the thread of human carelessness, which, like the far reaching tentacles of dry rot, reach into the uttermost human activity.

We shall find that one or perhaps all of the participants just failed to be alert, or on the job. They failed to see the proximity of danger or heed the dictates of caution because they had met with similar conditions countless times before and nothing had happened. But, in this instance the time margin was a bit short or reaction was sluggish and the inevitable occurred.

We, as analysts, must bring forth from our analysis of highway accidents the errors of commission or omission so clearly that the picture can be vividly presented to highway users as to the real dangers incurred.

We must remember the fundamentals of human nature typified in the person who will deny recklessness but who will admit he made a mistake.

As we go deeper and deeper into this analysis we will find greater simplicity. It finally will dawn upon us that the basic cause of any accident of any type

is absolutely the same, the only difference being in the background, and the instrument at hand at the moment of disaster. The same basic error leading to the dropping of the best china cup might lead to a fatal highway accident if the person were seated at the wheel of a vehicle in motion instead of holding the cup.

Use what terminology we will, this is what we must bring forth from our study of accident reports and use the facts so obtained as pigments to paint such clear pictures that even the lowest intelligence using our highways can see and learn much thereby.

Until we are able to bring to each highway user the realization as to the scope and extent of his or her own responsibility for accident prevention, and to emphasize it as a personal matter of great moment to such individual, we shall be unable to effect any real lasting diminution in the terrible toll now being exacted as the price of individual carelessness.

We must not attempt to consider in our analysis either civil or criminal responsibility. We must not be swayed by sentiment or fallacious beliefs; we must disregard technicalities. We must uncover the human errors which were the real cause of the disasters so that they may be broadcast far and wide.

No attempt has been made in presenting this paper to consider detailed analysis technique as the limited time prevents more than a general coverage of the subject.

MR. BURNHAM: I shall be very glad indeed to supply any information upon request. I have not attempted to give you details. I have attempted to emphasize and bring out to you that it is possible to secure from any accident report a very good idea as to the failure of the human element to see a condition developing before him or her which led to a final accident.

We can stand at this window here and we can see potential accident after potential accident. The only thing that keeps the accident from occurring is the fact that one of the human elements involved probably was alert or that the time element was sufficient to prevent.

To point out the time element, I would like to tell you about an accident which was deliberately staged. We hit a Ford touring car with a Pierce Arrow limousine. We had a great number of persons there just merely to observe it. They knew what was going to happen. They saw the accident. I took their comments. I then examined the film, one of the motion pictures being made at the rate of 16 pictures per second and the other at 128 pictures per second; and, gentlemen, there was not one of the fifteen persons that described the accident accurately, because that accident took place in $\frac{3}{16}$ of a second, and the average human being has no opportunity to get more than one impression at the time that accident took place. Each one of the fifteen individuals had a different impression, but by taking the fifteen impressions we could piece the accident together again, and it was the same as it showed on the film. But there were fifteen different impressions of the accident, and your average automobile accident happens in less than one second from the time it is first perceived to be a potential accident until it has happened.

I might mention that your average automobile travels at an average rate of speed on the highways of about 22 miles per hour or a little over 30 feet a second. Your average human being reacts in about seven-tenths of a second. In other words, it takes seven-tenths of a second to perceive something and get reaction through the motor nerve center. We are traveling say 30 feet a second; it takes us seven-tenths of a second to react. Therefore, we have to figure on going 21 feet while we are thinking about what we are going to do. Then we have got to stop the automobile after that. We will find upon studying we must allow

at least 45 to 50 feet to see something and stop before being involved in an accident, if we are traveling at 20 miles per hour. We have got to sell that idea.

I could go on telling you a lot of other things we have dug out in Rhode Island through the combination of a very comprehensive mass of accident statistics, the establishment of 54 observation posts upon the highways, taking in all kinds of highway conditions, traffic, the studies which we have made there and the compilations

CHAIRMAN DUBLIN: Mr. Burnham has presented a very interesting and a very stimulating paper. Here is a clear-cut issue which is involved in this paper. I am sure you all got it. His thesis is that it is possible in a large number of cases at least, to determine the basic responsibility of the individuals concerned in the accident. He is, in effect, saying that it is possible to place fault and blame in the causation of accidents, and that of course is quite contrary to the idea that has motivated the Committee under whose auspices this symposium is taking place. The Committee of the Safety Council concerned with public accidents, vehicular accidents, has definitely taken the stand not to attempt to place responsibility for the causation of accidents; that is, not to get behind these human elements that Mr. Burnham has referred to, but rather to get as complete a picture of the facts of the situation, of the physical conditions surrounding the accident, so that those at least might be correctly reported and controlled in the accident prevention campaign.

This is a clear-cut issue, and I sincerely hope that those of the Committee who were largely responsible for the development of that point of view—that is, for the elimination of the human element of responsibility from the picture of the accident, will have something to say, or will ask questions in regard to the system that is in operation in Rhode Island, so that the rest of us may be able to draw a fair conclusion with regard to the value, the advantages, of either stand.

I am taking pains to bring home to you the significance of Mr. Burnham's paper. It is a vital question, and we ought to have a very full discussion on the merits of the two systems. I hope Mr. Aronowitz will have something to say about it.

LEON ARONOWITZ (Statistician, Bureau of Motor Vehicles, Albany, N. Y.): There are a few points I would like to bring out. In analyzing the reports, one needs to have some familiarity with traffic conditions, to analyze the report thoroughly and use proper judgment. In New York State we have approximately 90,000 reports a year. With our staff of employees, getting anywhere from \$1,000 to \$1,2000 a year, you cannot expect them to possess the ability that Mr. Burnham would like to have people possess. In a small locality, one or two men can probably go over all the accident reports and determine just exactly what happened. We have got ten or twelve girls and they are changing every three or four months—two or three leave and two new ones come in—it would be impossible to get people of that type.

Then the next factor—Mr. Burnham mentioned about the accident that they staged. There were fifteen people and they all got a different impression. If fifteen people viewing the accident all get a different impression, how is a person sitting at a desk in an office to be able to draw any conclusions as to how the accident actually happened?

Then there is another phase of this problem that comes up. I have mentioned this to some of the other members of the Committee before. A man is driving a machine; he is intoxicated. As a result of his intoxication he is speeding and he is on the wrong side of the road, and he runs over a pedestrian who is jay walking. What particular factor caused that accident? What particular act of either the motorist or the pedestrian? If he had not been intoxicated it would not have happened; if he had not been riding on the wrong side of the road it would not have happened; if the pedestrian had not been jay walking it would not have happened.

It seems that the Statistics Committee's function is to get facts and not draw conclusions. If they get the facts and find out what is actually happening, then from these facts they can draw conclusions which will help this general campaign. They will know that certain drivers will speed; that a certain number of drivers are failing to observe the right of way. They will find out, for example, that taxicabs, while they only represent a small percentage of the cars registered, represent a large proportion of the accidents. Facts such as that can be drawn from your statistics.

In New York State in 1925 we licensed what were known as Junior Operators, people between sixteen and eighteen years of age. As a result of our statistics we found at the end of the first year that 15 per cent of the Junior Operators that were involved in accidents, caused deaths, whereas in the case of senior drivers, only 3 per cent caused deaths. That immediately brought home to the Commissioner that there was a dangerous element that must be controlled. So the following year the law was amended, so Junior Operators could drive only in the rural districts. That cut the fatalities down to 8 per cent, and that percentage even was 2-2/3 times as high as for the more experienced driver; and this year we are considering presenting to the legislature to have that law repealed. Facts such as that can be drawn from your study of statistics, rather than attempting to put the blame on any particular man.

L. E. MACBRAYNE (Boston): I would like to speak a word in support of Mr. Burnham. We try in Massachusetts to keep up with Rhode Island, and at our State Conference last May we assigned to Professor Parke of the Institute of Technology the discussion of a problem similar to this. We gave him the title—What is the Relation of Momentum to the Human Element in the Accident? I think what Mr. Burnham desires to bring out is this: That the average man involved in an accident does not know why it occurred. He does not know the failure of the human element. He does not know, as Professor Parke pointed out, that when he takes a certain car and drives at a certain speed, he has a momentum of five cars going five miles an hour, or a railroad train at a certain speed, and he does not know the variation in the mental reaction in a small group of even ten drivers so that in that group of ten drivers one man will do the thing within a limited range of time that will cause the accident.

It is not necessary for every community to make an analysis that will prove what may be discovered in any one important city; that is, if we find in a group of ten individuals there is a variation, then the idea we want to sell to our million drivers in New England, or your larger number in New York, is the fact that unless you know as much about yourself as you do about your car, you have no right to take chances on the highway above a certain speed. We have a phrase that says, "Driving too fast for conditions." Professor Parke said there should be added to that the words, "Driving too fast for the man behind the wheel;" that a large number of men are driving, just as a large number of pedestrians are walking, without a proper understanding of how they will act under certain conditions in which the time element is vital.

We were holding some road races on a track where if you don't go one hundred and twenty miles an hour you fall off, because the track is at an angle of some 45 degrees. Right in front of the grand stand one of the well-known racers approached so close to another driver that it looked as though he had struck him. Of course he had not struck him. Otherwise the accident would have occurred there. But in a fraction of a second after the first car had passed the second, the message came to the brain of that driver, "He is striking me," and so he made not an easy turn but a quick turn and went off the track; the car went into the air, turned over three times, and hurled both occupants over the fence, killing one of them. I talked with a dozen people who saw the accident and made this discovery; that those who

saw the first part of the accident were not able to describe any of the second part, and those who saw the body tossed over the fence could describe accurately only what occurred when the body struck, but had no picture at all of what happened before the body left the car.

Now, when confronted by a situation that may cause an accident, the average individual receives that same shock. He does not get the whole picture. Consequently, seeing only a part of it, he is a part of the accident, and may do the unexpected thing. If he has a narrow margin of time, which does not allow him to work out the whole problem, as Mr. Burnham says, he must react in a fraction of a second. I think Mr. Burnham has developed a very important thing, and it is not that each community should undertake to find these facts, because not every town would have the facilities; but once having established these facts, we should take them into our local campaigns, because, after all, too many of us are stopping with the statistics; we do not know what to do with them.

When we discover that there is an increase in elderly pedestrian accidents, when children's accidents go down, then we ought to increase our campaign in that five months' period, or four months' period, according to the geographic location, when the older people are getting hurt, because there is a direct relation between our Northern States and the upward curve of the elderly pedestrian accidents, and at the same time our children's accidents are going down until they reach the lowest point, when the old people are at the highest. There's where we should put the statistics to practical information and education in our campaign.

A. J. BAMS: I want to say first that it seems to me Mr. Burnham handled these subjects very, very well, but I think there are some adverse criticisms—not criticisms of the manner in which he handled the subject, but criticisms of the subject itself. In my experience in life, in compilation of any and all information, wherever the human element enters into it, we begin to get results which are usually based upon the ability of the individual who compiles these statistics to interpret, rather than on the facts which are presented, and if we develop too far the subject of probable cause, we reduce to a minimum the number of questions which we might ask about an accident, and when we do that we get nowhere. We get the result that we get in all other activities requiring the human element; that it varies accordingly as we vary the person; from person to person. I want to throw out these suggestions as counter to the thought of probable cause.

If we increase the number of questions, and of course ask the proper questions, we reduce the need for asking the probable cause, as it might be presented by the one who reports the accident. And, accordingly as we reduce the need for interpretation of conditions and facts relating to the accident, we get accuracy. Aren't most of our accidents, or a large percentage of them, accidents on which the facts will give the cause, without trying to develop a line or a column of remarks for an interpretation which is not needed?

My thought is that we ought to increase the number of questions to the point where probable cause would not enter into the discussion by the person reporting the accident, and when we do that, we eliminate the interpretation, which is a hit-and-miss job.

SMITH R. BRITTINGHAM (Seaboard Air Line R. R. Co., Norfolk, Va.): I had occasion some years ago to run down most minutely the causation of one particular accident. It was a case of serious injury and loss of an arm. I came to the conclusion that the accident was primarily and in its last analysis due to the fact that the injured person had had a fuss with his wife that morning before going to work. It put him in a mental frame which prevented his giving the proper attention to his work. If it is possible to ascertain from the report just what the fundamental cause of the accident is, when it involves such fine points, such elusive mental elements as that, I really want to know something more about it.

I am particularly interested in accidents on railroads. Sometime ago I had figures made up to try to ascertain the fundamental causation of crossing accidents, and I was astonished to learn that on our own railroad 46 per cent of all accidents at crossings were due to the automobilists running into the train rather than the train running into the automobilists, and I believe, that back of that 46 per cent of accidents were mental causation which it is absolutely impossible to learn from any statistical reports, howsoever finely it may be devised.

MR. HUBBELL (Massachusetts): Our friend from Rhode Island has received some somewhat adverse criticism, and I would like to go to his rescue as it were, and say that on this work I have been very much impressed that this human element has a very important part in accidents, and it is something that really, it seems to me, has got to be faced. In addition to the recording of the physical element, the one thing that comes into our minds is this: that we are handing out licenses too freely; that the examination that most of us face now, that operators are put through before they receive their licenses, should be made more strict, in such a way as to eliminate so far as possible these undesirable human factors.

MISS ETHEL USHER (Connecticut Bureau of Motor Vehicles): I feel, as one of the states which is working as a close neighbor to Rhode Island, New York and Massachusetts, and has had statistical records on much the same basis over a period of several years, I ought to go on record as saying that in Connecticut we operate very much as Mr. Burnham does, on a theory and basis that after all the automobiles are operated by human beings; therefore, are under the direct control of the human being. Therefore, if any prevention work is done, it must be done and aimed at the human element, and if we are getting statistics we are getting them for the purpose of getting a definite basis for prevention work, otherwise why bother to get them; and if the human element is the one that is the chief cause of these accidents, then we must be told so, because it is the common belief and it is borne out in almost every act of life, that unless the human being is told he is responsible for some act, he is going to lay the responsibility on other shoulders and not do anything about it. Therefore, we in Connecticut follow much the same line as Mr. Burnham is doing in Rhode Island, trying to establish the fundamental cause as being in the hands of the operator, and it has been our experience over a period of five or six years of work with these accident reports, made out by the operators themselves, that in a large majority of the cases there is a definite act on the part of some one person involved that is evident, and is primarily the cause. There are cases, of course, where the situation is complex, as it must be with several human minds involved. In those cases it is much more of a problem to determine the primary cause, but we have found in far and away the majority of cases there is some one act that stands out as causing it.

CHAIRMAN DUBLIN: Is there any other discussion? If not, I would ask Mr. Burnham to summarize the discussion, and will he please keep in mind to answer this question: whether in his State he does not also employ the essential items in the record that we are considering as basic to the system of the committee, such as we employ in New York and other States; whether he places any reliance on those facts; whether he is able through the application of that information to interpret the human element that he obtains through the statement of fault, and also how reliable is the information that he obtains of this type: what checks he has on this reliability, and finally what use he puts that information to in the prevention of accidents. I may say that as for myself, I am entirely open minded on this issue. I can see very well the possible advantages of Mr. Burnham's system. I can see, also, why we, as a committee, did not venture into that field, because we were pioneering, and had in mind only a simple statement which could be widely disseminated, which did not require a large staff and an expensive piece of machinery. But I can see very well how if this system of Mr. Burnham's is successful and does actually do the trick, that it will be necessary to adopt it

generally and change our method to include those items of the human element which he has in mind. So I would ask Mr. Burnham to conclude this discussion and cover some of those points I have just raised, as well as raised by some of the other speakers.

Discussion by Mr. H. C. Burnham

MR. BURNHAM: To summarize briefly—the first thing that was brought out was the attempt to pin individual responsibility. That we do not do. If John Jones and Bill Smith have an accident, we do not attempt to say whether John Jones or Bill Smith was to blame. That is the function of the courts or the penal section of the Board.

What we are interested in is what general mistake in the entire accident led to the trouble. To cite an instance: Two drivers have a collision at an intersecting street. The course of the two motor vehicles is at right angles. John Jones writes in and states he slowed down to eight miles an hour and sounded his horn and he saw nothing coming. There was not any intimation of an accident and he got half way across the intersection when Bill Smith came down at 40 miles an hour and struck him. Bill Smith's report comes in. He states he slowed down to ten miles an hour, blew his horn, he looked around, he could not see any other automobile, and he got to about the middle of the intersection when John Jones came along at 40 miles an hour and hit him. Any trouble to find out what that accident was caused by? I don't think so. Simple reason, that they both had the desire to stop and they could not stop, and the accident occurred. When a man is going eight miles an hour he is only traveling at the rate of about somewhere in the neighborhood of about eight or nine feet a second, and at eight miles an hour he can stop his automobile if he has any kind of brakes at all, in about six or seven feet, and in the worst blind corner you have a sidewalk eight feet wide, and a man before he reaches the curb line of the intersecting street can see at least 90 feet up the street. So if he looked all around he could have seen the other automobile.

The whole point was that those men, both of them, like every other driver on the road, were driving along at their average rate of speed, in the neighborhood of 20 to 25 miles an hour, passing intersection after intersection, paying no attention to them, not slowing down, and two of them happened to meet and tried to occupy the same point at the same time, and the accident occurred.

The same way with pedestrians. We find a pedestrian comes from the left side of the street to the right side of the street—clear street—nothing to hide the driver's view; we find that the weather is clear; the road is straight. Daylight. No reason in the world to expect an accident. There is no other traffic to amount to anything, and the pedestrian is struck, and the driver writes in and says that he did not see the pedestrian and did not notice the accident was about to happen until he hit the pedestrian. Is it hard to find the human error that led to the accident? What was the driver doing? Where were the eyes that God gave him to see with? What was he doing with them? We do not know what he was doing, but we do know he was not paying attention to his driving of the automobile. He was not watching the ever changing panorama ahead of his car so he could take cognizance of any situation which might lead to an accident, and therefore we know he was not paying attention.

One of the gentlemen cited the case of the man that had a fuss with his wife. Well, I don't know as there is anything complicated about that. His mind was on nothing else except that fuss, and he was going around in a mental fog; his brain was on a vacation and anything was liable to happen. He was liable to go along and trip over a curbstone because he forgot to lift his foot. He might trip over a rug; he didn't see it. He might walk into the furniture; he didn't see it.

It is the same as the driver approaching the railroad crossing. We have a railroad crossing—the railroads have developed all kinds of warnings—STOP, LOOK AND LISTEN—big signs—bells ringing—lights flashing—crossing tender standing out with a "Stop" sign. All of those things are within the vision of the driver, and the law tells him he must be careful, and he runs into the side of a train. We don't have any difficulty in tracing that human error back to this—that that fellow was not thinking of the railroad crossing. He gave it no thought whatsoever, but he approached the railroad crossing at such a rate of speed that when he found an emergency facing him, he was unable to stop, and there is no question but he was driving too fast for the conditions of the highway at that point.

Do you want a law violation? He did not have his motor vehicle under control. There is not any state in the United States where the law in substance does not direct that every motor vehicle shall be under the full control of the driver when on the highway. It is a universal law, and when a man cannot stop his automobile when he wants to, his automobile is not under control.

The same way with skidding. Some people say skidding causes an accident. Skidding is an absolutely expectable result when a man drives too fast for the condition of the pavement. He says, "I have good brakes." We go back at him and say, "Well, Mr. Man, here is your point: your brakes are only just as good as the coefficient of friction between your tires and the surface of the road. If you were driving on grease you would have no brakes whatsoever, because the only thing you could do is put a band around the metal drum to try to stop the wheel from turning, but the real braking action takes place between the tire and the pavement. And in wet weather you may have your coefficient of friction drop to one-tenth what it would be in dry weather. Drivers do not understand it. They think they can go along in wet weather and put their brakes on. I notice today in this statement of the visit to the subway a most significant thing. Pick it up and I will read it to you. See how they have considered the human element.

"At the Interborough Subway shops at 147th Street, Manhattan, inspection systems and devices will be demonstrated; devices responsible, for example, for the fact that in twenty years' operation no wheel or axle has ever broken in service."

The same thing applies to steering gears on automobiles, and if you go out and look at automobiles and see the man who has allowed the bolts to wear almost through, so you get all kinds of road shocks, it is a sure thing that steering gear is going to break. We cannot blame it on the steering gear; it is the failure of the grey matter inside of the skull to function, because he did not know anything about it.

To get down to brass tacks as to accident prevention, there is one thing we must all remember, and that is that the accident frequency in the United States today is such that the average person rarely sees an automobile accident. All of us here—we hear nothing but accidents: it is our job. But Bill Jones goes on the streets of the city day after day, day after day, and does not see an accident. What does he know about accidents? Nothing. And when he meets an accident ready to happen, how is he going to recognize it? That is our job. We have got to tell him where it is going to occur, and therefore we have got to keep the most comprehensive statistics. We have got to tell Bill Jones that it doesn't happen generally on a wet day. It does not happen in heavy traffic. That it is at a time of clear weather, in the daytime, on a straight road or an intersection, that he has got to be careful. He has got to be careful in passing parked cars. He has got to be careful in passing anything that hides his view. And the only thing that we can do is to get our history of experiences. They are statistics.

Mind you, we are not getting dry figures here. Our statistics are living. Every one of the figures that represents a death or an injury to a human being is human. They are not mere figures. They represent coffins, broken bones, sorrow, every-

thing like that. We say 174 dead. Can we visualize 174 coffins—little children and sorrowing homes—the terrible loss that is inflicted? We must make those figures live. Can we make our list of injuries visualize the hospital beds, the suffering from broken bones? The suffering that extends for years, sometimes the crippling?

I have reference now to one man in Rhode Island who was struck by an automobile. His spine was broken. That man will never put his foot on the floor again. To me that figure represents that man, and that's what we have got to sell the public. They are not figures, but they are human experiences; things that the public must realize may at any moment happen to them. And that's why we have got to show them the human error; why we have got to compile the most comprehensive system of experiences on the highway.

In Rhode Island we are using a system practically comparable to that of the National Safety Council. There are many small details where we differ. We do supplement our system of statistics in the laboratory of the highway, where we go out and observe the human element at the wheel of an automobile and a foot. We have these observation posts, and we check what the people are doing to find out whether our statistics are a correct picture of highway conditions. We must do that. We must not lean back in our office chairs and point to a series of figures and say, "These are enough." We should check them up; check them up by actual experience.

And when we get through with that, we have only started on our job. We have got to go out and sell to every Tom, Dick, Harry, Lizzie, Ann and Mary on the highway just those experiences. The figures are nothing. We have got to get the information out in a form that the lowest intelligence can understand. We have got to get down to the truck driver; make him realize what he must do; what he must look out for on the highway. We must make these various statistics present a mental red flag to their intelligence, so when the conditions crop up again it will say, DANGER, USE THE BRAKE. We have got to get that reaction.

In Rhode Island we are releasing each week to the press a little story about our accident troubles. We are continually talking to organizations. Every Thursday night from the main radio station in Rhode Island we put on one of these stories. We are making a motion picture. We are re-staging the average accident.

Gentlemen, we have only two main types of accidents—motor vehicles and motor and pedestrian. Twenty-six per cent of the average accidents are motor collisions due to the intersecting streets. Fifty-five per cent of all the accidents occurring on the public highways involve a motor vehicle and a pedestrian, and 50 per cent of those accidents involve children under fifteen years of age. We go to our legislature, and the legislature states they are not mentally responsible, and in every other human endeavor the adult is responsible for the immature child. Can we pin any responsibility upon the child?

We find that the elderly people, the people who are not able to move quickly, who are not able to get out and indulge in physical acrobatics in front of an automobile, are struck. I saw one such accident myself. The highway was 45 feet wide—clear, straight stretch. The afternoon was bright; sun was brilliantly shining down, not in the operator's face. This lady, 78 years of age, came to the curbstone, looked down the street, looked this way, and then she started to walk across the street slowly. I stood there and watched her. Some 300 feet away was an automobile. The driver came along. The woman reached the center of the road and the driver thought he would go between her and the curbstone. He blew his horn. He forgot that perhaps the elderly lady might be deaf, as she was. Then he decided he could not make it between her and the curbstone; so he turned slowly to the left, and he decided he would not make it that way, and he put on his brakes, and the rear end of the car skidded and struck this elderly woman, threw her into the air

and deposited her on the curbstone. I ran over there. The first thing that driver said to the old lady, who was not seriously injured, thank goodness, was "Why, madam, why didn't you get out of the way; I blew my horn."

What kind of a mental attitude is that for a driver; but go out and find out how many drivers will tell you, "I blew my horn." Honestly, the automobile horn is the most remarkable thing we ever heard of. Every driver presumes that it is going to blow everything out of his path and assure him a clear highway and drives on that principle. It is purely mental. It is not physical by any stretch of the imagination. We have got to get that idea over to the driver: that he is not care free—that he has this responsibility. And if we look at the State laws we have a fine background for it, because universally the laws in substance state that no operator of a motor vehicle shall drive in such manner as to endanger the life, limb or property of any person. The right-of-way law is mentioned, but if we study the laws of the State we find this: that the right-of-way law never becomes operable until after the driver has complied with the previous section of the law, which requires him to slow down to a rate of speed at which he can control his motor vehicle. Only on through or boulevard types of highways does it permit him to go by an intersection without slowing down. Otherwise he must first slow down, have his car under control, and then he can think about the right of way, because he cannot proceed so as to endanger the life, limb or property of any person on the highway. That's an important point to remember in analyzing accidents, because our function, after we get our figures, is to sell this thing to the public and sell it so strongly and finally that they are going to get on to the fact that they have got to pay attention to their driving.

And we have got to get comprehensive figures so that when anybody questions our deductions or conclusions, we are able to put before them a vivid picture, which is so convincing that we do not have to argue about it, because argument is futile and defeats its own purpose. And that is the real necessity for statistics, so that we know where both feet are planted solidly, and we can stand behind fact and actual experiences and convince people.

ADJOURNMENT

October 2, 1928**Accident Facts—How to Use Them****W. W. MATTHEWS, Chairman****Chief of Safety, Motor Vehicle Bureau, Harrisburg, Pa.**

The session was called to order at two o'clock by the chairman, Mr. W. W. Matthews, Chief of Safety, Motor Vehicle Bureau, Harrisburg, Pa.

CHAIRMAN MATTHEWS: The Commonwealth of Pennsylvania feels honored in having one of its representatives preside at this important session of your Congress, not only because this afternoon's discussion, with that of this morning, represents the first time that two special sessions of an Annual Safety Congress have been devoted to the particular subject of Accident Statistics, but also because the invitation carries with it the implication that young as we are in the compilation of motor vehicle accident data, we perhaps are making progress.

Your chairman is doubly honored in being privileged to substitute for Commissioner Eynon, who, were it not for the fact that he is representing Governor Fisher at a conference in a remote state, would be here to participate in your deliberations, and assist in reflecting the rapid increase and activities of public departments along this line. He has asked me to express his very deep regret at his inability to preside over this session, as originally announced.

The general subject for the afternoon is "Accident Facts—How to Use Them," and I submit that were we able to solve that problem in all its phases motor vehicle accident prevention would take long strides forward.

Undoubtedly too much emphasis cannot be laid on the compilation of motor statistics, especially since traffic accidents are responsible for so staggering a toll of human lives, the injury of so many of our citizenry—to say nothing of the immense property and economic loss.

But the question remains as to what use to make of the facts, after we have expended time, money and effort to collect them. Are we collecting charts, treatises, summaries and exhibits for a library, or are we analyzing the statistics with a view of their use and value in safety education, highway policing, highway construction and legislative enactment?

Your average motorist is impatient of profound doctrinaire theses and impressive monographs, and the mere statement that a certain number of persons have been killed and injured within a certain period makes little or no lasting impression on him.

The picture must be so drawn that his attention and interest are aroused, and a comparative means must be found to register in his mind the fact that the accident hazard is a real, ever-present and constantly changing problem.

That should be the first function of safety education, and the lessons to be drawn from these accidents are of the greatest value in publicity in implanting the safety idea in the minds of the motoring and pedestrian public.

The statistics on motor violations causative of accidents enable highway patrols and traffic police to centralize their activities on motorists who are responsible for a majority of the accidents, and to lessen the number of preventable accidents by punishment of the irresponsible and reckless driver.

There are, of course, always certain persons who cannot be educated to obey laws enacted for their own safety and that of others, and these drivers must be removed from the streets and highways by the exercise of the license suspension power vested in the motor vehicle administrator.

Close analysis of each accident report, and the determination to follow through on all cases of reckless driving and disregard for the safety of others, should accomplish this result.

Granting that a certain number of accidents are unavoidable, there is no doubt that a much greater number are due to temporary inability of the driver to react satisfactorily to certain more or less unfamiliar situations quickly enough to prevent trouble.

When faulty road construction or conditions are responsible, highway engineers should be quick to analyze the defects and to remedy them, and if the accident reports show a lack of reasonable alertness or attention on the part of the driver, his fitness to enjoy the driving privilege is immediately in question.

Where a motoring practice, now legal, is a causative factor in a large number of accidents, the state authorities, through a study of these statistics, are able to arrive at a method of their prevention and to recommend appropriate legislation.

So many angles of importance are presented that they cannot be enumerated—they offer material for endless study, but the most reassuring feature of the whole situation is the evident widespread realization on the part of those engaged in alleviating the serious condition, of the necessity for their familiarity with such facts and the best means of using them.

Properly appraised and intelligently used, accident facts will help us to chart a smooth course over the avenues of safety, rather than a perilous passage on roads to destruction.

CHAIRMAN MATTHEWS: New York has given much attention to reporting and studying its traffic conditions and accidents, and this work is under the supervision of your first speaker, the Honorable Philip D. Hoyt, Deputy Police Commissioner of New York City, who has very kindly consented to address this session.

How We Use Statistics for Accident Prevention

By PHILIP D. HOYT

Deputy Police Commissioner, New York City

Dr. McClintock, who made an address yesterday, stressed the importance of using facts instead of guesses in solving the traffic problem. Those of us who are responsible for traffic control in this city have occasion to know of the importance of using facts in deciding upon our traffic program. Traffic counts, speed tests, and other factual data which we obtain, are used almost daily; but no set facts that we obtain are more important than the accident statistics which we use in our plans for traffic control here.

I assume that what you are interested in particularly is facts and not opinions. So it is my purpose to describe to you somewhat in detail just how we collect and use our accident records.

The traffic problem is one of many phases. City or regional planning, the study and initiation of engineering projects which will provide additional facilities, is one of them. Regulation or handling of traffic with existing facilities is another. Discussion of the traffic problem too frequently considers one purpose of regulation—the acceleration of traffic, and ignores or minimizes the more important function, the protection of human life. Speeding up traffic is of course an essential object of regulation, but public safety comes first. The primary duty of the police in handling traffic is no different indeed from its duty to protect society against the criminal element. That is why traffic regulation generally lies in the hands of the police.

The complexities of the traffic problem in New York City are increased not

merely in proportion to its population, but because of many other factors, some of them peculiar to this city. The geographical barriers which divide and surround the city; the density of population; the height of the buildings; the number of automobiles; the extent of the suburban district—all complicate the situation. Handling traffic safely under such conditions on the city's five thousand miles of streets, is a task calling for the utmost effort.

Our toll from street accidents is high; yet we feel we are making some progress in our attempt to serve human life by a thorough and systematic study of accidents. Last year, for the first time since the appearance of the automobile, the number of fatalities and injuries to both adults and children resulting from highway accidents in this city, decreased from the preceding year. The fatalities from motor vehicles in this city in 1927 were 17.8 per one hundred thousand of population. The figures of the National Safety Council show that the general rate for the entire country, urban and rural, was 19.6 per hundred thousand, while the urban rate was 22.4.

The most encouraging fact, however, is that since 1923 there has been a steady reduction year after year in fatalities to children of sixteen and under, due to highway accidents in New York City. In 1923 there were 453 children killed; in 1924, 432; in 1925, 422; in 1926, 413, and in 1927, 408. In the first eight months of this year 218 children were killed as compared with 266 during the corresponding period last year, a decrease of 18 per cent. It is not, however, my intention to burden you with figures. Those I have just referred to are sufficient to give you a picture of the accident situation in this city and to show the decided progress in the reduction of accidents. This is due in no small measure, in my opinion, to our use of accident records. It is my purpose in this discussion to tell you something about our system of collecting, classifying and using these records.

The information relating to each accident involving death or injury comes in the first instance from a report made out by the patrolman on post. A printed card used for this report calls for certain specific information. The principal causes of accidents are specified on this card, so that the patrolman who has occasion to make out the report knows exactly what information we require. On the back of the card is a blank space calling for the details, for purposes of further classification. Our total force of 17,500 policemen is at our service in investigating accidents and making out these reports. One copy of the report or printed card goes to the local police station, in the district where the accident occurred. Another goes to the Information Bureau at Police Headquarters for various uses which will be referred to, and a third goes to the Accident Record Bureau of the Traffic Division, also at Police Headquarters. The Captain of each of the local precincts keeps his own file of these cards and prepares from them a precinct spot map of accidents in the district of which he is in charge. Each Captain is thus able to keep in close touch with the situation in his locality. The cards returned to the Information Bureau are used for a variety of purposes, such, for example, as checking up persons who have been reported missing, and who the cards may show have been removed to a hospital following a highway accident. The cards returned to the Traffic Division are first classified by names alphabetically. Reports are received daily from the Medical Examiner, and these are carefully checked; so that when an accident victim reported as injured later dies, the report may be corrected.

Every accident is next listed as to the cause. Seventy different causes are included in this classification. The cause records are the basis of a monthly report. The next classification is according to location. This is made in three ways. First, by a file of streets and avenues; second, by police precincts, and third on spot maps which show the location of all accidents involving death or injury for each of the five boroughs of the city. Further classifications are made as to the hours of accidents and the ages of the victims, divided into several groups. In the case of

children sixteen years old or under, several special classifications are made. These are according to ages, hours, school districts and schools.

All these records being merely collected, classified and filed away would be of little value. To avail ourselves, therefore, of this store of information is our next task. It is one to which we have devoted considerable thought in an effort to develop a system that would be of material aid in reducing traffic hazard. The monthly summaries are carefully studied. Our first interest is in the total for the month and the comparative figures for the preceding month and preceding years. Are accidents increasing or decreasing? Are children or adults the victims? What are the principal causes? Are they on main avenues or side streets? What hour do they occur? The answers to these and similar questions are found in the summaries and they give us a general idea of the accident situation in the city.

Closer study is made of the localities of accidents. This street has a high record. Is it because of the lack of traffic control, or inadequate regulations? The locality classifications are of particular interest in our planning of traffic control light systems; in fact, they are the basis of our request for appropriations for that purpose. Traffic lights may be provided where policemen may not. By the end of this year some 3,500 intersections in this city will be controlled by traffic lights. It would take about seven thousand policemen to cover these crossings during the hours when the lights will be in operation, involving an annual cost of more than seventeen million dollars. That does not mean we save that amount by supplementing traffic officers with traffic control lights, but it does mean that traffic lights will provide control at nearly three thousand intersections where otherwise control would be impossible, not only from the standpoint of cost, but because of the difficulty of obtaining and training that number of additional men of the right calibre.

So in planning our traffic light programs, the reports showing just how many persons were killed and injured on each thoroughfare of the city are of the utmost importance. The assignment of the three thousand men detailed to traffic duty in this city and the sixteen hundred others who do special duty in the vicinity of schools, is another task calling for frequent reference to the locality record.

In addition to the general regulations which the Police Department makes for the control of traffic here, several hundred special regulations affecting particular localities are made each year. In our consideration of the necessity for such regulations, many of which are requested by residents or civic organizations in the various neighborhoods, the locality accident records are of great use. These records also aid us in the direction of the activities of the police in enforcement. They often tell us where more attention should be given to speeders, or that drivers are not observing strictly the regulations covering turns, right of way, or other rules.

In order to go more deeply into accidents involving deaths in this city, the Traffic Division has recently inaugurated a system providing for a more detailed investigation of such accidents. Every death now occurring in the city as the result of a highway accident is investigated by a special squad, operating from Police Headquarters. This squad is composed of experienced traffic men who work in uniform. The work is so distributed that the investigator can give a full day to each fatal accident. Although the information received from the patrolman on post is quite complete, there are frequently conditions at the points where accidents occur which the ordinary policeman does not feel the responsibility to investigate and make the basis of recommendations to his superior. The members of this special squad, being few in number, know exactly what information is required, and their business is to make recommendations to improve traffic conditions at that point. The investigator visits the scene of the accident at the same hour of the day when it occurred. This enables him to take into account all conditions at that particular time, such, for example, as the volume of traffic, street lighting, or

many other factors. The investigators are all draftsmen, and their report includes a diagram of the locality, showing all the physical conditions and the position of the vehicles or pedestrians figuring in the accident. Specific information covering several points is required in the report—whether there was a traffic post or a traffic light at the point involved; the street lighting condition; any special traffic regulation, such as one-way street; and the condition of the pavement. These reports are taken up in conference with the patrolman who wrote them, and there is a thorough discussion of conditions at each point, for each fatality, so that we may get an answer in each case to the question whether anything possible can be done to improve conditions.

Many of these recommendations naturally come within the jurisdiction of the Police Department. Attention may be called to a crossing where traffic lights or traffic policemen should be provided; warning lights indicating dead end street, for example, or various other traffic regulations of a cautionary nature may be necessary; regulations such as one-way streets may be advisable. The investigator's visit may result in the discovery that particular attention to enforcement should be given at this point. White lines to designate pedestrians' crossings may be needed. Many recommendations relate to other departments. Street lighting conditions may be in need of repair or improvement. Repairs to highways or bridges may be necessary. The highway facilities may be inadequate, requiring engineering measures for relief. In some cases the recommendations relate to individuals or private agencies, involving, for example, the routing of vehicles to less congested sections. The investigations frequently disclose facts of interest to the school authorities and their cooperation is sought.

This system of a detailed investigation of fatalities, although comparatively new, and by no means fully developed, has been found to be of the greatest assistance to us in improving traffic conditions.

So you see there is hardly a step in our traffic program, whether it relates to the assignment of personal investigators, the placing of traffic equipment, or the use of our broad regulatory powers, that is not based upon our accident experience.

In addition to the uses which the Police Department makes of our records, these records are also constantly being supplied to private agencies for use in accident prevention. They are supplied in detail to safety organizations. Organizations interested in the extension of the playgrounds throughout the city obtain them regularly to support their requests for additional recreational facilities.

One of the most important uses of these records is in connection with the safety education program which the Board of Education is carrying on in this city under the personal supervision of Dr. William J. O'Shea, Superintendent of Education, and also in the parochial schools in the five boroughs of Greater New York. Every month an analysis of accidents involving children of sixteen or under is sent to the school authorities. This analysis stresses the causes of accidents and shows how these accidents vary from month to month. By means of these analyses the school authorities are able to determine what careless practices lead to accidents, and to impress upon the children the need for personal carefulness in these respects. Each of the twenty-seven school district superintendents receives a report for his district. A separate report is prepared showing the number of accidents involving children attending each of the 994 schools in the city; so that each school principal may learn every month whether the accident toll for his school is decreasing or mounting. The value of educational methods in accident prevention cannot be too highly estimated. Our own experience shows that can be done, although thus far we have made only a beginning.

One of the most important uses that can be made of accident statistics, in my opinion, is in safety education. This can best be accomplished through the schools. Safety education in the schools has been greatly developed during the last few years, but its possibilities as a regular part of our school program are only begin-

ning to be realized. Teaching the children how to take care of themselves under present-day traffic conditions is a duty no less important than teaching them reading, writing or arithmetic. Safety instructions, furthermore, can be combined with those and other subjects of the regular curriculum without taking any additional time. Such instructions, in fact, can be so planned that it will stimulate interest in the subjects into which it is incorporated. Education is not my forte, but I feel so strongly on this subject that I cannot refrain from making this reference to it. Personal safety, in my opinion, should be an acknowledged subject of instruction in the schools throughout the country. The importance of such a program is recognized. It remains only for some countrywide educational organization, perhaps some great educational foundation, to get behind this movement, in which great strides have already been made, and develop a systematic, comprehensive plan of safety education, which will be generally accepted as an essential part of the training of our youth. There is no accomplishment that I can think of that would be more worth while.

CHAIRMAN MATTHEWS: Thank you, Commissioner. One of the purposes of meetings such as this is the interchanging of ideas and the opportunity for discussion, and it is hoped that you will feel free to make any comments that you might desire in connection with any of the papers presented, and I am sure that if any of you would like to ask Commissioner Hoyt some questions concerning this program developed by the City of New York, he would be very glad to answer them. One of the principal points which he has stressed is the necessity for education in the schools. One of the most tragic facts about this whole accident situation is that there are so many fatalities and injuries to children under fifteen years of age. A great many people stress the fact that these safety campaigns perhaps may cost a great deal of money—take a lot of time and effort and there are no definite, tangible results that you can get hold of; but consider for a minute the saving of children's lives. Who knows but what the life of one small child who is saved from an accident may be worth more to the State or Nation in the field of arts, science, literature, military genius, than the cost of all the safety campaigns ever waged.

HARRY RAINES (Director of the Washington Driving School, Brooklyn): I would like to ask Mr. Hoyt, is it important for the auto driver to be trained properly before being tested by the Motor Vehicle Inspector, and are auto driving schools necessary or not? Should we only caution the children in the public schools, and not have schools for auto drivers or learners? Why not schools for the learner who intends to become a driver, to be cautioned in traffic regulation, motor vehicle and automobile driving, and protected with a car with a double clutch and brake, so he understands his own mistakes and the importance and the power of the clutch which connects the motor.

E. B. LEFFERTS (Automobile Club of Southern California): I would like to ask Commissioner Hoyt the size of his special investigating squad that investigates all fatalities. How many men comprise that squad?

COMMISSIONER HOYT: We have three men regularly on it, and it is to a certain extent flexible, so we may increase it.

MR. LEFFERTS: Do I understand that three men are sufficient to investigate all traffic fatalities thoroughly in the City of New York?

COMMISSIONER HOYT: Yes sir. They are sufficient to devote about a day to each fatality. There were 1,042 motor vehicle fatalities last year, 1,138 highway fatalities including all classes of vehicles, street cars, bicycles, horsedrawn vehicles and riding horses. That would make an average of about three a day.

MR. LEFFERTS: They don't try to investigate accidents in which persons are injured but not fatally?

COMMISSIONER HOYT: Not as yet. We have made a beginning only with fatal accidents.

H. C. BURNHAM (Research Director, Motor Vehicle Department, State Board of Public Roads, Providence, R. I.): Mr. Chairman, it seems as if we are giving considerable attention to the school children. It seems as if we have placed the entire responsibility for the situation on the coming generation. It occurs to me, what are we doing at the present day? The gentleman over here suggests we establish automobile schools and teach the new drivers. What are we going to do to take care of the man who learned to drive a car fifteen years ago? What are the Police Departments and other interested organizations doing to teach the men who are behind the wheel of the motor vehicle today the essentials of safety in driving and, more important, thinking? I would like to know what New York is doing with their traffic police to educate the drivers to using their heads for better driving conditions.

COMMISSIONER HOYT: The average traffic cop who stands at a busy corner don't have a great deal of time to educate anybody. He has his hands pretty full. We have tried to bring our traffic men into two or three schools every year, so that we explain the regulations to them thoroughly. That's the first thing, to have them understand the rules, and then impress upon them the necessity of explaining these to the motorist who simply runs afoul of some regulation by force of circumstances because he does not quite understand it. There is not a great deal of time for those men on the crossing to do much in that respect. We have, however, done this: We are sending out in the case of comparatively trivial violations, a warning letter, explaining that at such a time and such a place this car, bearing such a number, which is registered in the name of the person to whom the letter is sent, has violated a certain regulation. The regulation is quoted. The necessity for the regulation is explained in the letter, and those are sent out on reports that we receive from patrolmen, who simply turn in the numbers when they see a violation of that character.

The results we have had from that plan have been very good. We have hundreds of letters. We close our letters with the plea that the person cooperate with us in trying to help us to see that the traffic laws are enforced. In nearly every case the person thanks us for calling it to his attention and in some cases we reach the owner of large fleets of trucks. We have had cases where men have called meetings of their drivers and asked our men to come and talk with them on the traffic regulations and explain them. Although we have by no means developed the full possibilities of that plan, I think that that has been most helpful in educating the driver as to the regulations of the city.

Of course the trouble is that any system of regulations is pretty hard to simplify. There are so many exceptions that it is pretty hard to explain them in words that almost everyone will understand, and very few people will take the trouble to study the regulations, although we print them and have them available at every police station, and have advertised that fact very extensively in all the papers of the city. Does that answer your question, Sir?

MR. ALLEN (New York City): I wanted to ask you, Mr. Commissioner, how the general police officer, whether he is assigned to traffic or anything else—who patrols the beat—whether he takes the opportunity to graciously or otherwise explain to a person who he sees violating or taking a chance, the dangers of that violation. In other words, Mr. Commissioner, is there any part of the curriculum of your police school in New York City here that is devoted to safety, and to specific instances of safety education?

COMMISSIONER HOYT: No, there is not. That is, it is not one of the duties of the patrolman to engage in any systematic educational work, although I think very often that is done, and we frequently have names and cases reported to us by the patrolman on the post to whom we send the warning letters which I have just described.

RICHARD A. LEARNED (Society for Instruction and First Aid to the Injured, New York City): I should like to ask Mr. Hoyt if he has any statistics or figures here on accidents in large cities abroad—accidents in London, for instance? I ask that because I have driven a good deal here and good deal there, and there the automobile driver is much more courteous than he is here, and he is taught to be courteous, the police officers are taught to be courteous. The police are courteous to him, and there is more looking out for the other fellow than there is here. I am an American and proud of it, but I think here it is every man for himself and the devil take the hindmost.

COMMISSIONER HOYT: I have not the figures for the cities abroad. I have the figures for the cities in this country. Of course we have the figures of the National Safety Council available.

CAPTAIN CASEY (New Orleans): I may be able to answer the gentleman's question. I was in Europe last year and I visited Paris. At first sight you would think that about one hundred people were being killed in the streets every day, because there is a lack of pedestrian regulation there. I was surprised to find that the fatalities were very low as compared to American cities, and in looking for the causes I found out that the big bulk of the motor traffic in Paris is taxicabs. Possibly 75 per cent of those are trained drivers. They operate small cars, under rigid mechanical inspection; so that while they come bearing down on you at 45 or 40 miles an hour, they do not run over you; they stop at a very short distance.

Furthermore, there is a great deal of what we call "courtesy of the road" in the European cities, as compared with American cities. You will find in driving in Paris, if you get into a tight corner—for instance, a driver wants to make a left-hand turn, he is in a bad spot—automatically the other drivers will step aside and permit him to turn. The reverse is unfortunately true in this country:—lack of courtesy and the inclination to get there regardless of the other fellow. In London the accident rate is rather high, but they have a splendid body of police there—the metropolitan police in London. Yet I was surprised to find that the accident rate in London compares somewhat with New York.

I would say that the lowest accident rate in European cities as compared with American cities is entirely due to the lack of courtesy of drivers in this country, and to the courtesy of drivers on the other side.

CHAIRMAN MATTHEWS: That is rather a sad commentary on the American driver, that he is perhaps less courteous than Europeans are, but nevertheless that's one of the conditions we have to deal with in this country.

Those of us who are working with public accident statistics should be able to learn from the experience of those who have been busy in a similar field in industrial accidents for a great number of years. Your next speaker is one of the earliest pioneers in this field and will tell us of some experiences of the accident statisticians and the lessons which we may learn from them. It is with pleasure that I present Dr. L. W. Chaney, of the Bureau of Labor Statistics, Washington.

Mistakes to Be Avoided

By DR. LUCIEN W. CHANEY

Bureau of Labor Statistics, U. S. Department of Labor, Washington, D. C.

The foundation of all statistical procedure is of course the facts as determined by careful inquiry. If these facts are accepted without due criticism it may easily happen that the whole following treatment is hopelessly obscured.

The making of reports is often entrusted to those who have no adequate idea of what is needed and who make almost ludicrous errors. This may be illustrated

by an occurrence in my own early contact with accident matters. I had found with one concern a considerable body of data which seemed to throw some light on the hazard of the beginner in industry. In the blank furnished by the insurance company for reporting the accidents was this question: "What instructions were given the operator before starting work?" Over a period of several years the answer entered opposite this query was "to finish the job." It is clear that the one responsible for making these reports had small notion of the meaning of the question which he was attempting to answer. The concern was one having a large number of stamping presses and the instruction "to finish the job" was followed by a distressing number of lost fingers and mutilated hands.

So conspicuous an instance of misunderstanding would be readily detected but when such errors are possible it is evident these basic facts must be closely scrutinized in order to give assurance of reliability.

For three years now the Bureau of Labor Statistics has been gathering the facts regarding a group of some 29 industries from the compensation commissions in the various states. It has been necessary to introduce an undesirable number of explanatory foot notes in the tables prepared from this data in order to guard against misunderstanding due to the fact that the states do not gather their material on a uniform basis.

It has long been the custom for insurance companies to require a report for "any bodily damage however trivial." This was unsatisfactory because of the difficulty incident to securing complete reports. One large steel company had been operating under the insurance rule for many years and supposed that they were securing complete reports. It was then decided to improve the medical service. A chief surgeon was appointed with subordinates stationed at the various plants. Immediately under pressure from this new service the number of cases greatly increased and at the end of the first year the records of the emergency rooms and hospitals showed almost exactly twice the number of cases as were recorded during the previous year.

Consideration of this and similar instances led to the conclusion that unless an injury led to a loss of time from work it was difficult almost to the point of impossibility to be sure that reasonably complete record had been made.

The effort to develop a definition of an accident which would serve satisfactorily in the study of accident experience in the iron and steel industry resulted finally in the following: "An accident is an accidental injury resulting in death, permanent disability, or temporary disability beyond the day of injury." This definition of a "lost time" accident insures that practically every case coming under the definition will be a matter of record. When a worker is absent from work it becomes immediately a matter of concern to the paymaster's office.

With accidents as above defined as a basis it would be possible to proceed with some confidence were it not for another feature of the situation. In establishing the compensation laws it has seemed necessary to have a "waiting period" before compensation payments begin. Unfortunately this period is not of the same length in the different states. The tendency now is to adopt seven days as the standard but this tendency has not yet brought about uniformity. It becomes necessary therefore to determine the length of this period in any state which may be under consideration and to ascertain whether, though not compensated, cases of less than seven days are reported to the compensation board.

The foregoing gives some idea of the care which should be exercised regarding the basic data. The chances of error are many and must be checked with the utmost care.

In the second place having assured ourselves of the trustworthiness of the reporting which it is proposed to use we may advance a step and consider the error of mistaking enumeration for statistical treatment.

For example it is very common to see a list of industries with the number of

accidents for a given period entered opposite each industry. Such a procedure affords some interesting information but fails entirely to shed light upon the serious problems of accident prevention.

The idea that such a process of counting the cases has statistical significance is quite generally entertained. It will therefore be quite pertinent to present a rather full discussion of the standard procedure.

The importance of accurate accident reports has already been stressed. To afford a way to use these reports so as to afford a correct idea of their meaning another factor is necessary, namely, the amount of exposure to hazard corresponding to accidents occurring. The inadequacy of accident reports without the corresponding exposure may be indicated by a simple illustration. Let us say that two concerns report 200 and 100 accidents in a given year. What are the possible interpretations of such a condition? It is possible that the concern having 200 accidents is twice the size of the one having 100. Or it may be that the plants are of the same size but that the processes of the plant having 200 cases are twice as dangerous. It is evident on a moment's notice that there are an infinite number of possibilities and that unless there is some way selecting some one of these no definite conclusions are justified. This selection may be accomplished by determining the factor of amount of hazard and establishing its relation to the accidents occurring. The ratio between exposure and accident occurrence is an accident rate and affords an index of conditions of great exactness.

Several methods of determining a suitable base for the calculation of accident rates have been proposed such as the average number of workers on the pay roll, the pay roll itself or the "man hours" worked. The workers on the pay roll and the amount of the pay roll are undesirable for similar reasons. Neither of them is constant in value. Labor turn-over varies from plant to plant and wage rates are by no means stable. The most satisfactory unit for expressing the amount of exposure to hazard is the "man hour." A worker who in a given year worked 250 days, 10 hours per day, would have 2,500 hours of exposure, while a fellow worker who labored 200 days in the year, 8 hours per day, would have 1,600 hours of exposure.

The advantage of the "man hour" is its uniform value. A day, a week, a month may have several meanings according to the custom of industry or the particular plant under consideration. An hour is a uniform period of duration wherever and whenever it is mentioned.

It is coming to be more and more common to make wage payments by the hour and this tendency renders it easier to maintain a record of "man hours" for statistical purposes.

It is not the intention at this time to go into the details of handling the factors of "man hours" and accident occurrence but to emphasize as strongly as possible the necessity for such a procedure. The mere enumeration of the cases is wasteful and of very little value.

It has been indicated above that the only entirely satisfactory method of making comparisons of accident experience is by developing ratios between amount of exposure, preferably expressed in "man hours," and accident occurrence.

This leads to consideration of a third error desirable to avoid namely the attempt to make comparisons between units of operation by means of percentages.

To illustrate, a given company has ten departments in each of which 10 accidents happened in a given year. That is each department had 10 per cent of the accidents. Now suppose a second year in which each department has again 10 accidents except department 10 which in the second year has 12 accidents.

If now we compute percentages it will be found that departments 1 to 9 have each 9.8 while department 10 has 11.8 per cent. Comparison of these two groups of percentages will certainly suggest that departments 1 to 9 have changed for the better while department 10 has changed for the worse. The fact is that no

change has occurred in departments 1 to 9 the change being confined to department 10. Such comparisons as that shown above are somewhat common and are always misleading.

A fourth error to be avoided is the supposition that the best statistics will directly indicate what steps in accident prevention should be taken. Proper accident statistics will indicate the need of accident prevention effort, they will indicate where such effort is needed, they will indicate whether the efforts are or are not succeeding. They will not in many cases determine just what steps should be taken. In other words the accident problem is both a statistical problem and an engineering problem and the neglect of either phase spells disaster.

CHAIRMAN MATTHEWS: Thank you, Doctor. Dr. Chaney has mentioned the differences in the method of reporting accidents. I have some little experience of that kind in my own work in connection with that of other States. Frequently we present summaries of various types of accidents and we get inquiries as to just what we mean by some figures, and we have the same inquiries to make about some of the other reports that we get, and in defining accidents if someone could develop a reasonable definition of what was an automobile accident, perhaps we might be able to make some further progress. Sometimes I think that if we only crashed up a couple of cars, perhaps destroyed a little property, the situation would not be so bad; but the fact still remains that in practically every automobile accident there is some personal injury even a fatality.

Dr. Chaney has also mentioned the exposure to hazards in industrial accidents. Now, in operating an automobile, the driver is almost continually exposed to hazards,—not so much these which he may create himself, as to these presented by the problem of other drivers; and this reverts back to the question raised by Mr. Burnham as to what can be done to educate people now driving cars. There are a number of angles to that situation which I won't attempt to discuss. Perhaps there is among the audience someone else interested in industrial statistics who might be able to draw some analogy between those and the automobile accident statistics and give us a little further light on how we might apply some of the same problems and reach the same result. The meeting is now open for discussion.

W. E. SANFORD (United Electric Light & Power Co., N. Y. C.): I have spent a good deal of time for the last six months in studying the records of our company and analyzing the accidents for a year, dividing them up into classes A, B and C, in which A was the important class. In other words, any accident in which the possibilities seemed to point towards a serious chance, we classified as an A accident. If there was a pedestrian involved, or any speed over ten miles an hour—by that I mean indicated, not reported—we call that an A accident, and we ride the drivers pretty hard on an A accident.

But I think the important thing goes back to what was stated in the last address; that we do not allow enough for exposure in the reports we have been getting out. We have been getting out reports—so many accidents between 14th and 59th Street—and so many from 59th to 125th Street—and nothing to show how many cars driven in each district. There might be one car below 125th Street, and twenty between 14th and 34th. The figures will not show this because they do not show exposure. I found in analyzing the thing, by checking up and getting the exposure we could really get something that would give some information.

And when you get down to an accident, "fatality" does not mean much in accident prevention, because the least little accident may result in a fatality. A case in point: Not long ago we had a case in a filling station. A woman was alighting from a car. A taxicab backed up and caught her between the top and the body of the car. He only backed up about two feet, but if he had gone another two or three feet he might just as well have taken off both her legs. Had he gone an inch less, he would not have touched her at all. It is just as important to check up

on every accident and find out what happened and what the possibilities were. Any automobile accident may result in death.

L. R. SCHUYLER (Lycoming Mfg. Co., Williamsport, Pa.): I am wholeheartedly in favor of the National Safety Council giving us some information so that we can cooperate in obtaining a general basic computation in the reporting of accidents. I think we should have some common footing so when we read over these statistics we may know the other fellow is not putting anything over, regardless of what State he is from.

MR. PARKER (Pennsylvania): There has been much talk here about educating the driver, but judging from what I have seen here in New York City, I think a better place to start would be in educating the jay walkers. I never saw such a display of what I would consider in my poor countryfied experience as jay walking as I have seen since I have come to this great city of New York. I stood on the corner this morning and I saw the traffic policeman hold out his hand for the cars to stop, and the cars stopped. I saw him trying to keep pedestrians from going through when the traffic was going through, and the pedestrians kept on going through the cars. As a motor car driver I rather resent the idea which is prevalent with most people that in all cases, or almost all cases, the driver is "the guy that done it," and you all know that's true. "Four out of five times it is the driver. He was driving too fast, or he did not put on his brakes quickly enough. It is the driver's fault." As a motor car driver I rather resent that. I have been driving a car about six years, and, like my friend there, I have never had an accident, and I never went to any auto school either.

CHAIRMAN MATTHEWS: The Chair is about to exercise its privilege to call on someone from the floor. I would like to ask Mr. F. W. Johnson of the Citizens Safety Committee of the Philadelphia Chamber of Commerce if he might not be able to make a few remarks relative to this particular situation.

MR. F. W. JOHNSON (Citizens Safety Committee, Philadelphia Chamber of Commerce): Respecting the jay walker, I quite agree with all the previous speaker has to say and I quite agree with all that is to be said and has been said with much force on the opposite side of the question. As a matter of fact, as our distinguished Chairman in his wide experience in these matters in the State of Pennsylvania knows quite as well as I, there is a great deal to be said on both sides. It is a highly controversial subject. Unquestionably, as disclosed by the figures of our National Safety Council for the year 1927, approximately 65 per cent, or substantially two out of each three people who met death in street accidents in this country last year were pedestrians. And so there we have summarized the high spot of the street accident death rate in this country.

I confess I do not agree and I never have taken the position that this jay walking problem can be approached and attacked most effectively by simply broadcasting an appeal or an admonition to pedestrians not to jay walk. I believe, in the first place, that the word "don't" has been entirely outlawed in the development of this great work in which we are all so deeply interested. There is no use in telling anyone not to do a thing—don't do this; don't do that. I had a very earnest volunteer worker in my office a few days ago—a wonderful fellow, who runs a locomotive throughout the day and then in his hours in the evening and holidays, he goes out and works among the poor children of our city—and he told me with great pride of a list of twenty-seven Don'ts that he had prepared for these little children. I asked him in each case what he wanted them to do, and he told me, and I said, "Then why don't you say to these little children 'What you *should* do is this?'" In presenting your Don'ts to people, you are presenting your argument upside down. So it seems to me in saying to jay walkers "Don't jay walk" we are not really doing anything constructive and we are not appealing to the great mass of American people along the lines that will make for responsiveness.

The first step, educationally speaking, is not to leap to the limit of our objective, because no educational process works out in that manner, but rather that we should explain and endeavor to influence the great mass of these people to exercise judgment in walking the streets. I maintain that there is nobody in this hall, and they are all safety workers, that does not jay walk. I had the pleasure of attending a meeting of my committee of the National Conference on Street and Highway Safety in Washington sponsored by our great Secretary, Mr. Hoover, and after that meeting of three hours' discussion of this problem of the jay walker, we crossed one of the principal streets of Washington to the Metropolitan Club for luncheon, and, Mr. Chairman, I give you my word that every one of those twenty-one members of that Committee jay walked across that street.

Jay walking, gentlemen, I would remind you, has certain economic factors to commend it, and that's what you are bucking today. Jay walking works an economy of time and distance, and if there is anything to which these high-powered Americans today are given, it is the saving of time and the saving of distance. So that when a gentleman walks out to go to his office, take a railroad train, keep an appointment, if he can take the shortest or most direct route, he gets there most quickly, and that's why we are traveling express train speed, why we are going in so strong for one hundred miles or more per hour in our air travel, and why we have air mail and the fastest steamships, and why we don't stop to call on a friend but telephone; we don't write, we telegraph; we haven't time to lunch properly, so we grab a sandwich; we haven't time to eat in the middle of the day, so we hold a business meeting while we are lunching. As a matter of fact, we are obsessed with saving time and shortening distance. So I am trying to educate our people in Philadelphia, not to the giving up of jay walking instantaneously and entirely, because I regard that as futile; but I do say to our people, "When you choose to jay walk, at least please use your head and your eyes, and if you will jay walk, jay walk safely; use judgment; look where you are going"—and I am hopeful that we are making progress.

COMMISSIONER PHILIP D. HOYT (Deputy Police Commissioner, New York City): May I also say a word on this jay walking situation? It seems to me the jay walking campaign can be successful only on two conditions. The first is that the people are ready for it; that they will accept it voluntarily; and the second is if you can put enough policemen on the street to enforce it, whether they like it or not.

If they do not want it and you adopt a law, you are simply having another law on the statute books which nobody wants, and to which you have to devote a lot of man power to enforce. We had experiments here in this city. Some years ago in attempting to stop jay walking we had at a number of our intersections as many as eight men stationed to hold back the crowd. The experiments were not very successful. I do think the people know a great deal more about jay walking and the dangers of jay walking than they did one or two years ago, and I think they are learning more about it all the time; and I think the time will come when jay walking regulations will be accepted voluntarily; but until they are, it seems to me it would be futile to enact any jay walking regulations unless we are prepared to appoint and train and send out on the streets a very large force to enforce the ordinance.

CHAIRMAN MATTHEWS: It seems to me perhaps we have jay walked around the subject a little bit. Probably your Chairman is as much responsible for it as anybody. However, these discussions are interesting and there is no doubt but what something of value can be taken from the suggestions.

Last Spring the Statistics Committee of the National Safety Council released its annual printed report containing a great deal of valuable data in connection with accident facts. The Chairman now has the honor and pleasure of presenting to you the Chairman of that Committee, Dr. Louis I. Dublin, who is also statistician for the Metropolitan Life Insurance Company, and he will now present the high

points of that report and developments since then. Dr. Dublin has chosen as his subject, *The Accident Problem as Revealed by Statistics*. Dr. Dublin.

DR. LOUIS I. DUBLIN (Chairman, Statistics Committee, National Safety Council): Mr. Chairman, I hope that you have all had an opportunity to examine carefully this document entitled "Accident Facts, 1928." This is the sixth report which my committee has issued. I can at best summarize the main points in this report.

The Accident Problem as Revealed by Statistics

By DR. LOUIS I. DUBLIN

Chairman, Statistics Committee, National Safety Council, and Statistician,
Metropolitan Life Insurance Company

Accidents caused the death of 95,500 people in the United States during 1927, according to the report of the National Safety Council's Committee on Statistics.

About one death in every six arises from accidental causes. Since 1911 the number of accidental deaths in the United States has increased twenty per cent. In 1927, the increase over 1926 was four per cent. If this figure maintains for 1928, there will have occurred this year nearly 100,000 deaths from accidents, almost as many as the death-toll from tuberculosis! The heavy and increasing accident mortality is due largely to automobile accidents. In 1927 there were eleven times as many automobile fatalities in this country as occurred in 1911.

To offset somewhat the rising death roll of the automobile there occurred during the past fifteen years a reduction of twenty per cent in deaths from accidental burns, a decline of thirty-three per cent in drownings, of seven per cent in falls, twenty-nine per cent in mine accidents, forty-nine per cent in railroad accidents and a decline of fifty-three per cent in street-car accidents.

The automobile has become the leading cause of accident fatalities; it now accounts for one out of every four accident deaths. In 1927 for the first time in the history of accident statistics, the accident death rate *per 100,000 cars* showed a decisive increase. Prior to 1927, the risk of death per 100,000 cars in operation had been decreasing. In 1918, 157 automobile fatalities occurred per 100,000 cars registered; this figure decreased gradually to 95.5 in 1926. During this period the number of automobiles increased from 4,900,000 to 22,000,000. But in 1927, the death rate per 100,000 cars rose to 100.5 with a registration of 23,000,000 cars at the end of 1927. What attitude should the country assume toward this new phenomenon,—the increase of deaths per automobile registered in 1927? Have we done all that can be accomplished the country over in promoting safety on our streets and highways? Have our facilities for checking automobile accidents been swamped by the recent tremendous increase in cars on our streets and highways? Have we enough facts about personal and operating factors in highway accidents to study our street and highway safety problems locally, intensively and effectively? Undoubtedly, the automobile accident rate can be reduced if our states adopt a uniform system of reporting, studying and controlling the accidents which occur on our streets. Facts come first; they provide the foundation for police and engineering methods in promoting public safety.

The facts gathered under the National Safety Council's uniform accident reporting system showed that sixty-five per cent of the 25,800 automobile fatalities in the United States were those of pedestrians, and that only thirteen per cent occurred in collisions between automobiles, four per cent in collisions between motor-cars and railroad trains and seven per cent were in non-collision automobile accidents. These facts again emphasize the urgent need for country-wide extension of facilities for reporting, studying and acting upon the hazards which confront the citizens using our streets.

We must study the 23,000 to 25,000 fatal accidents which arise in the home each year. Almost as many fatal accidents occurred each year in the American home as on our public thoroughfares. Home accident deaths exceed the number of industrial or occupational fatalities each year in the United States.

A thorough analysis of home accidents should be made in each community. Some thirty-five per cent of the domestic accident fatalities last year were due to falls, twenty-one per cent to asphyxiation and suffocation, nineteen per cent to scalds and burns, six per cent to poisons and the rest of the home fatalities to a variety of hazards, all reducible if reported and studied. The National Safety Council's Committee on Statistics is planning production inquiries into the domestic accident situation, because it believes the next forward step in life conservation should be the safeguarding of the home and the reduction of injuries to women and children. The task of making the American home the haven of shelter and security ascribed to it in the world's literature, is one of gigantic proportions. It calls for the united effort of the safety movement, allied with all the other community interests having contact with the home, the press, family social agencies, women's clubs, the official and private health agencies, and the schools.

DR. DUBLIN: That last sentence is the theme which I want to harp on—facts as a basis for the prevention campaign—and having that in mind our Committee has had several meetings, continues to meet three or four times a year, and analyzes the material which has been collected from the cities.

Let me tell you that this Committee of ours is developing what will ultimately prove to be a most important service—nothing less than a registration area for the reporting of fatal and non-fatal highway accidents, just as there is a registration area for the reporting of births, just as there is a registration area for the reporting of deaths, both under governmental auspices in the Census Bureau. We are developing on a voluntary basis, under these auspices, a registration area for the reporting of public accidents, and more particularly vehicular accidents. An area comprising fifty million people is now reporting monthly to the Chicago office, on standardized blanks, so that uniformity is obtained; and this material is tabulated and analyzed, and, as you see, every month a report made in the PUBLIC SAFETY magazine.

What the outcome of that is you can readily see. We hope that before very long, and with your cooperation, it may be possible to have all the States of the Union, and if not that at least all the large cities of the country, bound together by this endeavor of reporting these facts, first voluntarily and then later under governmental auspices. These facts will then be analyzed, and once analyzed made the basis of a local campaign for the prevention of accidents. That is our hope.

We do not believe that you can by any emotional appeal, by any call for conscience or for judgment, or for anything else but the facts of where accidents are occurring, stem the tide of this increase in accidents. This Committee deserves, we believe, your cooperation. We want you to take these facts as presented in our annual report, and make it your local gospel. Collect your material locally along the lines we have outlined in this report. Use the material locally through your press. That is the idea we have in mind. When you have done that, we believe you will succeed in stemming this tide.

Now, in addition to the question of public accidents, our Committee is gradually opening up a new line of work. We notice that there is an equally large number of accidents that occur annually in the home, causing as many deaths as caused by the automobile. About 25,000 fatal accidents arise in the home each year, and nothing is being done about it. We are trying to collect material with which we can analyze the causes that are basic to this large number of deaths. What is it that is happening to the homes that results in that large number of deaths and injuries? When we have those facts it will be possible to develop a campaign very similar to the

campaign in industry and the campaign on the streets, which will ultimately, we hope, help to reduce the number of those injuries and fatalities. Your cooperation is asked for that locally. Your local Safety Council should gather this material from the various agencies and the police; through the following up of clippings; through local investigation, and send the reports in to the National Safety Council.

I want to say a word to you about this National Safety Council Committee. A small group of devoted men are doing a splendid work with a very small budget indeed. They are accomplishing wonders. It seems very right that this work that is being accomplished by Mr. Forney, Mr. Williams and the members of the staff in Chicago, should receive fullest recognition and should be expanded, and with that thought in mind a number of us have suggested that possibly the time is ripe for the recognition that, under the auspices of the Safety Council, there should be a section whose business it is to concern itself with the problem of the facts in the accident situation. We have therefore proposed that there shall be organized a new section, a section for accidents statistics. At the beginning this section will concern itself primarily with public accidents and with home accidents, leaving out of consideration those industrial accidents for which there is already provision in the several committees in the various other sections.

This matter is brought to your attention for your action. It is hoped that the Chairman will present this matter of a new section on accident statistics and receive your response and let us hope, your approval. If this matter does receive your approval, we believe that this entire movement will be accelerated, and that much more good will be accomplished. I think that the office has distributed among you an outline of the By-Laws of this proposed new Statistics Section.

R. L. FORNEY (Statistician, National Safety Council, Chicago): Mr. Chairman, the proposed By-Laws have not been distributed as yet among this group. My feeling, however, is that Dr. Dublin has given you a very good idea of what we have in mind. Do you desire that these proposed By-Laws be distributed among you before you vote upon this proposition, or, in view of the review and the study which this matter has already received, will you give your approval or your disapproval to the idea of establishing a Sectional Committee of the Safety Council? I am at your disposal in that regard.

CHAIRMAN MATTHEWS: This is not a very long prospectus here. The Chair will read it.

Proposed By-Laws of the Statistics Section, Public Safety Division, National Safety Council

Article 1

NAME

The name of this organization shall be **STATISTICS SECTION, PUBLIC SAFETY DIVISION, NATIONAL SAFETY COUNCIL**. This Section will be a development of the **STATISTICS COMMITTEE, PUBLIC SAFETY DIVISION, NATIONAL SAFETY COUNCIL**, and upon completion of organization, the above mentioned Statistics Committee shall cease to exist.

Article 2

PURPOSES

The purposes of the Statistics Section shall be as follows:

1. To serve as a clearing house for statistical information on public and home accidents.

2. To publish this information and analyses of it at suitable intervals.
3. To encourage and promote the collection, tabulation, and analysis of such information by agencies not already doing so.
4. To work for uniformity of methods and results among such agencies.
5. To bring such agencies into the membership of the National Safety Council and the Statistics Section.

Article 3

MEMBERSHIP

All members of the National Safety Council who are engaged in statistical work relating to public or home accidents will automatically be made members of the Statistics Section. Other members of the National Safety Council may become members of the Section on request. The members shall meet annually during the Annual Safety Congress of the National Safety Council.

Article 4

OFFICERS

The officers of the Statistics Section shall be: Chairman, one or more Vice Chairmen, Secretary. The Chairman and the Vice Chairmen shall be elected by members of the Section at each Annual Meeting for a term of one year. The Secretary of the Section shall be the Statistician, Public Safety Division, National Safety Council.

Article 5

EXECUTIVE COMMITTEE

The Executive Committee of the Section shall consist of the Officers, the Chairmen of standing committees, and such other members of the Section as may be elected at each Annual Safety Congress. The Executive Committee shall meet on call of the Chairman or of any five members.

Article 6

STANDING COMMITTEES

There shall be standing committees as follows:

1. Committee on motor vehicle accidents.
2. Committee on other public accidents.
3. Committee on home accidents.
4. Committee on child accidents.
5. Program committee.
6. Membership committee.

The Executive Committee may provide for standing or special committees.

Article 7

AMENDMENTS

These By-Laws may be amended at any annual meeting of the Section by a majority vote of those present, or at any meeting of the Executive Committee by a majority vote of the entire Committee, subject to approval by the Executive Committee of the National Safety Council.

CHAIRMAN MATTHEWS: Those, I believe, are the salient points outlining the purpose of the new Statistics Section. If there are any of those particular articles which you would like read again, or which you would like Dr. Dublin or Mr. Forney to explain to you, I am sure they will be glad to do it. I understand that the purpose of presenting this question at this time is that the Executive Com-

mittee of the Council may have some expression from the members here present, possibly in the form of a resolution stating that it is the consensus of opinion that such a Section should be established.

(It was moved and seconded that a Section as proposed be established.)

CHAIRMAN MATTHEWS: Is there any discussion on the proposition? Any further information that anyone would like to have brought out or any further questions?

A. K. GAGE (Ass't Prosecuting Atty. for Wayne County, Detroit): My objection to separating statistics from the consideration of the Public Safety Division would be that you cannot be in two places at one time, and I think most people who come to the meetings of the Public Safety Section realize the importance of these statistics to a proper understanding of all the other questions that come before this Public Section, and without those facts I think we will lose a great deal of the interest in these meetings. If the two Sections can be coordinated so we can attend both Sections when we come here for enlightenment, very well; but if they have to be held at the same time, we cannot divide ourselves very well and be in two places at one time.

CHAIRMAN MATTHEWS: One of the features of congresses such as this is that it is almost necessary to run parallel sessions, but I believe that might very properly be worked out, and perhaps Mr. Williams, who is in direct charge of the Public Safety Division, might be able to give us some information as to what the plans are along that line.

SIDNEY J. WILLIAMS (National Safety Council): The formation of this Section would not, I hope, have the effect that Mr. Gage foresees; we would still try to do as we did this year—not have the Statistical Section meetings come at the same time as other Sections that the same people would be interested in, and I do not anticipate that a year from now the program would involve any more conflicts than this year. We cannot avoid some conflicts.

As we see it, the statistical work of the Council is growing so fast—not only that, but there is such an increase in the statistical work around the country—so many cities and States are taking the thing up, and people are specializing on it, that we feel that this step would be a proper development, would give a better chance to coordinate the work of the different State and City departments around the country, and coordinate that work with the work of other organizations.

CHAIRMAN MATTHEWS: Any further discussion or comments? Are you ready for the question?

The question is that it is the sense of this meeting that a Statistics Section be established in the Public Safety Division of the National Safety Council. Those in favor of the adoption of this resolution will signify by saying aye; those opposed? So ordered.

ADJOURNMENT

October 3, 1928

Motor Vehicle Legislation

HON. ROBBINS B. STOECKEL, Chairman
Commissioner of Motor Vehicles, Hartford, Conn.

The third session was called to order at ten-fifteen o'clock by the chairman, Hon. Robbins B. Stoeckel, Commissioner of Motor Vehicles, Hartford, Conn.

CHAIRMAN STOECKEL: I see by the program that the chairman is supposed to begin the meeting by a few remarks. They will be very few and very brief, unless we get into an argument over something. This program which we are going to discuss today has to do with motor vehicle legislation. Two or three very apparent facts with relation to legislation stare every person in the face, and I think they ought to be mentioned as a part of the background for this meeting.

The first fact is that most people think that when they make a law they have cured a condition. The second is that a law in order to be worth anything at all, has to have a great public sentiment behind it. That public sentiment must be militant enough to call it forth and to force it upon the class for which it is intended. Third, the law must be popular enough so that people will try to enforce it; that is, it must have a basis of common sense.

In connection with another talk on legislation I was thinking some time ago about a good illustration of the kind of a law which has failed because of the fact that it did not have those things, and I went back immediately in my history to the old Connecticut blue law which made it an offense for a man to kiss his wife on Sunday. You can see that the law did not have any of those factors behind it which made it enforceable, and it has long since died.

QUESTION: Mr. Chairman, does it say anything about the other fellow's wife?

CHAIRMAN STOECKEL: I was just going to refer to that. There was never any law against kissing another man's wife on Sunday.

Now, we are here to discuss the various and sundry applications and details of legislation, and we have with us this morning Mr. A. C. Godward, who is one of a growing group of traffic engineers, who knows the application of traffic ordinances, who is bringing efficient methods into the handling of this great problem in his city, and who was a member and probably is yet, of the Committee on the Model Traffic Ordinance. I would like to introduce Mr. Godward, who will speak to you on the subject of the Model Traffic Ordinance.

The Model Municipal Traffic Ordinance

By A. C. GODWARD
City Planning Engineer, Minneapolis, Minnesota

On August 20, 1926, there was presented to the people of these United States the Final Text of a Uniform Vehicle Code prepared and recommended by the National Conference on Street and Highway Safety.

Two years later, in August of 1928, there was presented through the Conference and by the Committee on Municipal Traffic Ordinances and Regulations, the Model Municipal Traffic Ordinance, a supplement to the Uniform Vehicle Code, an ordinance which was recommended for adoption by all American cities.

The Uniform Code consisted of four Legislative Acts entitled, respectively:

- (a) A Uniform Motor Vehicle Registration Act.
- (b) A Uniform Motor Vehicle Auto Theft Act.
- (c) A Uniform Motor Vehicle Operators and Chauffeurs License Act.
- (d) A Uniform Act Regulating the Operation of Vehicles on Highways.

The Model Ordinance submits:

- (a) A uniform and comprehensive traffic ordinance.
- (b) An ordinance to create a division of traffic engineering.
- (c) An ordinance to create an Official Traffic Commission.
- (d) An ordinance to control Roadway and Sidewalk Obstructions.

To elaborate upon the subject matter so well presented in these reports widely distributed by the Department of Commerce would be a futile repetition of facts with which you are already conversant. To present in the few minutes allotted even a resume of the more than four years of deliberation, research and deduction of the Conference and its Committees is an impossibility; so permit me to discuss this morning the genesis, the progress and the purpose of this gigantic effort—to the end that we may increase your interest and secure your continuing support.

The efforts of the Conference and all who have so gladly and whole-heartedly participated therein will result in reduction of hazard on the street and highway and increase in convenience to the users of such highways, in the same measure as we can secure the public cooperation in the promulgation of the educational features of the code and the ordinance, the promotion of their enactment and insistence on consistency in their enforcement.

Any national problem approaching the status of an emergency and affecting all of the people of our country, has of late been the peculiar concern of the Department of Commerce.

In 1924, and earlier, we recognized the traffic condition of America as an emergency. We viewed with alarm the toll—the price of convenience—mounting to 25,000 fatalities, a half million personal injuries and an economical loss of billions of dollars annually.

This record of traffic accidents on our streets and highways was such as to almost convince some of us that our progress was indeed a delusion, that new gifts intended as a benefit to humanity were bringing sorrows and losses that were not compensated by either convenience or pleasure.

The demand of the people of this nation was for Governmental assistance in remedial action, that they might retain their privileges and yet reduce the costs and that demand upon the Government was based upon the fundamental principle that the purpose of Government was the protection of its people and the promotion of public safety, safety of life, person and property.

In answer to the growing need and that national demand, the Secretary of Commerce, the Honorable Herbert Hoover, called the first Safety Conference, representative of all sections and all activities to unite in research, study and recommendations, culminating in the presentation of the Uniform Vehicle Act.

This work—comprehensive as it was by inclusion of all particulars pertinent to State traffic legislation, was yet not complete in its provisions for uniformity of traffic rules. There was needed a uniformity of municipal traffic ordinances and a new committee, appointed by Mr. Hoover and led by Chairman William E. Metzger of Detroit, was charged with the task of producing a model traffic ordinance for the guidance and assistance of traffic and legislative officials of municipalities.

In the deliberations of the National Conference and in those of many State Conferences, it was observed that the outstanding feature was the lack of uniformity in traffic regulations, ordinances and rules of the road and that this lack of uniformity was the greatest contributory cause to accidents which were occurring.

Again it was agreed that the price of traffic safety was courtesy, and courtesy on the highway was carefulness and unselfishness.

Then and now the great majority of our people are willing to pay the price of safety if through uniform legislation we educate them as to how to best exemplify the required courtesy.

The Conference believed that the small majority of our people to whom courtesy was but a word and the Golden Rule but a jingle; the reckless, the habitually careless and the incompetent; those who could not or would not drive their motor vehicles in a manner thoroughly consistent with safety of others must, in the interest of that same safety, be denied the privilege of the road and that this could best be done by uniform laws and uniform ordinances, which would permit of uniform enforcement that is impartial, unprejudiced, prompt and positive.

Safety, in the opinion of the National Conference, had the characteristics of all fundamental movements and success in its promotion must, therefore, be dependent upon education; education that is uniform and consistent.

In the interests of safety, it is their endeavor to correct physical conditions of the motor vehicle and the highway; secure uniformity in State and Municipal legislation; standardization of rules, regulations, road practice and traffic control, and impartiality in law enforcement.

To this end, through their efforts, they have produced, presented and recommended the Uniform Vehicle Code and the Model Traffic Ordinance which—combined—are a rule and guide to courteous and safe conduct on the streets and highways of America; a common textbook for the study and education of all good citizens and a penal code only for those few who do not have the proper consideration for the rights and safety of others.

This textbook and code has been formulated in this attitude by the many who have participated in the committee and conference work.

If it is accepted in this attitude by you and the public at large then we can hope to early establish habits of safety which, in the last analysis, will be more effective than penal enforcement.

Those of you who have endeavored to promote the passage of state legislation, inclusive of the Uniform Vehicle Code, will recognize that there is a distinct difference between this Code and the Model Ordinance—a difference predicated on the division between State authority and the rights of the Municipality.

State legislators represent rural communities and municipalities and are jealous of the rights of those Governmental subdivisions.

Wisely in the preparation of the Uniform Vehicle Code, legislation which properly belonged with the municipality was omitted. This has now been presented in the form of a Model Traffic Ordinance.

Based upon Model Ordinances of various States and active and effective Ordinances of many Municipalities, it contains:

ARTICLE I.—A definition of the terms included in the Ordinance.

ARTICLE II.—Designation and allocation of authority to the police, commissioners, Board and other authorities.

ARTICLE III.—Standardization of regulations pertaining to Traffic signs and signals, legends and police control and requirements of obedience.

ARTICLE IV.—Establishment of the rights and duties of pedestrians.

ARTICLE V.—Ordinances relating to reasonable operation of street cars, railroad trains and other common carriers, and the relation between such vehicles and other traffic.

ARTICLE VI.—Regulations as to standing, stopping and parking.

ARTICLE VII.—The Rules of the Road or the operation of vehicles within municipalities.

ARTICLE VIII.—Miscellaneous provision in the interest of safety convenience provisions, many of which could well have been included in the Vehicle Code.

ARTICLE IX.—Penalties and Procedure upon arrest.

These provisions, all of which can well be considered within the scope of Municipal rights and powers, have in the Model Ordinance, been augmented by addition of portions of the Vehicle Code. These additions are for the purpose of making a complete text for more comprehensive educational use and for permitting the enforcement of State law provisions by the police of a city in compliance with its ordinances. This, incidentally, in some municipalities will permit them to collect fines for violations of state laws and add materially to the revenues needed for traffic ordinance enforcement.

In Article IX, Section 56, it will be noted that Procedure Under Arrest is not stipulated. Experience of cities did not appear to justify a definite recommendation.

The Engineering Committee of the National Safety Council are now occupied in research and study of this matter and hope to submit a report in the near future.

The Supplementary Ordinances, relating to an Official Traffic Commission, a Division of Traffic Engineering, and Controlling Roadway and Sidewalk Obstructions are self-explanatory and are obviously desirable for the effective enforcement of the Ordinance.

If any so desire, it will be a pleasure for your speaker—or other members of the Committee here present—to elaborate on specific provisions of the Ordinance itself.

In conclusion, let us remember that the Code and the Ordinances are an effort to give adequate and uniform rules and regulations to those who wish to obey such rules and the courtesies of the road; and a means whereby we may penalize those who cannot or will not drive in a manner consistent with safety, to the extent we hope that we will reduce the hazard of the Street and Highway.

The Code and the Ordinance, when enacted and enforced by our Government—which is ourselves—when studied and obeyed as a matter of habit by the public—which is ourselves—should result in safety—safety of the person and property—the guarding of which is the purpose of the Government.

CHAIRMAN STOECKEL: Mr. Gorward will be glad to answer questions, if there are any, and the meeting is now open for discussion on his paper. It seems to the chairman that the desirability of uniform traffic ordinance regulation is absolutely admitted; that the presence of a good model, as has been presented to you, is conceded to be a tremendous step in advance towards handling the most difficult portion of the traffic situation.

As there seems to be no questions, no discussion, on this paper, we will pass on to the next subject—that is, bringing the traffic laws up to date, and was assigned to Mr. Charles C. Janes of Ohio. Mr. Janes has telegraphed that he is unable to be here but his paper will be included in the transactions at this point.

Bringing Our Traffic Laws Up to Date

By CHARLES C. JANES

Secretary, Ohio State Automobile Association, Columbus, O.

I am glad to be a part of this very important meeting, which is being conducted for the express purpose of contributing, if possible, to the cause of safety, and to make an analysis of the problem which confronts us everywhere today—the saving of lives and property. I am sure that is why we are all here, and to the best of our ability will do all we possibly can in this direction.

In addressing you on this matter of Bringing Our Traffic Laws Up to Date,

I do not wish to criticize or discredit anyone for the laws or regulations that we have today. On the other hand, I desire to compliment all those who have from time to time attempted to solve the complexing problem which has faced us since the advent of the motor vehicle. I am unwilling to concede that there ever has been a master mind in working out the traffic laws for the various states and cities. To my way of thinking it has been everybody's problem—Legislators, Safety Councils, Automobile Clubs, Chambers of Commerce, individuals of all rank and file have in a measure contributed to the good that has been done and are responsible for the laws we now have.

It is my privilege at this time to pay particular respect to the Committee on Municipal Traffic Ordinances and Regulations, appointed by Mr. Hoover, which met in Washington last July. Although, but forty of the committee of one hundred contributed, in my judgment they have given us one of the finest and most constructive pieces of proposed legislation that has ever been produced—A Model Traffic Ordinance.

I was not a member of this committee, but I followed their work very closely, and I believe I am sufficiently informed to say that the proposed law which they have so kindly drafted for us deserves our support.

I am personally acquainted with many members of this committee and especially the chairman, Wm. Metzger of Detroit, whom I greatly admire for his sincerity and for the valuable time given to this proposed law. His ability to complete such a job can not be over-estimated.

No doubt, all or the majority of those present have been privileged to familiarize themselves with this model ordinance. As an owner and driver of an automobile for over twenty-seven years, I wish to contribute my thanks particularly for the new phases which deal with up-to-date traffic hazards and the causes for many accidents, which have been embodied in the proposed ordinance.

Section 3 provides for a Board of Police Commissioners or other traffic authorities authorized to adopt emergency regulations.

Section 7 compels persons propelling push carts or riding bicycles or animals to obey traffic regulations.

Section 10 provides that the traffic control legend shall be red, yellow and green.

I believe the use of the yellow or caution signal is absolutely necessary. It provides a definite time interval between the red and the green, which allows both the pedestrian and motorist a few seconds to concentrate and move with more confidence and safety. I am a convert from the "red to green" to the three color signal. My observation has been to the effect that where there are but two colors used it has caused much confusion, jerking of cars, abrupt application of brakes and wild scrambling of pedestrians.

The timing or intervals between signals should be carefully studied by competent officials in order that traffic may be moved at the highest possible speed that safety will permit. Long unnecessary delays are tiresome and annoying to all concerned. I am also in accord with the progressive or alternating system of traffic control.

Section 15 gives the pedestrian the right of way. No one will question the propriety of this. However, provision is made in paragraph C that when crossing a roadway at any point other than within a marked or unmarked crosswalk, they shall yield the right of way to vehicles. At the same time the driver is never relieved of the duty of exercising due care for the safety of pedestrians.

Some authorities claim that pedestrians should give the same respect to traffic lights, as motorists do. They further suggest stiff penalties for "jay-walking." It is claimed that this will lower the accident rate and speed up traffic. A number of Western cities, also here in New York, for that matter—especially on Fifth

Avenue—I have observed that pedestrians are being held at the curb until signals clear the way for them. This has made a very noticeable improvement in traffic.

Section 18 makes it unlawful for any person to stand in a roadway for the purpose of soliciting a ride from any private vehicle. "Thumbing" has become a menace, particularly in Ohio, at least, my home State. These rides are usually solicited on main thoroughfares where traffic is heavy. Thoughtless stopping by over-sympathetic motorists has been the cause of many serious accidents.

Section 24 provides that railway trains and street cars shall not block the streets for more than five minutes. This is a very welcome section to both motorists and pedestrians. It also deals liberally with the railway companies in exempting trains in motion, other than those engaged in switching.

Section 27 authorizes traffic authorities to designate bus stops and taxicab stands. This will tend to eliminate taxi cruising in the cities—another menace to traffic and safety that should be stopped.

Section 39. Limitations on turning around. Tourists are the principal violators of this section. They are not familiar with the local regulations and invariably make turns at the wrong place, hampering traffic and impairing safety. I am in favor of prohibiting all so called "U" turns in downtown business districts. In my travels over the United States, I can not recall an intersection in any city street or boulevard where "U" turns can be made safely.

The Model Ordinance would, of course, be a step forward, but we need more than that. We need a uniform traffic law for the entire United States—a state motor vehicle code, which would automatically bring uniformity between states as well as cities. When this is accomplished, I believe, we will have solved the traffic problem.

We hope to have a state-wide uniform traffic law enacted by our Ohio General Assembly, which convenes in January. Our proposed code follows very closely the recommendations of the Hoover Conference. A similar bill was introduced two years ago, but was defeated. Since then, however, we have conducted a publicity campaign on the need of such a law, and we feel confident that the proposition will be approved this time.

The need for a uniform traffic code in the United States is seen daily with the increased tourist travel everywhere. Every state has different rules and regulations for motor vehicles, which makes it very confusing to the motorist. A uniform speed law is needed. In the District of Columbia, for example, an automobile is not permitted by law to travel more than thirty miles an hour, while in Massachusetts the limit is twenty-two miles. In other states the limits range from twenty-five to forty-five miles an hour. In Michigan the speed limit has been entirely removed, and, I am glad to say, it seems to be working out very well. They, however, compel every motor vehicle to undergo brake and other mechanical inspections at regular intervals and reckless and drunken drivers are prosecuted to the limit. Twenty-three other states have wiped out obsolete speeds laws and have changed the emphasis from mere speed to carefulness.

Traffic authorities in many cities seem to have reached the conclusion that it is better to move traffic as rapidly as possible. Cautious drivers are frequently greeted—"Step on the gas" or "Do you think you're in a funeral procession?" Some states have minimum as well as maximum speed limits. The proposition has merit that cannot be denied. Slow driving often "jams" up traffic on the main highways. The driver who wants to drift along at fifteen or twenty miles per hour should stay off the main thoroughfares. There are numerous roads he may select, where he may drive as slow as he likes, causing little or no inconvenience to others. I do not believe it advisable to encourage speeding and my remarks are not intended in that direction.

With the uniform traffic law, we should have the standardization of all street and highway markers, traffic lights and equipment. I honestly believe we are "over regulated" on signs. Signs and traffic lights are placed where they really are not needed and where officials know they will not be obeyed. This practice tends to make motorists disrespect signs at dangerous intersections. That uniformity in signs and regulations can be carried out has been demonstrated by the State of Massachusetts. Since June 5th motorists have been guided by a uniform system of signals, marks and lights throughout the borders of the commonwealth. What a pleasure it must be for the Massachusetts resident to motor through his state! There are no local variations to confuse him and he runs no risk of arrest because he misunderstood the meaning of signs, marks and signals.

Massachusetts has set an excellent example. There is no reason why the country which has the greatest number of automobiles should also have the greatest number and variety of traffic laws, marks and signals. Today one can drive from the Atlantic to the Pacific and never know when he has passed from one state to another unless he takes the pains to find out. There is nobody to interfere with him at state borders and he is as free in one state as in any other. Yet drivers of cars are continually bewildered by the differences in driving regulations and the posted means of proclaiming them. What is valid and legal at one place is against the law a few miles farther on, and a custom esteemed to be the "best word" in safety in one jurisdiction, means the opposite in another.

Speaking of misunderstanding signals reminds me of the "left arm" signals of today. When the driver in a car ahead sticks out his arm, you know perfectly well that it means:

1. He is going to turn to the left.
2. He is knocking the ashes off his cigar.
3. He is going to turn to the right.
4. He is waving at a friend.
5. He is going to pass the car ahead.
6. He is feeling for raindrops.
7. He is going to slow down.
8. He is pointing out something interesting.
9. He is going to stop.
10. He is arguing with the wife or the kids.

Along with the uniform traffic laws, I think we should have a concentrated courtesy campaign. This is the day of speed, and common courtesy has been forgotten. "Courtesy prevents accidents" is a mighty good slogan and very true. Many accidents have been caused by one motorist trying to "beat the other fellow" to the intersection. Out on the open highway you also find the discourteous motorist shoving others off the road, glaring his bright lights in your eyes at night, etc. I might say, however, that in states like New York, New Jersey, Pennsylvania, Michigan, etc, where there is a state traffic police, the rules of the road and the rights of others are more carefully observed.

Before closing I wish to make another observation:

Harley Wiley Corbett, president of the Architectural League, here in New York, believes the traffic problem of the future city will be solved by the abolition of all automobile traffic. He says "Autos will pass because of inability to traverse streets." He was speaking, however, of the future city "fifty miles across and with a dense population of 50,000,000."

In Corbett's city of the future there will be pneumatic tubes for human beings, elevators the size of present-day ballrooms, underground freight distribution and aeroplane stations on skyscrapers. Other modes of urban travel will replace the "slow" taxicabs, subways and elevated.

But this does not solve the existing traffic problem of the modern city. If automobile traffic could be abolished on the city streets—and it cannot—that would not solve the traffic problem. Street car systems and suburban railroads in the average city could not absorb the increased traffic that would be thrown upon them by the abolition of motor traffic on city streets. The automobile is not the sole cause of prevalent traffic conditions. On the contrary, the automobile is rendering indispensable assistance to urban transportation.

Not so long ago, it was predicted that eventually the pedestrian traffic would disappear because everyone would be riding in motor vehicles. We all know how absurd that is. As the population increased, motor vehicles increased and as the motor vehicle registration increased, pedestrian traffic increased. Motorists are pedestrians, and pedestrians are motorists.

The final solution seems to be this—bring the traffic laws up-to-date, both state and municipal. The adoption of the uniform traffic law would, I believe, accomplish this. When motorists and pedestrians are thoroughly familiar with the law by which they are to abide, they will be in better position to take care of themselves. As it is now, a few minutes' drive takes a motorist from one jurisdiction where he understands the regulations to another where lack of knowledge of the local rules makes him an innocent menace. All this would be changed by uniform laws, and, in closing, I heartily recommend the adoption of the uniform traffic laws, as I am convinced it is the proper move.

CHAIRMAN STOECKEL: In Mr. Janes' absence I will call on Mr. Frank Ballantyne to discuss the subject.

FRANK E. BALLANTYNE (Maine Automobile Assn., Portland): This job of pinch hitting usually has its disadvantages. I share with you rather keen regret that Charlie Janes is not able to be here and I am going to emphasize the words up to date, because in some circumstances it seems to me it might be well to consider bringing them back to date. I have in mind particularly the habit which has grown upon some of our Eastern seaboard cities, that of erecting their present-day traffic signals with a view to some time in the future having them regulate airplane traffic at the same time they regulate street traffic. Sometimes it seems to me that in our planning of traffic signals and our planning of traffic regulations, our municipal officers and municipal authorities have attempted to take in a bit too large a scope.

When the Model Municipal Traffic Ordinance was issued in its final draft, I had the pleasure of presenting a copy of it to the chairman of the City Council in one of our Eastern seaboard cities, and he passed it back to me with the remark: "Oh, that won't fit our case." I said, "Bill, have you read it?" "No; haven't seen it before." "Well, how do you know it won't fit your case?" "I know; we have gone all over that problem and we are licked on it. We have just done the best we could." Well, fortunately, I knew Bill, and I anticipated Bill's reply, and I handed Bill a little clipping taken from that morning's newspaper, showing an accident that occurred in one of the principal thoroughfares of that city, and I said, Bill, did you see this report in the morning paper?" "Yes, I saw it." "Did you think maybe it might have been prevented?" "No; I don't know any way to prevent that accident." Well, anticipating an opportunity to have another dig at Bill because of his narrow-minded selfish interest in his attitude toward a municipal code, I said, "Bill, there is a certain paragraph on such-and-such a page of that particular code which if this city had had in effect, that accident would not have happened." "Is that so?" "Sure, it is so." "Well, let's see that." We did that; turned to that particular paragraph, and we proved very conclusively to the chairman of that City Council that if that particular paragraph had been in effect in that city, that one accident at least would not have happened. That was my opening wedge and I jumped into it with both feet and tomorrow noon I think

that particular council will adopt the Uniform Municipal Code, just because we took advantage of that opportunity.

The human relation side of the Motor Vehicle Code, as referred to by Mr. Godward, is the stumbling block in the advance of uniform traffic laws. There is another stumbling block. The committee, which has worked hard, and to which I certainly want to pay a sincere note of tribute, have not been able to take care of minute details such as obtained in our city, for instance, but they have offered a near solution, and if those of us who are engaged in the business of finding a way to prevent accidents will view this code with a bit of unselfishness, with a purpose bigger than our own individual selves, and accept an opportunity to be educated, and learn something as a result of it, I think we will get further.

I have in mind an instance which appeared recently in Maine, when Dick Armstrong from the Motor Vehicle Conference Committee, who was here this morning, spoke before our Council. Dick elaborated quite a bit upon the uniform code for States and a uniform code for municipalities, and a lady in his audience, a lady who happens to be a leader in women's club work in the city, approached me after the meeting and said: "That particular thought that Mr. Armstrong brought out about having all of our traffic laws the same all over the State is the most interesting part of the whole conference to me." She said, "I am interested in good roads; I am interested in safety; I am interested in all the various fundamental elements of this problem, but the privilege of having our tourists, upon whom we depend so much in the State of Maine, the privilege of having them come into our State and know when they come into Portland a green light means something and when they get to some other place that green light means the same thing, it seems to me that's one of our biggest opportunities today, and if I in my work can help, because of the contacts I have with some forty-eight or forty-nine organizations throughout the State, I want you to count on me."

There was a big, broad-minded attitude to the traffic code. This job is not by any means your job or my job. It is everyone's job. I think you will find in every case that the man who is willing to submerge his own personality for the good of the community is the man you need and I need to put across any form of uniform traffic regulations.

CHAIRMAN STOECKEL: It occurs to the chairman that there does not seem to be any great difference in principles or fundamentals in the adoption of a traffic code over anything else in human experience which involves many people. The principle of self-sacrifice is involved; the willingness to consider the problem of the other man is probably, as I look at it, the entire solution of many of the most difficult problems which we have to meet.

The meeting is open for discussion on Mr. Ballantyne's remarks.

H. C. BURNHAM (Research Director, Motor Vehicle Department, State Board of Public Roads, Providence, R. I.): It recently became part of my duties in studying the matter of accident causation, to take over two thousand operators, and under actual conditions obtaining on the highways, attempt to find out why they did a certain thing which was contrary to the regulations. We have laws, plenty of them. We all believe that our ordinances and laws are more or less designed to meet the conditions. The missing link seemed to be the fact that the drivers, or the users of the street, seem to have a colossal ignorance of the ordinances and laws designed to produce safe use of such highways.

Ask a man why he committed a certain violation. Search him and study him and you finally arrive at this conclusion: He did not intend to violate the law, but he forgot all about it, or did not even know about it. It seems if we work out model or uniform codes that that should be one of the things we should consider the most;—to sell that code to the average user of the highways, so that he knows what it is all about, and knowing thereof he can conform with the least inconvenience to himself and to the general public.

ALEXANDER GAGE (Detroit): Speaking directly on the point of this second address, it seems to me that one of the things that we have to take into consideration in relation to bringing our traffic laws up to date is the proper coordination of the various activities in our larger cities at least. We have a large number of departments that have something to say on most of the questions involved in proper traffic regulations; and because of the fact that most of the men that are at the head of our great municipalities frequently are chiefly distinguished because of political ability and not because they have made a particular study of traffic regulations and traffic necessities, we have very little realization oftentimes of the necessity of getting these various departments coordinated.

I have in mind, of course, my own city, where we have a situation of a number of very excellent men who are at the head of the various city departments, but up to date, so far as I know, there has been no effort to coordinate the different departments with the idea of getting together on the question of uniform traffic regulations. Each one of these men, without any particular training or information, has his own ideas and they get together when they have some particular proposition that they want to put over, but they do not get together with the idea of reconciling their various views; and perhaps the Safety Council, the National Safety Council, could do no finer work than a missionary work among leaders, the political leaders of our great cities, to get them into the frame of mind where they would seek to coordinate the heads of the departments on this great topic of safety.

W. A. CORBETT (New Jersey Bell Telephone Co., Newark, N. J.): I would like to ask Mr. Godward what the Committee found for the three-system light in preference to the two.

A. C. GODWARD (City Planning Engineer, Minneapolis): I do not know that it is quite fair to discuss that; it will be brought up by Mr. Powell, Mr. Goodrich and others at Thursday's session. There was a lot of discussion on the two systems, the two-color as compared with the three. The general consensus of opinion of the Committee, after full discussion, was that the yellow or amber cautional colors were necessary and desirable for safety.

MR. BALLANTYNE: We are told that the State of New Jersey is about to enact a State law. If there is anybody present who can tell us something about that, I personally will be grateful to hear about it.

FRED J. BLACKSHAW (Chief of Police, Ridgewood, N. J.): We have the Wise Act, which was passed in the session of the New Jersey legislature last year and became operative on September 1st of this year, covering the three-color lights. In part of our State we have the flare light or beacon. We have had the intersection light. We have the light in the center of the street. From now on there will be no lights placed in the streets at any intersection, but they must be on the curb on either side. Those that are in now will remain there until September, 1929. The lights all through the State of New Jersey are red, orange and green, and traffic moves on green only.

We have tried to educate our people to cooperate with the Police Department, and we have met with wonderful success. I, as Chief of Police of Ridgewood, have had cards printed—a warning, and giving a number of the ordinances of our town. We do not serve them with a summons until the second offense. We have given out since September about 1,500 of these red tickets, but I have yet from September 1st until this morning had a second offense come to the office.

MR. BALLANTYNE: The Chief has answered part of my question, and if I am taking too much time say so, and we will pass on to the next; but what I am interested in finding out is how far has the State of New Jersey gone to make it mandatory upon its various communities to adopt the various features of the municipal code. He spoke only about the traffic lights. I am interested in knowing

whether they attempt to say that Ridgewood must have a speed of twenty miles an hour—alike in all communities.

FRED J. BLACKSHAW: I will answer that. Our new limits are, 40 mile speed in open country, 20 in a municipality, and 10 mile in a school district.

MR. GODWARD: Just a word in regard to that distinction between State rights and the municipality, brought out by the Chairman. The success of the Model Code will depend upon the people themselves; their lives, their movements, their convenience. There is abroad in the United States,—maybe not so much on the Eastern coast, but there is in other parts, a feeling among the municipalities that the State has taken away too many of their rights as it is. Personally I think the States should go very slow in enforcing as a State law things that are primarily and fundamentally local and municipal in their effect, and that we will make greater progress towards uniformity, uniformity of not only legislation, but of enforcement if we will let the municipality continue to keep some of its rights and be responsible for the enforcement of its own ordinances. The States can never enforce in every municipality of America all the things necessary to the safety of the municipality. The municipality has its ordinances and their laws, and feels it is its privilege to give service. I think we should go rather slow in giving the States all rights that the people themselves would like to retain.

MR. BALLANTYNE: It seems to me, not to show any disrespect to Mr. Godward, that the State of New Jersey in enacting such a law, rather than having taken away any rights of the people, has given us rights. They have given us the right to know how to drive anywhere in New Jersey, and if there is any State on the Eastern seaboard—with due respect to you, Chief—that has been a chief offender with respect to the various forms of traffic lights, it has been New Jersey. You can drive from Cape May up to Ridgewood and you will have passed a dozen different kinds of ordinances, and you will have to have a Bible with you and an encyclopedia to know how to drive. If New Jersey has taken that step, I think it is a decided step forward, and I am interested in getting all the information I can on it.

F. W. JOHNSON (Citizens Safety Committee, Philadelphia Chamber of Commerce): We are close to Jersey and are experiencing some of the difficulties of the gentleman from Maine in the past, and I think that is now completely wiped out. The present New Jersey law, combining as it does the major points of the Hoover code and in addition to that, many of the desirable points of the Model Traffic Ordinance, all in the one code, does tend to produce greater uniformity through the State. One point I want to bring out is this: that in the New Jersey law, there is a diagram that definitely shows how and where and from what position the turn shall be made, particularly with reference to the turn to the left. It includes as well numerous standard signs. There is just one thing—this may raise a little discussion, but in the matter of penalties the New Jersey law places in the hands of the minor judiciary the right to fine and imprison. That we from Pennsylvania most seriously feel is unwise.

J. H. WYSE (Canadian National Safety League): This auto traffic code is one of the best things that has ever been conceived. I come here to sit at the feet of the Model Traffic Ordinance and not inflict you with our troubles north of the United States, but some time ago I got one copy of this code and it appealed to me so much that I asked for eight more copies, and I distributed them in Canada in some of our largest municipalities there. The replies were so gracious and so much interest was shown in that code that I wrote to Washington for one hundred more copies. Now I am going to distribute them to one hundred of our largest cities in Canada with the view of obtaining as far as possible uniform

traffic regulations; that is, so we will have over the entire continent a uniform traffic code, and I think it will not only be of great benefit to us touring in the United States, but of benefit to United States citizens touring in Canada. For that reason I think this almost ought to be regarded as an international code, and the Canadian National Safety League is going to do everything possible to make it so far as the United States and Canada are concerned.

W. GRAHAM COLE (Metropolitan Life Insurance Co.): The New Jersey Act we have been discussing here is putting across coordinated municipal regulation. New York State undertook that a number of years ago in its Highway Traffic Act, which, although not consistent with the New Jersey law in respect to individual clauses, does the same general thing. There is a movement on foot at the present time to revise that Act and make it consistent with the accepted Model Municipal Traffic Code. We will have New York and New Jersey, the two States very closely allied with each other, working on practically the same State law, which takes into account the Hoover Municipal Traffic Code.

A Copy of the Traffic Regulations with Each License

MR. LYON: I should like to ask the Chief whether there is any provision in the Jersey law for making the automobile drivers familiar with the law, and whether that provision is carried out. I ask that because in this State the Commissioner of Motor Vehicles is supposed to give a copy of the traffic regulations to each new licensee; but it is not done. The licensee gets it if he asks for it, and the result, as I know from personal experience, is that there is a most appalling ignorance of traffic regulations. If they were better known by the drivers in the State, there might be fewer accidents.

One of my boys recently came from England, where he lived for many years. He is an auto engineer, and in order to become familiar with American makes of cars, he went into a big service garage and tried to find from somebody in that garage something about traffic regulations; there was nobody there who could tell him, and he had to go to the Commissioner of Motor Vehicles to get a copy. There was absolutely nobody in that garage could tell him a single thing he wanted to know about traffic regulations. While we are busying ourselves with getting a model traffic law and bringing it up to date, wouldn't it be well also to busy ourselves with making the motor drivers familiar with such laws as there are?

BURTON W. MARSH (City Traffic Engineer, Pittsburgh): My work in Pittsburgh as Traffic Engineer of that city has brought me in contact with a problem which I believe many persons in this room may encounter if they are sincerely interested in seeing this uniform legislation adopted in the State with which they are mainly associated. I think it will be well to have the gentlemen present understand, if they do not already, that during the discussions of this Model Ordinance Committee, in Washington, there were in a number of cases certain ideas which different people from certain States had which we were willing to adopt, with the idea of going along on something which would be uniform. There were points of view which some of us had—I think I would say probably everybody had—which they were willing to give up in order to go along on something which would be a standard.

Now, when I went back to Pittsburgh and started to work on getting this adopted there, and it is now before our Law Department, I encountered just these same local ideas. I would like to suggest that if you want to help secure this legislation and have it really amount to something as standard, you ought

to try to help in your city to sell the idea of going along if there is some slight difference; in other words, paying a little price of your own idea in order to secure a standard practice.

I do not believe the last speaker has answered the question of the previous speaker,—What is being done towards educating the motorist as to what is expected of him? I believe the Chairman is too modest to get up and tell us what is being done in Connecticut, but coming from that State I do know this: That the Motor Vehicle Department under his control is doing more than is being done in any State I know of to teach the motorist what is expected of him. I should like to ask him if he will outline briefly the policy of the Connecticut Motor Vehicle Department concerning the dissemination of the proper information. I believe his policy is not only sound but practical, and I know it is deeply appreciated by thousands of motorists in that State.

A Public Jealous of "Paternalism"

CHAIRMAN STOECKEL: If it seems to be the wish of the meeting that the Chairman close the discussion, there is one observation which I would like to make. It comes out of an experience of some years as a State official. That is, that members of the public are increasingly jealous of what they call in letters to me "paternalism," meaning that, in my opinion, so far as Connecticut at least is concerned, it may not be possible to proceed to put a traffic ordinance into the State law, because the people are desirous of governing themselves through the ordinance method. I don't say we shall not try it. You can't always weigh up the material that comes to a Commissioner that way. Some of it is pretty bad; some of it is moderate; but there's enough of it in volume to make it certain in my mind that in Connecticut and possibly in New England, there is enough of a feeling that what we ought to present is a model, just-as these gentlemen are presenting their model ordinance, and let the public decide.

Now, as to the dissemination of information in Connecticut, it is a pleasure to tell you very briefly about it. The Department of Motor Vehicles has had, ever since I have been in there, a first rate publicity bureau, and that bureau has had the statistics and has given them out without fear or favor. We have tried to keep the condition before the public at large through newspaper releases; and then I have written a monthly bulletin, started writing it six years ago, and have covered in that topics which occurred to me and which seem to have aroused interest enough to keep people talking about the motor vehicle problem, which is the main thing. If they will talk about it enough, they will come to a point where something can be done. We are now engaged in an unceasing newspaper campaign, which is bringing the situation before the public at large continuously, and trying to suggest remedies where they can be used.

Now, to turn to the next subject: There are in my opinion a good many bad laws on the books of almost every State; not meaning that they are bad in the sense they are vicious, but probably they are unenforcable because they have not got the elements required to make them popular behind it. On the other hand, there are a great many good ideas which are drafted into the laws and presented to each legislature which do not ever succeed in getting any further than possibly before a committee, and it is necessary, as everyone who has had experience with the legislative committee and legislation in general knows, to have an understanding of the problems of the making of laws. We are fortunate in having with us today Honorable Seth T. Cole, who is counsel to the Commissioner of Motor Vehicles, in New York, and who will speak to you on the subject of "Practical Pointers on Legislative Promotion."

Practical Pointers on Legislative Promotion.

By HON. SETH T. COLE

Counsel to the Commissioner of Motor Vehicles of the State of New York

The subject of legislative promotion is vital to every effort to procure sound safety laws. It often happens that meritorious proposals fail to obtain legislative approval because their promotion is handled in a haphazard manner, while sometimes measures which are unsound from the safety standpoint find their way onto the statute books because the opposition is inept and ineffective to combat the organized movement in their favor. Opposition to safety legislation usually comes from business interests which feel that they may be adversely affected and I do not put it too strongly when I say that such opposition is usually well organized and represented by trained and capable legislative agents, whereas the proponents of safety measures are too often unorganized and inadequately represented in the legislative halls.

From what I have said, you will gather that organization is a prerequisite to effective promotion of legislative proposals and my efforts shall be devoted to outline what, in my judgment, are the steps which should be taken in order effectively to prepare and present a legislative program of safety measures to the end that favorable consideration and action may follow. My remarks will apply with equal force to the promotion of any safety program although they will be directed primarily to the subject of motor vehicle legislation and will be based upon an experience of several years as legislative representative of the Department of Taxation and Finance and Commissioner of Motor Vehicles of the State of New York.

The first step to be taken, and perhaps the most important, is the determination of the subjects to be included in the safety program. This can best be done by the organization of a small committee of arrangements composed of persons most interested in the subject. This committee should get into touch with organizations, public officials and others concerned with safety problems and procure from them such suggestions as they may have to offer in the way of proposed new laws or changes in existing laws. When these proposals are received, they should be carefully considered and classified, and should then be incorporated into an agenda for a conference to which should be invited all persons and organizations to whom the safety movement carries an appeal. This conference should be held from two to three months before the legislature convenes. At it the several proposals should be carefully analyzed and discussed from the standpoints of those in attendance at the meeting and the interests which they represent. It is of importance that there should be submitted to the legislature only such proposals as, in the judgment of those qualified to consider them, are of sufficient importance to call for legislative action and well suited to accomplish the purpose sought to be served. The measures selected and agreed upon should constitute the legislative safety program and might well be set forth in a pamphlet describing each proposal with a brief statement of the reasons for its being advocated. Such a pamphlet would prove to be of great value in the campaign for legislative endorsement.

In any given jurisdiction the question of the composition of the conference to formulate the safety program will, of course, be determined by the local situation. I may suggest, however, that where motor vehicle legislation is being considered, the conference should include the state officer charged with the administration of motor vehicle laws, the head of the state police, outstanding safety engineers, representatives of the state safety council, state and local organization of motorists, the state organization of chiefs of police, the state grange, the state farm bureau, the state federation of labor, the state insurance organizations, the state motor vehicle dealers' organizations, the state taxicab association, the American Auto-

mobile Association, the Motor Truck Association of America, and the American Motorists Association. This list is merely suggestive and is not intended to be all inclusive. It is probable that other organizations to be represented will occur to those charged with the duty of calling a conference. My purpose is to indicate in a general way the various interests which should have representation.

The campaign in favor of the safety program should be one of education. Each organization represented at the meeting should lay the program before its membership and urge that each member bring it to the attention of his local representatives in the legislature and enlist their support. The importance of reaching the individual legislator through his constituents can not be over-emphasized as this is one of the most effective ways of insuring the success of the program. The cooperation of the newspapers should be sought as well as that of the motor vehicle magazines and other interested publications. A trained publicity agent to prepare articles for publication and supervise the publicity campaign will be found to be of great value.

The bills to be introduced in the legislature for the purpose of carrying the program into effect should be carefully prepared. A subcommittee of the conference to have charge of this feature will prove helpful. The assistance of those familiar with the drafting of legislative bills should be sought, including the advice of the state bill drafting commission, if there be such a body. Too often have measures of much merit gone to pieces on the rocks of legislative procedure because the bills in which they were embodied have been hastily and loosely drawn. Bill drafting is a science by itself and should be undertaken only under the direction or with the approval of those skilled in the subject.

After bills have been prepared, the members of the legislature who are to introduce them in the respective houses should be carefully selected as the fate of a bill frequently is affected by the standing and connections of the legislators by whom it is sponsored. If possible, it is usually desirable that legislation be introduced by the chairmen of the committees to which it will be referred. Bills should be gone over in detail with the introducers to the end that they may be thoroughly familiar with them and in a position to discuss them intelligently in committee and on the floor of the legislature. Every effort should be made to convince the introducers of the desirability of the legislation and to make them earnest advocates thereof. A piece of proposed legislation should have a father who really understands and believes in his child.

Bills should be introduced early in the legislative session in order that there may be ample time for their consideration and, if the necessity develops, for their adjustment or amendment. To a large degree, all legislation is a matter of compromise and there should never be a stubborn attitude or unwillingness to make reasonable concessions, provided the essential principle at stake is not placed in jeopardy. As soon as a bill is introduced, a conference should be arranged with the leaders in the respective houses of the legislature and the purpose and effect of the bill should be carefully explained to them. In addition, the introducers and leaders should be furnished with a written statement showing the purport of the bill and the reasons for its advocacy. After the bill has been referred to committees, each member of the committees should be interviewed, apprised of the purpose of the legislation and furnished with explanatory data.

After a bill has been introduced and printed, copies of it should be distributed freely among the active members of the legislature with suitable markings and annotations to readily explain its purpose, but not in such detail as to require a great amount of time to absorb. In the hurry of legislative work the average legislator, who is not a member of the committee to which a bill is referred, will gain more from a copy of the bill so prepared than from a more detailed explanation. Many will not find sufficient time to analyze the more detailed data but will examine the synopsis and obtain an understanding of the legislation.

It is of importance that safety bills should be referred to the proper committees. While ordinarily this will follow as a matter of course, it should be given some attention. An improper reference may tend to interfere with prompt and careful consideration.

The progress of bills through the various legislative channels should be carefully watched to see that they do not suffer from neglect. Committee chairmen should be urged to report the bills to the respective houses of the legislature as soon as they have been given adequate consideration by the committees or, if public hearings are necessary or desirable, these should be held without delay and thereafter the bills should be promptly reported. When they find their way to the calendars of the houses, attention should be paid to their progress to see that they are regularly read and advanced toward final passage. When finally passed in one house, bills should be pressed for action in the other house to the end that they may be passed there and sent to the executive for his consideration. If a bill does not move satisfactorily the source of the obstruction should be sought out and removed. Many times a slight and unimportant amendment will remove an objectionable feature which has delayed progress. A careful follow up system will bring such objections to light but in the absence of such system a trivial objection may be sufficient to defeat the proposal. Always bear in mind that legislative committees and houses are busy institutions during the session and that that which is everybody's business is nobody's business. Diligence in following the course of legislation is essential.

It is desirable, where possible, to secure the services of trained legislative agents who understand the legislative machinery and are therefor better equipped to promote legislation than those who have not had the necessary training even though they may not lack in enthusiasm. A legislative agent should fully understand the bills which he is promoting and be convinced of their merits, for unless the advocate has faith in his cause, he is not so likely to impart faith to others. A lukewarm representative who has never really grasped or felt the importance of a measure will often produce fatal results. In selecting legislative agents, only those should be chosen who have the confidence of officers and members of the legislature.

As soon as a bill reaches the executive, his counsel should be furnished with full information in writing concerning the bill and the reasons why it should be approved. A conference should be arranged with counsel and, if necessary, a public hearing by the executive should be called for. When a public hearing is held, it should be arranged sufficiently far in advance so that the proponents of the bill may be notified and given an opportunity to appear. It is not essential that a great many speakers be heard at such a hearing but they should be carefully selected to make the best possible presentation of the case for the bill. As many as possible in addition to the speakers should be encouraged to attend the hearing. A large number of people appearing in favor of a measure make a strong impression upon the mind of the executive.

Thus far I have discussed the ordinary legislative procedure but I do not feel that my subject would be fully covered without a reference to the excellent results which may be obtained where an important legislative program is involved through the means and aid of a joint legislative committee representing both houses of the legislature and, if thought desirable, including representative nonlegislative members. Where extensive and novel changes in the law are to be undertaken, it may be well to start a year in advance by the appointment of such a committee. This will enable the committee to hold hearings and conduct its investigation during the summer months and prepare its recommendations for the legislature before it again convenes. In states holding biennial sessions of the legislature, it may be necessary to have a committee appointed two years in advance or possibly machinery may exist for the appointment of such a committee during the interim between sessions. Experience has shown that the legislature is prone to look with

favor upon the result of an inquiry conducted through the medium of its own members and the recommendation of a joint legislative committee are usually enacted into law without delay and with little of the ordinary mass of red tape to be cut through.

In conclusion, let me say that legislative promotion is not a matter of accident or chance. It calls for the most careful preparation and for a thorough follow up system. It often involves the expenditure of funds for legitimate publicity and to pay for legitimate services. These funds are usually obtained from individuals and organizations who are interested in procuring better safety laws and in greater protection to life, health and property. Eternal vigilance and hard work are most essential to success in this line of endeavor. I believe that adherence to the methods which I have outlined will aid in the presentation of any legislative safety program and in the great majority of instances result in the production of better and more adequate safety laws.

CHAIRMAN STOECKEL: The program now passes to a demonstration of methods of examination for drivers' licenses given by the New York Motor Vehicle Department. In the absence of Commissioner Harnett, I will ask Mr. Leon Aronowitz to explain, if explanation is necessary, how this will be conducted so we may all follow it.

LEON ARONOWITZ (Statistician, Bureau of Motor Vehicles, Albany, N. Y.): Mr. Chairman, in Commissioner Harnett's absence I want to express his regret at his inability to be here, and he wished me to extend his greetings to this meeting. Lieutenant John E. Mahoney and Inspector Arthur Putz of our Bureau will give a demonstration of how a road test is conducted. At the conclusion of this road test, if there are any questions the members care to ask, they will be present here and will be pleased to answer. There is just one thought I wish to leave with the conference—at the present time in New York State we have one hundred and four inspectors, and we are conducting approximately 450,000 examinations every year for new drivers. In addition to the new drivers, anyone who has had his license suspended or revoked as the result of an accident, is required to come in and pass a special test before his license is restored. If the Chair is ready, I think Lieutenant Mahoney is ready to begin.

Demonstration of Examination for Driver's License

By LIEUTENANT MAHONEY

State Bureau of Motor Vehicles, Brooklyn, N. Y.

The State of New York through its Motor Vehicle Bureau wishes to present to your body the mechanics of road testing. The Bureau has a duty to perform to the public of this State and to those who visit our State. With the thought always in mind that the Bureau's creation and existence depend upon the service that it gives to the people of this State, we take into consideration what is necessary for a driver, and we divide it into three parts; that is, he must be physically competent; he must be mentally competent; he must be morally competent, besides being able to operate an automobile. Consider that in the year 1927 in this State alone approximately one person every four hours in every day of that year went to meet his Maker through the agency of an automobile—every day during the year 1927 there were 235 people injured.

This work is conducted by a group of inspectors. These inspectors are selected after a competitive Civil Service examination. They are given a course of training which includes attendance at the New York State Police School. Before they

are turned loose, they are put on probation, and then the Commissioner takes that inspector—does not delegate this power to anybody else—and paints for that inspector a very vivid word picture of his responsibility. He brings home to him the fact that some member of his family may be killed or injured—the little voice that he is listening to and brings joy to his life, may be stilled by a careless or incompetent driver; and he tries to bring home to the inspector the fact that he must be ever careful and ever watchful in everybody that he passes after a road test, so that he may not be morally guilty of murder or of the charge of somebody being injured or property damaged.

Now, we have three classes of applications. We have the chauffeur's application, an operator's application and a junior operator's application. The chauffeur's application covers a person who drives for hire. The operator covers a person who does not drive for hire, that is, the ordinary pleasure driver, and the age limit is eighteen years. The junior operator's license takes care of the boys and girls in the rural section primarily; those who work on the farm and would take produce to the nearby market or point of transportation, or take milk to the creamery. It has since been extended to cover boys and girls who are helping their father and mother. No junior license, however, is issued in any cities, and the junior cannot drive in a city. It is only issued in the rural districts, and then only as an aid to the father and mother; and after nightfall there are certain limitations on the junior operator; that he must be accompanied by some member of his family, an adult.

Now, I am going to ask the Inspector to fill in one of these applications to show you what we try to cover. In this application, the first thing we must do is to establish the person's identity—that is, his name, where he lives; if he is employed, where he is employed, his employer's name and his employer's address. If he has a business of his own, we want his business address. Then to further identify him, we get when he was born; the day, the year and the month; how tall is he; how much does he weigh; is he white or black, male or female; what is the color of the eyes; what is the color of his hair. The next thing is to find out does he speak, read and understand English. You can readily see that if we turn a man loose on the road who could not read a sign, who would not know when to stop, would not know what streets were right hand streets or left hand streets, one-way or two-way streets, it would be a very bad thing. Another very bad thing is if he came to a bridge in some rural district in which the capacity of the bridge was printed on the sign—if the capacity was four tons and that man was driving a vehicle carrying eight tons and went over the bridge, the natural result would be that he would go through the bridge.

We ask him if he is familiar with the Motor Vehicle Law and the State Highway Traffic Law. If he says no, we cannot accept him. We tell him to go and study it. The average man when he sees that question, will try and get some pamphlets, some books. As a matter of fact, on the tables where the applicants make out the applications in the Brooklyn and New York offices, it is one of the functions of the janitor in the morning when he opens up to see that those tables have a supply of the Motor Vehicle Law and the State Highway Traffic Law on them, and to replenish that supply when it is exhausted.

They ask him then if he has ever been convicted of a felony. "Were you ever convicted of any violation of the Motor Vehicle Law or any ordinance or code relating thereto?"—and if he was guilty of a felony he must tell the details of it. If he was guilty of any violation of any Motor Vehicle Law or law relating to the operation of motor vehicles, he must give the details. "Tell when you were convicted, where and what the crime was." And we next ask if he suffers from any physical disability. Now, the man with one arm, one leg, one eye, a man who is suffering from the result of infantile paralysis, something that would tend to make his extremities useless, we want to see that man; we want to know all

about him; we want to pass on him before the license is issued to him. We ask him if he has ever suffered from fainting spells, vertigo, epilepsy. We want to know more about that man if he has. We ask him if he uses narcotics and to what extent he uses them. We are interested in that man to find out if he abuses it, and abusing it thereby is an unfit person to receive a license from the State of New York. And in every way we try to set up a safeguard so that the persons driving on our highways or traveling on our streets are protected so far as the mental, physical and moral condition of the man is concerned.

Now, on this application there is a form of affidavit. The applicant when he passes in his application is handled by clerks known as examiners. These examiners, through training and experience, are very competent in picking out the little missing links in these applications. For instance, if they find that the man has been convicted of a felony, they tell him he must take his application and present it to what is known as the Complaint Section; and after an investigation and examination in the Complaint Section, if they think that he is a safe man morally to issue a license to, they stamp it with a rubber stamp and he returns to the issuing office and files his application. If his license has been suspended or revoked by this State for any reason, the issuing office must send him to the Complaint Section where he is inspected and examined and the same stamp placed if they O. K. it. If he is a habitual law breaker—that is, if he has five or more misdemeanors to his credit in this or any other State, the examiner refuses to accept the application and refers him again to the Complaint Section. If he is convicted of leaving the scene of an accident, driving while intoxicated, several other points of law breaking, we refuse to accept his application and refer him to the Complaint Section.

In this acknowledgment he swears that every statement made in his application is true. If he has answered all the questions and meets all the requirements, a road test permit is issued to him. Now, these road test permits—the white is for the chauffeur and the yellow is for the operator. On the application for the chauffeur, pictures must be attached, and one picture then is placed on this road test permit. This road test permit carries a description of the person; that is, his height, weight, color, male or female, color of his eyes, color of his hair. You can readily see why we insist upon that. For instance, I might file an application and my friend over here would take the test for me. So that we want to try and pin it right down to the fellow who is going to take the test. He files his application and this permit is issued to him, and on the face of it tells him where and when he will take his examination. Throughout the greater City of New York and in every small village where we think it is necessary, there is what we call a road test post. In the City of New York we have 38 of those posts during the busy season, and those will get down to probably 15, 18 or 20 during the non-rush season. We try and lay out those posts to develop the driving capabilities in the man. The ideal post takes in two right turns, two left turns, four or five intersections, through traffic and a hill; to stop and start your candidate on your hill or to turn him around on the hill. In any event, he must be turned around at the end of his test; that is, complete turn. Now, due to the population density and the geographical condition of the city, this is not always possible. We must go where we can give to the people the greatest accommodations of certain areas, but unfortunately we cannot always find a hill on every road test post. So to make up for that, we add a few more blocks of traffic, or take him through more congested areas. In other words, we try to make it fair and square for every applicant who goes along.

The applicant, after the time has been placed on this slip, presents himself at the road test point. He must have a licensed chauffeur or operator to accompany him. On this application there is a question: "Do you desire a learner's permit?" A learner's permit is a provision made by the legislature that those wishing to

learn how to drive might do so and be identified. If any man came in, physically incompetent or morally incompetent, the State would not be protecting the rights of its citizens if it said to that man, "Here's a 60 day permit; you can go out and drive as long as you are accompanied by someone who will see you don't kill somebody else." That man may have both legs off; he may be blind; he may be in the common expression, a "hophead"; that is, one who is addicted to the use of drugs—and it would not be fair to the citizens to do that. So we say you must make out an application, show your qualifications, and if they meet with the requirements of the Bureau, we will issue to you a learner's permit.

This learner's permit permits him to drive while accompanied by a licensed chauffeur or operator. He cannot drive alone, and there is a little joker in that that many people do not know; that is, among operators and chauffeurs—that they are responsible for any crime, any infraction of the rules and regulations, that the 60-day permit holder makes. In other words, if he passes a red light, the officer is entitled to give both the beginner and the operator a summons.

Now they come to the road test point and present themselves to the inspector, and the inspector has an appointment card on which the number of this permit appears, and he checks that. If the number is not on it, then he refuses to take the man, and sends him to the office. There's another way we try and safeguard and make things fair, and square.

Before the inspector gets to the point, I want to describe to you what happens. When the inspectors report to the office tomorrow morning, they do not know where they are going and neither do I. I have a bowl, hollow, with numbered pills in it. Those pills are shaken up and each man is given a pill. That pill is numbered, and that represents the post he is assigned to for that day. He does not go to the same post twice in any week, and the men are changed from the Brooklyn office, where I work out of—a new contingent of men is sent to me every week; so that no friend knows where an inspector is going, so he can go and have his test prepared to go to that particular point; and no inspector can work up a little clientele of his own favorites. What we want to do is to put the thing on a level, shoot straight and keep it straight.

The inspector takes up this permit and after checking it, on the stub here there is a notice—"IMPORTANT"—and it says "No road test will be given unless you comply with the following:" the certificate of registration must be in the possession of the man who is to take the test, or the driver of the car who brings him there, and the headlights must be equipped with legal lenses and properly adjusted, and the license plates must not be obstructed, and the horn must be in working order and the steering device must be in working order, and on commercial vehicles there must be a mirror. Now, you can readily grasp the idea of that. As Mr. Aronowitz said, last year we gave over 450,000 examinations. That means that somewhere in the neighborhood of 450,000 cars were examined. The brakes were tried out; the lights were looked at; the horns were looked at; the steering mechanism was examined.

The first step in the road test is to ascertain whether the man has vision. That's very necessary, and to do that he is given an eye test at the road test station. This is the eye test chart (displaying chart) and the rule is that the man must read this line with both eyes uncovered at a distance of 20 feet. Now, I am going to demonstrate this to you. The inspector for this purpose is a candidate taking a road test. Now, I ask him to sign his name on the reverse side, and at the same time I ask him how long he has been driving. I will explain why I ask him that question later. This also has on it an acknowledgment in which he swears that he is the man who presents himself to take this test. Now, I start to give him the test. We cover the right eye and ask him to start from the top and call the letters off. (Inspector reads letters on test chart with right eye covered.)

Now, of course, the space up here does not permit us to mark off the exact 20 feet, but assuming that this is 20 feet, the man has a vision at 20. That's marked in a space provided for the purpose. In his right eye he has a vision of 20.

Now we try his left eye. Now, read the third line from the top. Now skip the next one and read the next. Read the next line backwards. We get the same result in that eye. The same result in the left eye and the same result with both eyes.

The idea of jumping around is simply this: That a man of average intelligence could stand on the road test line and memorize that chart. It has been done. It is done every day in the week, and we try to overcome that by jumping around from line to line, so that he does not memorize it. We ask him to read one line backwards, another line forwards, and skip two lines; pick out individual letters and ask him.

The eye tests are scheduled every hour and the time devoted to each candidate is about 7 minutes. Each class is made up of seven or eight candidates.

Let us assume that this man failed in his eye test; that he had a vision with both eyes uncovered of less than 40. The inspector marks it on this permit, and each inspector has a punch. Each punch has a designated symbol on it (mine happens to be a key, like St. Peter) and he takes and punches the first result, so that there cannot be any change in it, and the applicant is advised to see an eye doctor; and one very particular thing in force is that he must not tell him what eye doctor to go and see.

Now, assume that the man has vision in only one eye; that is, one eye has no vision. The inspector marks on that in the space allotted to him, "No vision." That candidate must pass two tests, whereas the ordinary man must only pass one. If a candidate only has one leg, one arm, one hand, or suffers some physical disability, the inspector marks that in the space provided, and that man must also be passed by two inspectors. He must pass two tests successfully.

Now the time is ripe for this man to take his actual road test, assuming that his car meets with all the requirements; that he is physically fit so far as the inspector can see; and he is taken for a ride—not the kind of a ride that you read about in the papers. He is given two right turns; two left turns; turn round on a hill or on the level; four or five intersections through traffic. The party who came with him to the road test point is permitted to ride in the car with him.

On the reverse side of this permit are twenty reasons why you cannot have a license, and I am going to go over them in the time allotted to me, always bearing in mind this: The average man when he comes to make a complaint, complains that some right has been denied him by the State; that is, that he cannot drive; whereas it is not a right—he was not born with it. It is a privilege that the State gives him after he qualifies that he is a driver. In other words, it is our job, as I said before, to stop the careless and incompetent driver from starting out on the road, and I want to say this: In 1927 less than one per cent of the people who were given road tests had an accident in that year—less than one per cent. It was the fellow who was driving more than one year that did most of the damage. But when a man comes to complain, he always loses sight of the fact that the reason he was kept off the road is not because the Bureau took a negative attitude and said, no you can't do it; but because they took a positive attitude and said, you can't drive because you are not a competent or a careful driver; and most of the cases are that they are not careful.

The first reason for failure is inexperience. That does not need any explanation. The fellow that gets into the car and jerks the head off the inspector before he pulls away from the curb, grinds the gears out of the car, you don't have to take him any further—he is inexperienced; he is guilty before he starts.

The next is poor shifting. That's No. 2. Now, poor shifting means the fellow that starts off in first and goes a little distance and slips into reverse—starts back

again—you give him another chance. He starts off in first, goes along, gets on famously, goes into second. He comes to a street intersection, and he throws on his foot brake—forgets all about his clutch. He stalls. You have congested traffic. That man if he continues to do that kind of thing is not going to get very far. He is going to jam up traffic and cause a number of accidents. The inspector encourages him a little more and he starts him off again. He gets on well again until somebody about half a block away passes him. He jams on his brake and forgets again he has a clutch. Now, that man cannot drive; he does not know how to drive. He does not know how to shift. He is a menace. He is a liability on the highway.

No. 3 is repeated stalling. Same thing. The fellow forgets that he ever had a clutch in the car. The only thing he knows about is the stopper. Some fellow who was teaching him told him "never forget you have a brake," and he didn't. He simply jams that on at every opportunity.

Now, the next one comes in the class of what we term the potential killer—the fellow who speeds on corners and throws traffic regulations up in the air and forgets all about them. The fifth count is "swing wide on turn." Here he is right here. The inspector tells him half way down the block he will take a right turn at the next corner and he goes up and swings out wide.

The next one is swinging on your left turns. The inspector tells him to make a left turn. But this fellow shoots across: He says, "I don't care about this other fellow; this fellow makes no difference to me"—and the inspector says "You are not a fit driver." The inspector is right, because the inspector is trying to save human lives.

The next count is speed in turning. Assuming that he does make a proper turn, which he usually does not when he speeds on a crossing—we say your speed on crossings ought to be around eight miles an hour, and that's the proper speed for crossings, eight miles an hour, and those of you who have paper and pencil can figure it out. The man going faster than that, I believe for each mile per hour he increases his speed a foot and a half for every second. Now, the persons traveling across here, once they set their foot off this curb, have a right to be there, they have the right of way, being a pedestrian. If the pedestrian happens to be a good broadjumper with this fellow coming around here at $17\frac{1}{2}$ feet a second, he has got to jump to get out of his way; and the fellow that argues with you that he ought to go around that turn at 15 to 20 miles an hour, he is crazy, because another thing is, as he increases his speed he also increases the distance in which he can bring his car to a standstill, two or four-wheel brakes notwithstanding.

Rolling back on a hill—that's another point. Now, the proper way to start on a hill, probably most of you know it—is to overcome the law of gravity. The idea is to let your clutch in slowly, release your brake, feed her enough gas so she will overcome that gravity, and go up the hill. Here's what happens—a man comes to a stop on a hill; the inspector says, "All right, we will go up here a few feet and turn around." He goes into first; puts his foot on the gas; feeds her the gas, and then lets in his clutch; but he forgets his brake—he stalls the car. Or he will start, put his clutch pedal down, go into first speed, let his emergency brake off, and he starts to roll down the hill, and then he is panic stricken. Now, you can visualize what will happen when a man starts rolling down a hill who loses his head if there is nothing there to stop him. Of course there may be another vehicle there he is going to wreck. Or there may be a pedestrian who is going between his car and the car in back. There may be a jam there, or somebody killed or sent to the hospital. A man operating an engine of that kind, with so many horsepower, ought to know how to start it on a hill, and the State takes the stand that it is protecting its citizens when it insists he must know how to start that car up and control it on a hill.

Delayed braking. Those of you who have driven cars have probably met this person. He is the fellow that will travel behind you and keep bumping you all

the time. He is the fellow that will shoot out of a side street and jam his brakes on screeching, and then grin at you and say, "Everything is O. K." But the time is going to come when the brakes won't hold and everything will not be O. K. That fellow is a careless driver. He is going to go through a water hole some day and his brakes are going to be wet, and he is going to come up to a crossing and see how close he can come to hit a man; but he won't only hit him; he will kill him. He is a careless driver. He is an incompetent driver. He is a liability.

Of course, the next one is "accident"—where a man has an accident. That automatically lets him out from getting a license. The same way with the near accident. It may be that he does not really have an accident, but through the alertness and the quickness of the inspector, or the good driving of the fellow who is coming in the opposite direction, he only has a near accident and not a true accident.

Reckless driving—This is what we find in a great many cases in the driver of some experience. Any act or omission that makes the road unsafe for others is reckless driving—mainly speeding. That constitutes reckless driving, but any act and any omission that makes the road unsafe for others is reckless driving.

Operating the machine too slow to be safe. Many times well meaning friends will tell him, "Take it easy with the inspector and show him you are careful and you will get by." He will go along at ten miles an hour, assuming he is making a wonderful hit. The ideal conditions would be if we could put him in a machine and see how the brain responds under certain conditions. That would be the ideal way to give a road test; but, as it is, we can only see what a man does that the inspector can observe. That man going too slow ties up traffic, as I pointed out before.

Failure to signal on turning. Now, the man who will go along and turn where he pleases, without notifying the other man of his intention, and does that repeatedly, he is not a safe driver. He is not carrying out the ideas that your body represents. He is not carrying out the ideas of the Commissioner, or the State of New York. We say the man traveling behind you has a perfect right to know what you intend to do, and the only way he knows what you are going to do is for you to put your hand out and tell him. Otherwise he does not know what is in your mind. It is safe for him to assume you are going to go in a straight line.

Next one is "assisted or coached." We all have well-meaning friends that sit in the back seat. They tell the candidate to do this or that; but somebody asked a friend of mine not long ago, "Do you drive a car?" He said, "No, I steer it and my wife drives it from the back seat," and that's pretty much like the person who coaches or assists a candidate.

Poor judgment in traffic. A man comes up in two lanes of traffic. He pulls out, comes around here, cuts these two fellows off; or he makes this turn here, cutting this man off, instead of making the proper turn, which is this, and getting on the inside lane here, and coming up this way. Another indication of that type is that he will come half way up to a crossing, and some vehicle happens to cross it; he stops right then and lets it go by. That man holds up traffic, with the resulting traffic conditions.

The next point is nervousness. That's open to debate in this respect: That a man or a woman is naturally nervous when they present themselves to take a road test. It is natural they would be nervous; and the inspector tries to discount that nervousness in summing up the result of the test. If a person is too nervous, and he thinks they are a risk on the road, then he fails them on that account, but ordinarily a man is nervous when he appears for his test.

And the next one is the last one—failure to follow instructions. Now, there's an idea prevalent in some quarters that the inspectors try to trap a man; that they want him to do things he should not do, and they tell him to do this or that. It is not anything of the kind. A man gets his license on his merits, a fair and square deal. The inspector may tell that man to stop over here, "I want to get out," and

there is a pump there and the fellow says: "Oh, no, I won't stop there; it is against the law." That is not against the law to stop at a pump to discharge a passenger. It is against the law to park your car at a pump. He may tell him to pull over to a No Parking sign; that he wants to alight, and he tells him, "No, there is a No Parking sign there; I can't park." The inspector did not ask him to park. He refuses to follow instructions and at the same time shows an ignorance of the laws. He may ask him to turn around in the middle of the street that is not heavy in traffic. He refuses and says it is against the law. It is not against the law. There is no law which says you cannot turn around in the middle of the street to make a complete turn. It is against the laws of commonsense if you make that turn in a street with very heavy traffic.

After he has successfully passed his examination, the inspector turns this into the office, and he is mailed his license. If he fails, he is mailed the sad news and he is told why he failed, and he is expected to polish up and do better the next time.

I spoke a little while ago about a man having to take two tests where he had one arm or one leg or any physical disability. We have restriction stamps. For a deaf man or a man that is dumb, cannot speak, there are certain restrictions. If the inspector in giving the eye test notices that the man wears glasses, he so notes it on the road test permit, and when the license is issued, it is stamped with a red stamp, something like this, which shows that the car can only be operated when the bearer of this license is wearing glasses. It may be that he has special equipment that is due to the loss of an arm or leg. He has certain equipment in his car. If he has one leg, we might perhaps prescribe the tying up of the brake clutch; one arm, we might prescribe the shifting of the shift lever or the bringing over of the emergency brake to a certain position. When a man has one arm we may prescribe a hook in the arm he has to get hold of the hook in the steering wheel. In that case we stamp on the license "Restricted to operate with special equipment." A man who is hard of hearing or deaf, we prescribe a full length mirror for him, or, if his hearing is not so bad that he can use an acousticon, we prescribe the acousticon.

I have covered as much as I thought of in the time that has been given to me, and want at this time to express my thanks for your courtesy in listening to me, and if there is any question that you would like to have me answer that is in line with this particular subject, I will be very glad to do so.

D. A. DREW (Director of the Traffic School of R. H. Macy Co., New York): I would like to ask the Lieutenant why it is, when you are giving a license in the State of New York, why a man who passes his test on a passenger car is not allowed to drive a truck on the streets of New York.

LIEUTENANT MAHONEY: That particular question you ask me is often brought up. We will assume that a man presents himself to take a test with a Chevrolet roadster or Chevrolet touring car. It is a light car and he takes his test on that. He passes his test successfully as a chauffeur, and he goes to work for any concern. Now, he holds a chauffeur's license. He can drive for hire, but it would not be fair to turn around and put that man, who is in the habit of driving a little toy, on a great big ten or twelve ton truck, would it?

MR. DREW: The reason I brought up that question is this: We have the largest fleet in the department store field today; we have over 345 trucks, and to my knowledge we are the only organization in the department store field that has at the present time a traffic school. Only recently in our Long Island City Works when we advertised for chauffeurs, we had quite a few young, likely looking chaps that we hoped might make drivers. When we failed them, their first argument was they passed the motor vehicle test given by the State. That's why I asked the question. The other question I would like to ask is this: When the applicant is with the inspector, how far must he be from the car in front?

LIEUTENANT MAHONEY: The only thing is that he must be far enough away from the car that at the speed he is going he can stop his car without striking the car ahead. We call that flirting with the car ahead. It is not a very nice sensation to have a candidate that you are driving with pulling in behind a great big Mack truck, and every so often come up and graze off, and sometimes hanging from the Mack truck will take the head off the inspector.

Every applicant is entitled to two tests; that is, he is entitled to fail twice on his eyes and he is entitled to fail twice on his road condition. Then the application is cancelled. He must file another application.

CHAIRMAN STOECKEL: For one fee? He gets two chances for five dollars?

LIEUTENANT MAHONEY: He gets two chances for one dollar. With this chauffeur's application there is a fee of five dollars. If he does fail two of his tests, a refund is made of four dollars to him. The State holds that other dollar as wear and tear and charges to overhead.

CHAIRMAN STOECKEL: The Chair desires to thank you all for your kind attention, for your participation, and to express to you its gratitude.

ADJOURNMENT

October 3, 1928

Traffic Law Enforcement

HON. WILLIAM McADOO, Chairman
Chief City Magistrate, New York City

The fifth session of the Public Safety Division was called to order at two-fifteen o'clock, by the chairman, Hon. William McAdoo, Chief Magistrate, New York City.

CHAIRMAN McADOO: Gentlemen, it gives me great pleasure indeed to have the privilege of presiding over your gathering. Some years ago I met many of you, I think, at Washington at the convention somewhat similar to this.

Since I came into the room, I have been asked many questions about what we do in New York, so far as the law is concerned and the police, in regulating vehicular traffic.

You know, New York is divided into five boroughs, and each borough has to some extent a government of its own. The City of New York contains over 6,000,000. London has a population of 7,000,000 people. But in reality, taking the Metropolitan District, as it is, we have a population of about 9,000,000, not to speak of the immense number of visitors that pour into the city.

The magistrate courts were reorganized in 1910 and we have 37 courts and 57 magistrates. And the courts are divided again into specialties. We have three traffic courts in the borough of Manhattan, which is this borough, three traffic courts in the borough of Brooklyn, two traffic courts in the borough of the Bronx, and we are about to establish another traffic court in the borough of Queens. No cases excepting those relating to traffic go into the traffic courts, and the traffic courts are in session every day in the week, except Saturdays and Sundays.

Yesterday, in the Manhattan Court, I disposed of 700 cases which is infrequent. We are governed by the State Law in the disposition of these cases, by the city ordinances, enacted by aldermen and approved by the Mayor and by police legislation. Under the charter the police commissioner has a very extensive law-making power, and the regulations made by the police commissioner are enforceable with the state law and the city ordinance.

We regulate as to speeds. We have minimum and maximum speeds which must not be exceeded. There was a very bitter controversy as to whether a man should be charged with reckless driving that imperiled the public safety or whether he should be arraigned for exceeding the minimum of miles within the law. Practically all our cases in the traffic court are for exceeding the speed limit as fixed by the ordinance.

We have the fixed mileage per hour, and then we have as to the penalty a fixed minimum below which we cannot go. We must fine the speeder \$25 for the first offense, and if he is a second offender, and is so charged, we cannot fine him less than \$50.

Under the police regulations under the charter, we cannot fine a parker for less than \$5 and we can carry the penalty up to a great deal higher. So if I am sitting in the traffic court and there are 150 people brought in for parking, I can do only two things with them. I can acquit them if they plead not guilty. If they plead guilty and are convicted, I can suspend sentence. But I cannot go below the \$5 limit. I am strongly in favor of the minimum fine, and I would like to see it standardized throughout the country. It not only is more definite than to leave a wide discretion with us as to the payment, but it relieves the magistrate of being allowed to say, "This man will only be fined \$2. He is a poor man."

We have also to state the number of days imprisonment there will be if there is failure to pay. I have had a wounded veteran before me, with a glorious record overseas. He was guilty, of course. He said, "I can't pay that \$5. I haven't got it."

I don't feel justified in suspending the sentence, because in the first place, it is always suspicious, and I am very chary about doing a thing like that. He says, "I will go down to the city prison," and God knows, I don't want to send a veteran down to the city prison, a man who is wearing a medal for carrying our flag in France. But I can suspend sentence.

A Money Fine Often the Worse Punishment

In some cases, a man comes in and says he has a mother and twelve children. He says, "I would rather spend three days in the city prison than to pay \$50." Of course, I can minimize the prison sentence. We have no minimum of days or months in the prison.

Our serious offenses of course are driving while intoxicated, and there the license is lost.

We have here in New York, and I think it ought to be general throughout the country, a very wide and sweeping discretion as to the suspension and revocation of the license, and I am convinced from long years of experience that taking away the license is the most determined thing you can do as against a reckless, a drunken or a careless driver.

I was up in Maine last year spending my vacation, and reading the local paper. In the City of Bangor I was told, and I saw it was true, that for driving while intoxicated in every case there was six months imprisonment, \$200 fine and costs.

Before proceeding with the afternoon's program, I am going to trespass on your patience by saying a few words about an evil which I believe is prevalent all over the country.

Traffic Law Enforcement

By HON. WILLIAM McADOO
Chief City Magistrate, New York City

If, as a Judge or a Magistrate I have before me a person who is on trial for an equally serious offense, or a felony, no one would think of calling me up on the telephone to influence my judgment and it is a serious offense under the law for anyone to interfere beyond certain lines with the Court in arriving at a determination as to the penalty.

Legitimate information from probation officers and others, of course, is sought. We have here in New York as in all great cities a large number of ordinances and regulations made under the Charter by the legislative authorities of the city and the Police Commissioner and very rarely is the Magistrate approached in these cases asking for suspended sentences or acquittals; but all over the country from the village to the metropolis there seems to be a general public opinion that it is perfectly legitimate to lobby the Magistrates, Police Justices, Recorders and Justices of the Peace in the matter of violating laws regulating vehicular traffic. There are otherwise respectable men, who consider themselves good citizens who would ring me up at two o'clock in the morning to ask me to intercede for them or a friend in the Traffic Court where the whole fine would not amount at most to five dollars and where the plea, in keeping with the facts, must of necessity be guilty.

In going with a car this summer through certain states and cities, friends in

those places advised me in advance that if I got in trouble on the road with police officers or constables to let them know and they would take care of me in their locality, meaning that their influence would protect me from any serious consequences. Now, these men really consider themselves good citizens, and I am not going to dispute it and I know it would be useless for me to argue with the people who attempt to lobby us in the matter of defendants brought in by the police for violating the law in the rules of the road.

Now, here is a plain citizen who has not violated any law and who is highly esteemed by his neighbors and the members of his club. He has a ticket for parking or some violation, serious or otherwise. His first impulse is to go to some person either in or out of office, who is a man of influence, and to have him intercede with the Judge to either have the case kissed out of court or the penalty made as light as possible. If he succeeds he is the proudest man in the neighborhood. He lets it be known among his friends and at the club that he is in touch with the powers of government; that he is a recognized person of influence and lives in a sphere entirely different from those whom he meets in business or socially and lets it also be known that if any one of the rest of them gets into trouble to let him know and thereby a sort of endless chain is started to interfere with Recorders, Justices of the Peace, Police Justices and Magistrates all over this broad land.

Correction Is a Serious Problem

How are we going to correct this? By public opinion? Well, who will make the public opinion? It is a very serious matter because it is an undue interference with the conscience of the Judge. It is putting an unfair pressure upon him.

Here is a man who is a real close friend, whom he otherwise highly esteems and he reaches the crossroad in the case between his plain duty to the public and the atmospheric pressure of friendship. Then too, the serious evil in it is this, here are two hundred people crowded in the Traffic Courtroom charged with the same offense, under very nearly the same circumstances. They include all classes of people, men and women of social prominence, obscure people, rich people, poor people, high and low; now, here comes a man well known in the community, socially, commercially or politically, and I let him off; or, here is a woman of great wealth and social prominence and I suspend sentence in her case.

What am I going to say to the other one hundred and ninety-nine people? Haven't I given a public demonstration that the law is not equitably courageously and impartially enforced? Won't this poor woman going down the stairs, who has paid \$25, think to herself, if she does not say it aloud, that if she was a rich and prominent woman she need not pay anything, whereas the \$25 meant a whole lot to her?

Of course, if all Magistrates, Recorders, Police Justices and Justices of the Peace, or whatever our titles may be, throughout the whole country should form into a sort of secret organization and take blood-curdling oaths that we would not listen to appeals of this kind and then carry out our pledges, we might get some results. But, if all the friends or alleged friends, whose requests were refused, organized against this they would beat us against an unorganized and uninformed public thousands to one and our tenure of office would be much endangered. Brethren, these are serious thoughts!

We have a very important and constructive paper to be delivered by Mr. Brown, Attorney for the Detroit Automobile Club, Detroit.

How Detroit Cut Accidents Through Law Enforcement

By HOWARD D. BROWN

Attorney, Detroit Automobile Club, Detroit, Mich.

It is my particular pleasure to be here to tell you a story of how Detroit cut its death rate in automobile accidents. I shall attempt to point out as nearly as possible the procedure that was followed in that great city to reduce the number of fatalities.

I want to impress upon you that Detroit is the fourth city in this country in size and that here was a battle so to speak between an organized police force, thousands of pedestrians, and practically 400,000 automobiles. The police department, under its good commissioner, William P. Rutledge, was faced with this problem.

In order to give you some of the background, it will be necessary to take up a few statistics. In 1927 there were 421 people killed in traffic accidents. In the last two months of that year, the situation became so bad that it was necessary to consider ways and means to reduce this great hazard.

As a matter of fact, on November 18, 1927, there were five people killed, and on the 10th of the same month, there were four people killed. During the whole month of November there were forty-eight people killed. And in December, up until the 28th, there were 38 people killed. The citizens were being aroused. What were they going to do to cut down their accident rate? Commissioner Rutledge was faced with the problem of working out a solution, and I will tell you somewhat how he went at it.

As a matter of fact, he had tried safety education in the schools, having organized a Public Safety Bureau. This bureau had enlisted the cooperation of men, women and children. They had given in the course of a year 1,260 shows of motion pictures in which the safety problem was well worked out. These meetings were attended by approximately one million people.

In addition, 500,000 safety posters had been circulated all over the city. Everything had been done that the police commissioner and his officers could think of to stimulate the people into recognizing that there was a serious problem and that they must drive in such a way as to cut down accidents.

A Violation Bureau was organized in which the people could admit their own guilt and pay their own fines. But that apparently wasn't sufficient to reduce the number of accidents. The Commissioner realized that all these educational facilities had to be supplemented. There must be something else done, because the death rate was still soaring. Evidently education in itself wasn't sufficient.

So he started to analyze the problem, and in analyzing the accident rate he discovered that a great many of these accidents resulted from violation of the law. But when he went out on the street and observed traffic, he was impressed that there were a great many minor violations that people were not checked up on. The motorist was running by the red and yellow lights. He was turning the corner against the red light without coming to a stop, which is against the ordinance of the City of Detroit. They were doing all sorts of things and "getting away with it" in common parlance.

How could this be changed? The Commissioner decided all these old methods had been insufficient and that somehow the people had to be shocked into realization of the importance of the traffic laws. There must be some change in the psychological setup in order that people would recognize that these traffic laws were to be obeyed.

In other words, the Commissioner made up his mind that he would have to exact obedience from a public that was not willing to give obedience voluntarily. So this is the way he proceeded.

He called the commanding officers of the Detroit Police Department together into his office. He told them in substance that the traffic laws had to be enforced to the letter. He told them that they would have to get sufficient man-power to see that those regulations were enforced. He told them that there would be no publicity. He didn't even publish a general order on the subject. He simply conveyed these orders verbally to the men assembled in his office. He didn't want the public to realize that they were going to be checked up until the officers had already started to do it. In other words, he decided he was going to give many of them a little practical education in traffic enforcement.

Well, to change the scene a bit, on December 28, the next day after the Commissioner called his officers together, I was driving down to my office. When I arrived at the boulevard which is approximately three miles from the downtown district, I noticed there were two officers at a signal-controlled intersection. I thought that was rather strange. I had never seen two traffic officers posted at an intersection where there was an automatic signal.

I continued on, and at every intersection, I discovered two more officers. I began to wonder what had happened. I had never seen so many patrolmen in my life on the way to the office in the morning. I thought there must be a riot somewhere.

Then I began to observe the driving public was rather beginning to take it seriously, and when they came to these intersections they were slowing down. You could hear the brakes squeak and they would come to a stop, and they would not cross the limit lines, because if they did, they knew they were going to get a ticket.

Afterward, when I sat in the Commissioner's office and heard his side of the story, here is what he told me: On the morning of December 28, 1927, he threw 600 officers into the three-mile circle. You can imagine that that would have considerable effect when the public had no anticipation whatever that there were going to be so many officers there.

In addition to the 600 patrolmen on foot, he had a flying squadron of 40 motorcycle officers and he put those officers on one main artery for two hours. They would go up and down and up and down, and then switch over to another main artery, until the motorists in Detroit began to think there must be 10,000 motorcycle men in that city, because they had seen them in one street and then they had switched over and seen them on another street.

The Commissioner was proceeding with his policy of an eye for an eye and a tooth for a tooth, and during that day the officers gave out 4,115 violation certificates. The department gave out 8,493 tickets from December 27 to 31. Previously the average number of tickets served was 300 a day. So you can see there was considerable increase. In other words, the public was getting some first-hand information on practical law-enforcement.

Well, what happened? Did it have any effect as to the public? I can answer and say that on December 27, 28, 30 and 31 there was not a single automobile fatality in the City of Detroit.

Here was something new—the police had made a showing. They were as surprised as anybody else. They were encouraged. The idea here was a revelation. Lives could be saved through traffic enforcement. The public had never heard of such a thing evidently in our part of the country. The idea that people could drive automobiles on the street without killing people was rather a revelation to a lot of them.

And then the idea began to take hold. The police were encouraged that they had shown some results and as a result of that enforcement, which was continuing there was only one fatality in Detroit between February 23 and March 8.

Of course, there was some reaction from stringer enforcement. The Commissioner's orders had been that no tickets given to violators were to be cancelled

or killed. Of course, some of the politicians who couldn't serve their constituents in the ordinary way, as Judge McAdoo mentioned, rather took exception to the fact that tickets couldn't be killed, and so they demanded a showdown in the matter.

But what happened? The newspapers of Detroit ridiculed the politicians. The Public Safety Committee appeared before the hearing to a man and stood by the Commissioner. The better citizens of Detroit demanded that enforcement continue and Commissioner Rutledge be given a free hand to carry out his program. The work continued.

But all these 600 officers who were patrolmen were not accustomed to enforcing the traffic regulations, and so you would expect that in cases there were violation tickets given out where only a warning should have been given. To overcome that, the Commissioner organized what he called a Board of Review, and that Board of Review consisted of the deputy chief of detectives, the head of the Violation Bureau, and the patrolman making the arrest, and if the citizen who had received a ticket thought he had been aggrieved, he could appear before this Board of Review and state the facts as he saw them, and if the Board of Review thought that he had been illegally arrested, the ticket was ordered cancelled.

I want to impress upon you the importance of this Board of Review. Mind you, orders had been issued that no tickets should be killed. Consequently if you did not correct that by creating the Board of Review, there would be bad feeling on the part of the public. But when this Board of Review was created, that sounded the death knell of the ticket pulling system, because the Commissioner could say, "Very well, if you think you have a kick, go and appear before the Board of Review, and if they feel your kick is justified, then your ticket will be cancelled." And that is one way that probably the Commissioner got to sleep nights too.

What was the result? What was the final result of all this hullabaloo and enforcement? In 1927, for the first eight months, there were 243 people killed in Detroit. During the same time, in 1928, there were only 173 fatalities. In other words, through stringent enforcement, 70 lives were saved over the same period in 1928 above that of 1927. Reducing these figures to a percentage, it shows that 28.8 per cent lives were saved in the first eight months of 1928.

Enforcement is still proceeding. Of course, it is impossible to keep 600 officers in the three-mile circle and to check up on every violation. But on Saturday, when the schools are not in session and on holidays and at such other times when the inspectors can be released from their precincts, they have been on the corners and are checking up on every minor violation.

A man runs across a limit line. He is warned or given a ticket. In other words, he knows he has to live up to the law.

The Commissioner had hoped, when he started this campaign, to reduce fatal accidents 50 per cent. It is true that he has not arrived at that goal. But he has saved 28.8 per cent of lives during this year.

Sometimes you hear it said that safety work is devoid of interest. I want to say that one great city's heart goes out to its Police Commissioner and to its police officers for saving 70 lives, and we in Detroit feel that all this work and effort on the part of the Police Department has been a very commendable thing and that we are very much gratified and interested and hope that it can continue.

I believe this story I am telling you would not be complete if I would not tell you something that we have learned from this situation in Detroit. Every story should have a moral. In the first place, we have learned this—and I want to emphasize this with every bit of energy that I have—The minute you take off enforcement, the minute you release stringent enforcement, your death rate goes up.

Therefore, I feel that we cannot say that educational and other methods that we are using to reduce accidents are sufficient in themselves. We must in one way or another secure an adequate stringent and forceful means of cutting down these accidents, and that can only be in my opinion through holding the people respon-

sible for their actions. I do not believe the public is willing, up to the present time, to give voluntary obedience. Therefore, the police have to exact obedience from the public in order that they may drive properly.

I am very glad to say to you, that our own Commissioner, Mr. Rutledge, who did not expect to be here, has been able to attend this meeting, and I know that you will all be glad to hear a word from him.

CHAIRMAN McADOO: Mr. Rutledge, we would be glad to hear from you.

WILLIAM P. RUTLEDGE (Police Commissioner, Detroit): I haven't a speech of such length, Mr. Chairman, to warrant my getting up on the platform. I have listened to Mr. Brown's talk, and it sounded to me as though he were nominating the Commissioner of Detroit for a candidate for the Hall of Fame.

I have been a policeman for 33 years. I have been in the traffic-enforcement branch of the police department for a number of years. I was director of traffic thirteen years.

You heard Mr. Brown say that we had—although he didn't use those words—tired of the effort of bringing about a better condition by educational methods, and decided that some more practical lesson should be given. The result is very gratifying indeed to the Police Department of Detroit. We read in the pamphlets of the National Safety Council that throughout the country there has been an increase of approximately nine per cent in automobile fatalities while we had a decrease of 30 per cent in the first eight months of this year.

I said at the beginning of the year that unless the people were awakened to the seriousness of the situation, there would be upwards of 500 people killed in Detroit during this year. I based that upon the fact that last year there were 396,000 automobiles registered and 396 automobile fatalities. When Mr. Brown spoke of 421 he included other fatalities, other than automobile fatalities.

Last year there was one death for every thousand automobiles. This year there are 475,000 automobiles registered in Detroit, and so it goes without saying that had we continued at the same ratio of one per thousand, we would have killed 475, this year.

Mr. Brown stated that we aimed to cut the death rate in half, 50 per cent, but we attained the mark of 28 per cent. We are still encouraged that we may reach the mark of reduction of 50 per cent for the reason that the last three months of last year, as he told you, on some days we had four and on other days we had five killed. There were 48 people killed in November last year. There were 34 in October, 38 in December, and 120 in the last quarter of last year.

We started a campaign yesterday by which we believe we can cut that death rate in half for the last quarter of the year, which will mean a saving of nearly 200 lives in Detroit this year, based on the automobile registrations.

If I can be of any service to those who are interested in the saving of lives and traffic accidents, I would say that Detroit is particularly fortunate in having a police department that is absolutely separated from any political influence. The police commissioner is free, as Mr. Brown said. He has a free hand. If there is any police commissioner or chief who has not a free hand, the only way I know to obtain it, is that the mayor or the director of public safety, or the Common Council shall let the police department operate without any hindrance of political or other improper influence.

The stopping of the killing of tickets was a rather difficult problem. I guess you will agree with me that it is a common custom. It is similar to what His Honor the Chairman said about the problem or about lobbyism.

I was told by newspaper men that I couldn't get away with it. And it was rather difficult to convince certain politicians that a ticket couldn't be fixed. You understand what I mean. An officer hands a violator a ticket and he is to report to a Violation Bureau and adjust it. If he doesn't he goes to court and adjusts it there. Between 10,000 and 15,000 of those tickets were adjusted improperly last

year. Not one has been adjusted improperly this year. I mean by improperly, it has not been adjusted outside the Violation Bureau.

The Judge referred to these people as alleged friends. I had many alleged friends who were frequent callers at my office, but they are not so frequent any more. It seemed for a while as though I were ostracized to quite an extent. The men with whom I had visited at their summer homes over week-ends were not my friends any more, because they couldn't unload a pocket full of tickets on me or anyone else in the department. The Common Council had their friends, and when they learned they couldn't fix the tickets for their constituents, I was attacked not only by the Common Council but from other directions.

I am a retired policeman. I retired two years ago to accept the position of Commissioner, and it was publicly stated in the press, by a politician, that if I were old enough to retire I was too old to be police commissioner. I am, of course, drawing a retirement pay together with my salary, and that was attacked. It was rather discouraging.

I am just telling you this so that if you are going to stop fixing tickets, you want to look forward to a rather disagreeable time. But you have to stop fixing the tickets.

I was in a town in the South last winter, and the traffic officer told me how discouraging it was there, how 75 per cent of the tickets were cancelled by the people with influence in that town, a town of a little over a hundred thousand.

One man from whom I received a ticket and whom I met in one of the meeting clubs at lunch time, the Detroit Athletic Club, after I had returned the ticket to him with a polite letter that that sort of thing was a thing of the past, and whom I was avoiding because I thought he would look upon me the same as some of my other alleged friends had, proved to be a real friend. He hailed me, as I was avoiding him, trying to get out of the door without meeting him, and he said, "Hey, Bill! When I got that little note from you, returning that ticket to me, your stock went up 100 per cent with me, and I am with you. Stick to it!" Then I commenced to receive encouragement.

I have nothing else to say except a repeat that it is a matter of life and death, whether a police department can be allowed to function without interference and hindrance from politicians and to get along without political interference of any kind whatever.

CHAIRMAN McADOO: We have an open discussion on all these talks, and if anyone else wants to speak on the matter, I would be glad to hear from him.

I was immensely encouraged by this talk from Detroit. In the first place, I find that human nature hasn't changed at all in Detroit from New York City. Even Henry Ford is not able to change human nature. The same thing occurs all over the country.

We may gather from that, I take it, this: that after all, we lean upon the integrity and the intelligence of the individual police officer. He acts by himself. They don't go in couples or dozens like companies in the army. There is no one present but the police officer, and he gives out the tickets or the summons. Therefore, his character for integrity should be thoroughly established.

I am glad to tell you that in this great city, with 16,000 policemen, it is the rarest thing that any charge is made against the fairness or honesty in the giving out of summons. That is a great tribute.

MR. SPAYD (Secretary, Brooklyn Safety Council): You folks perhaps don't know Judge McAdoo as we do in New York. I would like to say that he is

largely responsible for the remarkable record that was made in New York in the safety line.

I also want to ask the gentleman from Detroit to what he attributes that great number of fatalities in Detroit. It seems to me that 400-and-some is a tremendous lot of people to kill in a city the size of Detroit. In Brooklyn, we have 2,250,000 people, and in 1927 there were 158 people killed.

MR. RUTLEDGE: The Police Department will have to confess there has been some laxity in the enforcement of the so-called minor trivial violations, the ones we mentioned about turning without stopping and starting up before the green light came on, and that sort of thing. But I don't know why there were more. I don't know whether there were, as I haven't any figures on other cities of the same population. We have a population of about 1,400,000. We have a very large number of cars in Detroit—375,000 cars—and there are a great number of owner drivers in Detroit. There are 500 or 600 new applications for drivers' licenses every day.

Just what the loss of life is attributed to, I don't know. Mr. Brown is an expert in the Automobile Club, and I would like to have him tell you about that.

MR. BROWN: No, I can't answer that question. An analysis has been made every week of our fatalities by one of the members of the National Safety Council, and we find—I can't give the exact percentage—but a great many of these deaths are children and aged people.

I do think that in Detroit we drive much faster than it is possible to drive in a city like New York, of course. Our thoroughfares permit fast driving.

The Pedestrian Often at Fault

The Commissioner just whispered in my ear that a great many of those cases through analysis have been shown to be the fault of the pedestrian and not the motorist. It ranges about 48 or 50 per cent the fault on the part of the pedestrian and probably 50 to 52 per cent the fault of the motorist. So when you are discussing the pedestrian control you are speaking of something that is very dear to our hearts in Detroit. I rather feel that in controlled intersections there must be pedestrian control. Either there must be sufficient time for them to cross the street or they must be held back in one way or another.

CHAIRMAN McADOO: What is your total police force in Detroit?

MR. RUTLEDGE: 3,300.

CHAIRMAN McADOO: Do you have a special traffic squad?

MR. BROWN: Yes, there is a traffic director that has charge of the traffic division. It is a special squad that looks after traffic. That is very well backed up by the Safety Committee that meets once a week, in which all the representatives of the various sections of the city, the Department of Public Works, the Department of Street Railways, the Recreation Department, and the Board of Education are represented. You have a cross-section of the community—the big industries, the public service companies. They all meet and at that meeting the director of traffic division attends or one of his lieutenants and they discuss many matters that come up in the regulation of traffic.

CHAIRMAN McADOO: How many men are engaged in the regulation of traffic?

MR. BROWN: About 275.

CHAIRMAN McADOO: Do you train the men for traffic work?

MR. RUTLEDGE: They receive a training in traffic regulation, yes. They have a special course in the training school, pertaining to traffic regulation.

CHAIRMAN McADOO: The next subject on the program will be handled by Mr. Joseph T. Davis, President of the St. Louis Safety Council, St. Louis.

Getting Public Support for Law Enforcement

By JOSEPH T. DAVIS

President, St. Louis Safety Council, St. Louis, Mo.

If we could deal with every individual personally by appealing to his better instincts through the power of reason, the subject of crime would not be such a problem. We would not be here for the purpose of discussing traffic law enforcement as a matter of public safety nor would we be solicitous of "Getting Public Support for Law Enforcement."

Unfortunately, however, in all ages we have had to consider individuals collectively, as parts of classes, groups or the masses. In this populous country the individual becomes a part of the whole community or political subdivision, and as such his individual thought, action and sentiment conforms to those of his class or group. The sentiment of responsibility which always controls him as an individual disappears entirely unless the moral sentiment of the group is aroused to action.

As a member of the class or community he is subjected to the sentiment and acts of others and becomes an imitator. His sentiment of responsibility to others is again under the contagious influences of the class.

Consider for a moment the inclination of the motorist: As the stream of traffic, in which he is moving, increases the speed, he unconsciously increases the speed of his car. The fast driving habit forms and he becomes a speed maniac unless restricted. He observes that most drivers disregard boulevard stops with impunity and he imitates them.

The pedestrian fails to observe the traffic signal and "jaywalks" across the street because others have established precedents for him to imitate.

This condition is true from childhood. Parents admonish their children to be careful of their associations and place restrictive means upon them to prevent the acquiring of bad habits. The child grows into manhood and becomes one of a community.

The individual is no longer under the restraining influence of his parents. The State now steps in and places its restrictive influence upon all of the individuals who comprise the group.

The State or City enacts traffic laws and ordinances to preserve order in the community and to force upon the individual that sense of responsibility to others which he lost by being absorbed into the group.

These laws are merely rules of action and conduct, restrictive in character, and are in-operative and unenforceable within themselves. They must be enforced by a group of individuals, the police, prosecuting officials, and courts, which we designate as the Law Enforcement branch of our government.

Here, again, the human element enters. Too often a member of the group of the law enforcing body will lose his sense of responsibility to the community and allow himself to be controlled by selfish motives and impulses especially if public sentiment is not aroused.

The great majority of the law enforcement officials are honest and are desirous of serving the community. On the other hand, however, the official is human and is possessed of all the human frailties, some of which are selfishness, ambition and indifference.

While the State restrains the individual, the public, composing the State, must in turn restrain the law enforcement officials through aroused public opinion. No public official can stand the searchlight of public opinion playing upon the selfish, ambitious or indifferent conduct of his official duties. Public support must be had to create public opinion so as to impress all members of the group and law enforcement officials that law enforcement is applicable to each whether he is a

willful or unconscious violator. In all crusades some innocent victims must suffer for the good of the whole.

The crystallization of public sentiment to keep public opinion aroused is a matter of some effort. Once more we find the individual absorbed in his selfishness and self-satisfaction. Too many times his selfishness in business causes a well meaning law abiding citizen who believes in law enforcement to take an indifferent attitude because of fear. He feels that an active interest for law enforcement will injure his business. He may resent, as an individual, the conduct of the officer, but he takes no action, due to indifference, fear and other reasons, or possibly because as an individual citizen he would be ineffective. As soon as he joins with others under proper leadership his influence becomes manifest and he realizes that there is no cause for fear. In other words this public sentiment crystallized into public opinion must be the result of organized and fearless leadership. This leadership in safety movements is dependent upon the Safety Councils in various communities.

The public is willing to follow unselfish and constructive leadership in most moral and humanitarian moves, which tend to the betterment and protection of themselves and their neighbors. Such sentiment can be aroused and the support maintained for law enforcement by a well organized and active Safety Council acting as the leader in the safety movement of the community. Leadership once established, public support may be secured for proper law enforcement by means of cooperation with the legislative and law enforcement branches of the community. The public press and other organizations will follow this leadership with the result that a constructive public sentiment for strict law enforcement is aroused.

I may be pardoned if I refer to the leadership of the St. Louis Safety Council in the City of St. Louis—merely to aid as an illustration of what has been and can be done in a community.

Since prestige and public confidence is necessary to establish leadership, the St. Louis Council was and is organized along strictly non-political and non-commercial lines, and is composed of outstanding public spirited business and professional men.

Our Council first interested itself in the subject of traffic law enforcement about six years ago. Up to that time the Council had not seen fit to consider it a special duty to get into the field of law enforcement as applicable to the community as a whole. It had contented itself with carrying on an educational program outlined for the purpose of reaching the individual through process of reasoning and by appealing to his personal sense of responsibility. It was found, however, that this plan was ineffective because the average citizen had lost that sense of responsibility after he became part of the group.

By the end of 1922 we found that deaths due to traffic accidents were constantly increasing. Our Executive Committee which meets every week, decided some affirmative and constructive action must be taken. A Law Enforcement Committee, with Mr. Arthur Morey of the Commonwealth Steel Company as Chairman, was appointed. This Committee in due time found and reported that the increase in fatalities was due primarily to a failure of proper law enforcement and that, in part at least, such failure to enforce was due to antiquated and improper laws and regulations.

An analysis of the disposition of traffic cases in the City Courts indicated a policy of lax enforcement by the Police Judges with a result that the violators who were brought into Court were let off with small money fines and in many instances by merely paying the costs. The traffic laws did not provide for punishment whereby the offender could be sentenced to the workhouse.

The press gave wide publicity to this report and this was the beginning of arousing public sentiment and opinion.

Following this, the Council decided an effort be made to see that the traffic laws be made as practicable as possible and see that public support be had so the laws would be enforced and the guilty severely punished.

In the early part of 1923 the Council formulated a plan of cooperation with all of the law enforcement officials and agencies. It was felt that a change was necessary in the policy of the City Courts. On three different occasions during 1923, committees appointed by the Safety Council called upon the Mayor, who appoints the City Judges, and called to his attention the failure of the City Court Judges to assess heavy fines under the then existing laws.

While we were now having some public support, still so little had been done prior to Public Safety work being started on law enforcement that the officials had not yet realized the importance of rigidly enforcing the laws as one great step to reducing traffic accidents, consequently these committees met with only a small degree of success with the Mayor. After each session with the Mayor the Judges would assess a little heavier fine, but would soon fall back to the old system of small fines and Court costs.

During the early part of 1923 the Council began an active campaign for changes in the traffic laws which its Law Enforcement Committee had found to be inadequate and impractical of proper enforcement. The Council called upon the Mayor for support. The Mayor then appointed a special committee consisting of the Presidents of the Safety Council and the Automobile Club of Missouri and the City Counselor to make a study of the traffic laws of other cities and to prepare a new traffic code for the City of St. Louis. This Committee accomplished a splendid piece of constructive work and in April of 1924 the City's Board of Aldermen was induced, through public opinion, to pass the new code. This was a great step in the right direction for the improvement of traffic regulations, but we still had to educate the law enforcement officials, which was even more difficult than that of securing the new code. Among other excuses given by the City Court Judges was that they insisted the provision for punishment by sentencing the violator to the workhouse was invalid as being against the provisions of the City Charter. The Council promptly arranged for a test case with one of its members as the defendant. The Safety Council entered its appearance and filed briefs as a friend of the Court. The Supreme Court upheld the ordinance as being valid.

Again we realized that we were not getting proper support from the local law enforcement officials.

Our statistics showed that in 1923 our fatalities numbered 156 as against 131 in 1922 and in 1924 they increased to 187 even in the face of the activities of the Safety Council. We began to realize the relationship between increasing fatalities and laxity in law enforcement.

We were receiving splendid support from the press and the public, but we realized that something out of the ordinary would have to be done to crystallize public opinion upon the law enforcement officials.

The Council then decided to appoint another law enforcement committee of outstanding members of the Bar of St. Louis, irrespective of their political affiliations. This committee worked conscientiously for several months and finally gave a report which gave the press and public an opportunity to concentrate public opinion upon the question of law enforcement. By the time our Municipal Election in the spring of 1925 came on, public opinion was so well crystallized that the successful candidate for Mayor adopted the Law Enforcement subject as one of his major planks. He promised the public and the Safety Council publicly that, if elected, he would appoint men to office who would enforce the traffic laws.

When elected, the Mayor appointed two new City Court Judges and gave strict instructions that they were to enforce the traffic laws without fear or favor.

The press of St. Louis took notice and carried first-page news items of this change and gave warning to motorists. The newly appointed Judges gave warnings

through the press and from the bench as soon as they assumed their duties as City Court Judges. They gave warnings that reckless and careless drivers, speeders and other flagrant violators of traffic laws need expect no leniency in their courts. Promptly they began assessing the maximum money fines of \$500.00 in many cases and in others they assessed 10 to 90 days' workhouse sentences.

While the Safety Council believes that public officials should be openly criticized if they persist in failing to perform their duty, the Council also believes that it is equally as beneficial to publicly commend officers for performing their duty. As these new judges enforced the laws, press notices were released by the Council commending the judges. The press gave the news of the fines and punishments being meted out to the violators.

It was not long until the fatality rate began to decrease.

During the first four months of 1925, before the new judges assumed their duties, motor vehicle deaths showed an increase of nearly 50 per cent of the first four months of 1925. After the new judges assumed their duties, during the last eight months of 1925, there was a flat reduction of 14 deaths over the same period of 1924.

In 1926, this policy of law enforcement was continued and motor vehicle deaths showed a further drop of 18, with a total of 174 for that year. In 1927 under a continuation of the law enforcement policy the number of deaths was reduced to 147—a decrease of 25 per cent, as compared with the year 1925.

The strict enforcement of traffic regulations and the assessment of severe penalties has produced results in St. Louis. Records of the Safety Council show that approximately 90 per cent of the automobile drivers in St. Louis during the year 1927 had no accident record inside of the limits of the City of St. Louis. It is logical to assume that at least two or three per cent of the 10 per cent who had accidents could charge contributory negligence to the party injured. It would appear, then, that in 1927 there were about 7 per cent or 8 per cent of willful or grossly careless drivers.

We believe that these figures will bear out the contention that most individual drivers try to observe the traffic laws providing the group to which they belong is made to realize that traffic laws are made to be observed and not to be violated. The large percentage of individuals of the group can be made to respect traffic laws and the rights of others through proper enforcement and through public opinion. A larger proportion of the 7 per cent, however, are the type who are willfully reckless and they think that they have a prior right on the streets. They will not listen to the Safety Council and its educational program. These are the drivers who are causing most of the trouble and the only way this class of drivers can be reached is through the Police Department and the Courts. If the laws are enforced and the guilty prosecuted without fear or favor it doesn't take long for this message to sink into the consciousness of the reckless. When you threaten a driver with heavy fines or with workhouse sentences you appeal to his selfish instinct in a way that creates his respect and attention.

Careless drivers on the streets of a community are a great deal like bad apples in a barrel of good ones; if the bad apples are allowed to remain undisturbed any length of time they spoil the other apples in the barrel, and so it is with careless drivers. If they are allowed to run rampant on the streets their bad influence and their recklessness affects other drivers through contagion.

In order to maintain proper law enforcement the Safety Council, as the leader, must follow up the work.

We have a concrete example of how political ambition to be Circuit Judge has caused one of our model City Court Judges to become as bad or even worse than his predecessors. Since he opened his campaign for the nomination for Judge of our Circuit Court, he has failed to enforce the traffic laws with the result that

many motorists who were before him for violations carried his campaign banners on their cars.

The Safety Council immediately became active with the result that public opinion has caused him to resign his position until after the campaign.

In the meantime the Safety Council has appointed another Law Enforcement Committee which is now about to report.

The Provisional Judge appointed to fill the vacancy of the Police Judge who resigned began to follow the policy of his predecessor and delivered a speech from the bench to twelve guilty violators a few days ago in which he accused the newspapers and the Safety Council of destructive criticism and was promptly answered through the press. The editorial of September 28, 1928 of the St. Louis Post Dispatch, if I may be pardoned for reading, will show the newspaper support law enforcement is receiving:

"Traffic Paroles"

"If proof the pudding is the eating, then the policy of paroling speeders in Judge Rosecan's court causes the death toll to mount.

"Joseph T. Davis, president of the St. Louis Safety Council, points out that there were only seven fatalities from September 5 to 26, the period in which the policy was abandoned by Judge Blocher, who is sitting for Judge Rosecan while the latter is campaigning for the Circuit Court, whereas there were eight fatalities in the first four days of September, when the policy was in operation, 14 from July 5 to 26 and 16 from August 5 to 26.

"Nevertheless, Judge Blocher characterizes as destructive criticism protests of the Safety Council, the press, and Chief of Police Gerk, against the parole policy, and he has again put it in force. It involves only a verbal promise to the Court not to drive for 30 days, a promise which the Chief of Police says the speeder seldom keeps. Judge Blocher's defense of the policy, as stated in his remarks to 12 speeders arraigned before him, is that since most of the speeders are youths 'it is unfair to put the stigma of the workhouse upon them.'

"The Post-Dispatch protests against such sentimentalism where human life is at stake. We assume, of course, that the dispute pertains to flagrant carelessness. Mr. Davis has proved that the workhouse is a deterrent. Chief Gerk has complained that the parole system sets at naught the work of the police. The death toll this year is more than 40 in excess of that at the same time last year. At the rate we are going, or 131 people killed in the city by automobiles up to this morning, as against 88 for the same period last year, there will be a toll of approximately 200 by the end of the year.

"If it is unfair to put the stigma of the workhouse upon youth, how fair is it to kill these 200 men, women and children? And how fair is it to the people of St. Louis when other cities are licensing drivers and depriving them of their licenses when they prove themselves a hazard to society, to continue practicing such loose traffic methods as we persist in here?"

Our experiences in the matter of keeping public opinion concentrated all the time, which seems to be necessary, has caused the St. Louis Safety Council this year to appoint a permanent Law Enforcement Committee.

We are convinced that through proper leadership public support can be had and maintained for Law Enforcement providing a group of public spirited citizens are willing to take sufficient interest to promote the cause of public safety.

CHAIRMAN MCADOO: We shall now have the pleasure of listening to Mr. E. B. Lefferts, Manager of the Public Safety Department, Automobile Club of Southern California, Los Angeles.

A New Procedure in Traffic Law Enforcement

By E. B. LEFFERTS

Manager, Public Safety Department, Automobile Club of Southern California,
Los Angeles

"A New Procedure in Traffic Law Enforcement" is what we know on the Pacific coast as the San Diego Plan.

Traffic law enforcement is a difficult problem in Southern California, as it is in every community. If enforcement is too strict, the community is apt to become antagonistic to the regulations and those charged with their enforcement; but, on the other hand, if enforcement is lax and sentences are light, the law becomes more or less of a joke and the enforcement officers and court lose the respect of the community. The latter condition is usually attended with an upward trend of the accident curve.

In the southern half of California, which is the territory served by the Automobile Club of Southern California, we have had both severe and lax enforcement in different sections at the same time. From our membership of in excess of 129,000, we have been able to get a very good cross-section of the general motoring public's reaction to these different types of law enforcement, while the close contact which we have with the law enforcement officers and courts has given us their viewpoint and has enabled us to understand the difficulties with which they are confronted.

Hearing both sides of this question would give the impression that the motorists and the enforcement units were like two armies in daily combat; or possibly a better simile would be the attitude of the naughty boy who is trying to do everything he can without being caught by his teacher. I really believe this to be the truer simile, because so many men and women seem to have such a juvenile reaction toward the traffic regulations, in spite of the fact that their other attitudes show the maturity you would expect from a person of their age and position in the community.

In their enthusiasm of playing the game of trying to out-wit one another, both motorists and officers seem to have lost sight entirely of the safety motive that underlies our rules of the road. This is one of the contributing factors to our increasing accident and death toll resulting from the use of vehicles propelled by an internal combustion engine.

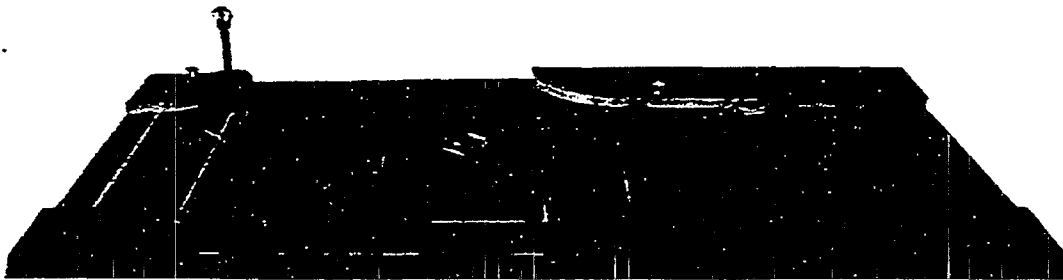
The seriousness of the annual loss from accidents has led to a demand from many quarters for more stringent laws to cope with the situation. I grant that this is typical of our national attitude, but in my opinion, the solution for our traffic problem does not lie in the enacting of more regulations; we have sufficient laws today with which we can effectively undertake the solution of this perplexing question, but we are not making the most effective use of them. As an example, in analysing 89,320 accidents I find that 23,101, or 25.9 per cent, were attributed to a violation of the right of way rule. This, I appreciate, is a very difficult regulation to enforce, yet we have generally throughout the nation a law specifying who has the right of way when two vehicles approach each other at an intersection, and still a failure to observe this law in the foregoing analysis was the largest single accident cause.

Studying facts of this nature led me to come to the conclusion that we were not approaching our traffic problem from the proper angle. In searching for an answer to this disconcerting problem I talked with judges hearing traffic cases, enforcement offices and with professors of psychology at our universities and found that they were in general agreement that fear is the basis of most human behavior. Accepting this fact, why should we not focus our attention upon accidents rather than upon technical violations of our Motor Vehicle Act, thereby developing in

the minds of the motorists a definite *fear* of being involved in an accident, instead of fear of being observed by a traffic officer, as is in most cases the situation today.

In discussing this situation with many police executives, most of them were willing to agree to the soundness of these arguments, but the idea of concentrating their officers' attention upon accidents was too radical a departure from an established procedure for any to undertake until in June, 1927, I had the pleasure of meeting Mr. J. V. Doran, who had just been appointed Chief of Police of the city of San Diego. While going over with him the traffic situation, I suggested that he break away from the old established method of traffic law enforcement and have his men concentrate their attention upon accidents, pointing out to him that the California Vehicle Act compels the reporting to the authorities of every traffic accident in which a person is injured. His department would therefore be notified of all mishaps of this character, which would enable his men to start their activity with this type of accident.

This appealed to Chief Doran, who then called for Captain Arthur R. Hill,



Model of a street intersection with traffic.

in charge of traffic, with whom we discussed the matter more at length. The result was the issuance, on July 1, 1927, of the following order over Chief Doran's signature:

"Effective this date, all auto accidents, whether involving personal injury or not, coming to the attention of any police officer, will be carefully investigated, measurements made and names of all witnesses secured. If the person responsible can be determined beyond question, he is to be given a summons to court; if there is a question as to who is responsible, summons both parties and all witnesses to court."

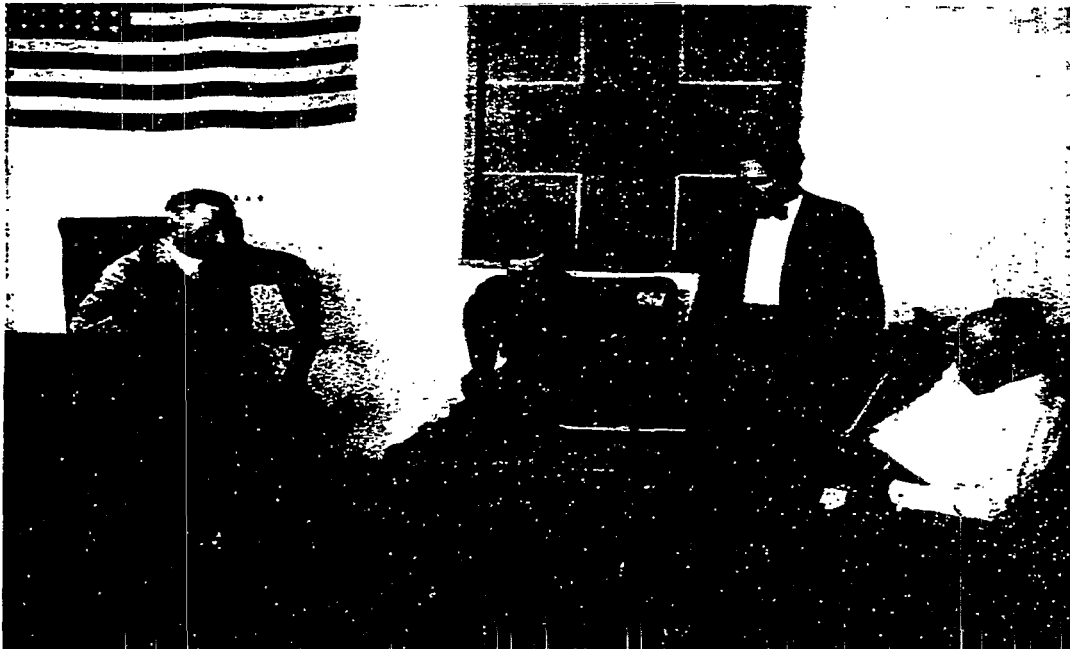
This practically amounted to the San Diego Police Department serving notice to the motorists that they were not going to lie in wait for them and pounce out and make an arrest whenever a technical violation of the Motor Vehicle Act was witnessed. They were in reality putting the motorists on their own responsibility to drive safely, which I repeat is a basis of the rules of the road, and admitting that it is impossible to patrol thoroughly and completely every side road and back street in the city. In other words, they were recognizing what is generally known, namely, that it is not possible to have an officer watching every motorist all the time. They put the responsibility on the driver to so operate his car that even though an officer is not present, no violation will be committed which might result in the injury of any person or property.

The traffic officers, since the promulgation of this order, are not overlooking

high speeds that in reality constitute reckless driving, or other violations which come to their attention; however, these are not their main objective.

Judge Claude Chambers, who has charge of the Traffic Court, has provided himself with a small model of a street intersection, on which traffic signals, warning signs and other traffic markers are shown. These are not fastened down, but may be moved around to show the exact conditions that existed at the location where the alleged law violation occurred. This model includes miniature automobiles and street cars.

When those charged with violating some provision of the Motor Vehicle Act, and thereby causing an accident, appear before the judge they are requested to



Demonstrating how the accident was caused.

show on the model, with the help of the traffic officer, the exact conditions which pertained at the time the collision occurred. From this demonstration the court is able to determine which driver committed the violation that was responsible for the accident and makes the procedure more simple than attempting to describe intelligently without this aid, just what happened. In many instances the court has found that both drivers contributed to the collision by each ignoring some of the provisions set forth in the law, which, if observed, would have prevented the accident. In such cases the judge has based the penalty upon the seriousness of their respective offenses.

One of the interesting effects of this program is the attitude of those motorists who are given citations to appear in court; the traffic officer is no longer considered as their sworn enemy; nor do they waste so much time in volubly describ-

ing their years of experience in driving during which time they have never received a traffic citation or been involved in an accident, in an endeavor to persuade the officer that he should put his citation book back in his pocket. Neither do these protestations have much weight with the court or with juries, since there is irrefutable evidence that careless driving has been practiced.

When we consider this question of enforcement of our traffic laws or in fact any other law, we must recognize that it is not necessarily the apprehension of every violator, but the swift and sure punishment meted out to all those who are apprehended which serve as a deterrent. We have found that this same effect has occurred in San Diego, in that the swift and sure punishment of those who have caused accidents has served as a remarkable deterrent to other drivers who might under other conditions have been less attentive to the business of driving or less scrupulous in their observance of the rules of the road.

One question probably is in your minds as it was in ours: Does this procedure increase the number of hit and run drivers? The answer based upon one year's experience is, no! On the contrary the motorists have developed the habit of calling for a police officer whenever a collision occurs even if no personal injuries have resulted as they want the benefit of his expert judgment as to responsibility; which shows that in San Diego a traffic officer is coming to be recognized by the motoring public as an individual who is endeavoring to increase the safety on the highway, and therefore entitled to their cooperation, rather than feeling that he is in the nature of a tax collector who is put out there to serve as a medium of collecting toll to help fill the city coffers.

While developing better attitudes upon the part of motorists and officers toward one another, it has also been developing the police personnel into trained investigators. Upon arriving at the scene of an accident they note all facts and essential details and are able to present better cases in court. This is resulting in the loss of very few cases due to the type of evidence presented.

I am not going to bore you with a mass of statistics, but when we are studying this traffic problem they must be considered if we are to show whether or not results have been obtained, and results are the thing in which we are most interested.

I am glad to say that this program has justified our hopes and has effected a reduction in accidents. This plan has been in force for a little over a year, and during the first twelve months the accidents were reduced from 961 to 703, showing a decrease of 26.8 per cent; while the number of personal injuries has dropped from 1,206 to 877, a decline of 27.1 per cent. These reductions took place in face of an increase of 2.08 per cent in population, an increase of 7.03 per cent in motor vehicle registration, and an increase of 9.8 per cent in this type of accidents in other communities similarly situated.

We all observe certain laws of health because we realize that failure to do so will result in punishment of some kind. The laws of nature, when violated, exact their punishment of a personal nature, which is what has been done in San Diego with this new procedure in traffic law enforcement.

Today this program, which has proved so successful, is spreading to other parts of Southern California and is helping to develop an appreciation of the seriousness of accidents and creating a desire to keep from being involved in such happenings. It is developing a realization upon the part of the public that the traffic regulations have been enacted for the purpose of making motoring safe and not to serve only as a means of annoyance and a medium of increasing the revenue of the community. This is resulting in a better knowledge of our traffic laws and, of course, a closer observance of them. The drivers are legion who, month in and month out, so operate their vehicles that they have no accidents. Looking from effect to cause, we are justified in reaching the conclusion that these drivers of necessity must have a fair knowledge of the municipal and state traffic regulations

of their community, coupled with a sense of the mechanical capabilities of their vehicle as to stopping, pick-up, maneuvering, etc., under various conditions, with last but not least the judgment not to attempt the impossible. With this legion of drivers, the safety engineers, enforcement officers, and courts need have no concern. Under the plan I have been describing to you this type of driver is off of everyone's mind as they deserve to be, thus allowing the necessary time to concentrate upon those who through ignorance or indifference do not operate their vehicles so as to have a clear accident record.

I submit to you in closing that were this plan of focusing attention on the accident phase of the problem, rather than upon the technical aspect of traffic violations, followed throughout the nation, I feel safe in predicting that the next few years would show a decrease rather than the increase in traffic accidents with which we are today confronted.

CHAIRMAN McADOO: I would like to say a word myself on that.

I take it that the Los Angeles program, or system, is to concentrate on the accidents and not to insist upon a general and wide-ranging enforcement. In New York, we punish a man for allowing his car to smoke. First of all, it imperils the public health. Secondly, if they all smoked, we would be running the cars like ships navigating in the fog.

As I said in the beginning, we don't consider anything trivial. We punish a man for exceeding the speed limit in this locality, as I told you in the beginning, fifteen miles being the maximum. But we try a large number of cases for reckless driving, and most of our reckless driving cases involve an accident. So the accident cases come to us just the same as they do in San Diego, and our punishment for reckless driving can be very severe.

I have said, and I will say it again, because I hope you will all take it into consideration in other cities. We believe that the suspension and revocation of licenses is as much a deterrent as imprisonment.

JOSEPH T. DAVIS (President, St. Louis Safety Council, St. Louis): I want to commend Mr. Lefferts on his paper, and particularly with reference to the manner of the investigation of accidents by a police officer at the time the accident occurs. I think that is one of the faults which we find in most of our cities. I know it was one of our troubles in St. Louis.

We had this very subject up before our Safety Council a few months ago. We didn't know the policy had been adopted out on the Pacific Coast. But it occurred in this manner. A serious accident happened in the neighborhood of one of the representatives of our staff, one Sunday evening. There was no police officer around at the time the accident happened, and when this staff officer of the Safety Council heard of the accident, he immediately rushed to the point of the accident and began taking measurements of the places where the two machines were after the accident was over. He observed the skidding of the cars on the street, and he made plats showing all of these details with measurements.

Then he followed that case. By the time the police officer got there all the police officer did was merely to take the names of the two parties who were driving the cars and ask a few questions and ask the names of the witnesses.

When the matter came up before the police court, our staff representative, following the case because of his interest, went to the police court, and none of the witnesses appeared. There is one of the great difficulties that we encounter in all our police courts with reference to traffic accidents. Where a collision or accident occurs the party who is guilty usually gets to the party who is injured or who has been damaged and says to him, "Let's settle this question of financial loss, and if we settle that, we won't have to appear in police court."

That was the case here. But no witnesses were present. The police officer was there. He merely had the names of the witnesses and the names of the parties, that some right has been denied him by the State; that is, that he cannot drive;

Our staff representative stepped up with the details and measurements, and from the details and the measurements which he presented to that court, the offender or the man guilty of causing that accident was severely fined. If it hadn't been for him, the guilty party would have gone without punishment.

That is what I see in this plan. We took that up with our police department in St. Louis, and our police department, I may say, has been cooperating with us to the fullest extent. But we found there are not a sufficient number of policemen in the city of St. Louis. We only have about 1,600 or 1,800 police officers in the city, as compared with the number in Detroit and New York. So we are inadequately policed from the traffic standpoint. But we have the cooperation of the police force, if we can increase the police force, to put in a group of technical men whose duty it shall be to immediately go to the place of accident, as soon as the accident occurs, take pictures and take measurements and get all the physical facts surrounding the accident, and then we will carry out that policy.

PERCY C. ABELL (Manager, British Columbia Safety League, Vancouver, British Columbia): I think I can tell you, with some justifiable sense of pride, that I come from a country where the law is enforced, and therefore, it is respected.

Our Superintendent of Police in British Columbia, has the power and is using the power to suspend and cancel a driver's license without the culprit going into the courts at all.

For instance, our Safety League in Vancouver encounters in our records or through our members, an individual whom we know to be a menace. We don't issue summons or go to any police department about him at all. We go up to the Superintendent of Provincial Police, who deputizes one of his officers to take that individual and submit him to what is apparently a test as to his fitness to drive a car. The culprit doesn't know he is there for another purpose. Depending on the circumstances, he may be told to be a good boy or he may have his license cancelled or suspended.

MR. LEFFERTS: I would like to inform the gentleman from British Columbia that we have pretty much the same thing in our state through the Division of Motor Vehicles. Any certificated report of a habitually careless driver is forwarded to the Division of Motor Vehicles, and calls for an investigation of capabilities of that individual, with the end in view of suspending his license or revoking it, if conditions warrant.

CHAIRMAN McADOO: If you will look at our newspapers, you will see long lists of the licenses revoked. It is a common punishment in the State of New York.

ADJOURNMENT

October 4, 1928

Traffic Engineering

W. B. POWELL, Chairman

Chairman, American Engineering Council's Committee on Signs, Signals and Markings, Buffalo, N. Y.

The sixth session was called to order at ten o'clock by the chairman, Mr. W. B. Powell of Buffalo, Chairman, American Engineering Council's Committee on Street Traffic Signs, Signals and Markings.

CHAIRMAN POWELL: At the second National Conference on Street and Highway Safety, the American Engineering Council offered to make a study leading to a standard code for city practice, and was given the job to build up a committee which was to function as a sectional committee of the American Engineering Standards Committee, so that the code when published would be a standard. We then secured our material by sending out questionnaires to selected committees in each of the communities, and having returns from something over one hundred cities, that material was very carefully compiled and analyzed. Then we started to work on the drafting of the code. That work has been in progress for two years, and the committee has been actively at work on the material for something over a year. We have held a number of meetings and we have done a tremendous lot of work by correspondence, and the last meeting of the committee was held on Monday and Tuesday of this week under the auspices of this organization, who very kindly loaned us one of their committee rooms for the purpose, and I am happy to say that today we are just ready to go to press.

How well the report will be received and how generally it will be adopted is a matter for the future to decide. We have done the very best we could with a situation that was extremely difficult, because as we got to work on it we found there were very wide divergences of opinion on certain matters, and in some cases we had to compromise, so that we are not entirely set even as yet; but at least we have something that will point the way, and I hope it is generally adopted and used. After a year or so we may find by actual experience just where it can be modified, so that we will eventually get a standard that we can all accept and adopt without any reservations whatsoever.

Now, in order to discuss the details of the report for your benefit, we have had three gentlemen scheduled for this morning's session, who have been closely related to the work. I take great pleasure now in introducing Mr. G. C. Kelcey, of the American Gas Accumulator Co., who will tell you about the A. E. C. Report on Signals.

The American Engineering Council's Report on Signals

By GUY KELCEY

**Manager, Traffic Engineering Division, American Gas Accumulator Company,
Elizabeth, New Jersey**

In the invitation which was extended to me to speak at this meeting, it was requested that I offer appropriate comments on the American Engineering Council's Report on Traffic Signals.

I find myself in the very difficult position of discussing this report before it has been presented and without having had an opportunity to ascertain clearly just what changes have been made in the tentative draft upon which my discussion is based. I shall, therefore, proceed on the assumption that the tentative report has been adopted in the final draft, except for such modifications as have been called to my attention during the past few days.

The Committee has organized and clarified much that has been confusing to traffic officials. Within the range of present traffic experience and knowledge, this committee has done most excellent work and their effort will be of great value to the traffic official and to the manufacturers of traffic devices, who, by the way, are distracted by the great variety of demands for special equipment which does not fit in a quantity production program.

The time for this discussion is limited, so, while much should be said in praise of the conclusions of the Report, it would seem more constructive to confine my remarks to those aspects of the Report which may possibly be confusing to traffic officials or which may later be subject to modification.

The United States has gone in for standardization to a greater extent than other nations. Our urge to standardize arises principally out of several motives. There is the standardization of intolerance and of the fixed idea. There is the standardization of habit, to which we all conform to avoid being unconventional. Again, standardization of production which permits the manufacture of many identical articles with the advantage of low cost, ease and economy of repair, maintenance and replacement. Finally, there is the uniformity expressed by the standardization of road signs which, like the alphabet, enables us all to read the same message at a glance, just as we all read the same language.

Before proceeding to the details of the report, it is proper at this point to mention that standardization has opportunities for both good and evil. If standardization is overdone, or if it be premature, it can easily close the door on improvement and on invention. Again, it is easy to standardize without taking into consideration all conditions, because the scope of any one man's experience in traffic work cannot comprehend all conditions. This may be illustrated by the many attempts at standardization of traffic practice during the past eight years. A highway official with mountains to contend with has an entirely different idea of a curve, turn or grade than a highway official in a prairie state. The narrow, winding streets of New England towns present an entirely different problem than the wide, straight streets of some western cities. No one who has not had to take the responsibility for the solution of multiple intersection problems such as are to be found in the six point intersections of Indianapolis and Chicago, can have a very sound judgment of what may or may not be used in their treatment. The driving habits and abilities of motorists in South Carolina, Wisconsin and New Jersey are surprisingly different. So condition after condition varies from one jurisdiction to the next, and so, likewise, does the point of view of what is the proper treatment and the proper standard. As a result, we have had a great number of standardizing bodies or groups in different parts of the country, whose conclusions are sound within the range of their limited experience. We have also had a tremendous pressure to standardize on pet ideas from a considerable group of persons who make traffic an avocation and not a business, and whose real experience is in question.

It seems proper to say, therefore, that standardization will be attained in actual practice only when the combined experience of men with a great variety of local traffic problems is added to the experience and ability of highway officials who drive thousands of miles a year over every conceivable kind of road, whether it be the shell roads of Louisiana, the gravel roads in Wisconsin, the mud roads of other states; the long, high speed stretches of concrete, or narrow, winding, moun-

tainous highways of our eastern and western states. Until these conditions are reconciled, national standardization is not possible because any standard adopted, which does not fit, will not be used in practice.

The American Engineering Council, in its present effort, has probably gone as far as it is possible at present to combine in the personnel of its committee as wide an experience as possible, but their effort will have permanent value only insofar as the investigations and study of this Committee are expanded and continued and the standards code, which is here presented, modified and improved in terms of changing conditions and experience.

For a number of years the American Association of State Highway Officials and the Bureau of Public Roads have combined their best experience to formulate and produce a set of standard signs. This standard suits the highway problem; whether in mountainous or flat country, or on mud or concrete roads. The American Engineering Council Committee in its report, recognizes and adopts this standard with some modification. Under the standard referred to, a sign twenty-four inches on a side, and used as a square or diamond, constitutes the backbone of the system of signs. Used as a square, the horizontal dimension is twenty-four inches, and as a diamond the horizontal dimension becomes thirty-four inches. There are many towns and cities where the streets are so narrow and where there is so little sidewalk space that, if this diamond sign is installed, it will absorb much, and in some cases all of the usable sidewalk width. In addition, the points of this sign are dangerous to pedestrians, and particularly to running children. This standard is perfectly adapted to highway practice but, unless the same type of sign can be used in cities and towns, the system can hardly become a national standard. In this instance, highway officials, thinking only of highway problems, adopted a most excellent standard for their use. Many municipalities cannot use it effectively, and it cannot, therefore, become a universal standard without modification. This modification the Committee of the American Engineering Council has seen fit to make, by reducing the dimension to eighteen inches instead of twenty-four inches. This modification is still probably not enough. It should be required that the points of the sign used as a diamond be rounded off to safeguard pedestrians and children. Since town signs must present as little horizontal width as possible, it is desirable that the diamond shaped sign, which presents a maximum horizontal dimension, be used as little as possible or not at all, and, if the shape standard could be changed, it is highly desirable that the diamond sign be eliminated where narrow streets are involved. The problem could be met by installing all such signs at an elevation of eight feet.

Under Section 1 on "Street Traffic Signs," appears a list of eight traffic requirements, which are designated by various shapes and dimensions. All these requirements reduce to three—prohibition, limitation or information. A diamond shaped sign, which indicates a condition inherent in the roadway itself, is specified for "SLOW," and a square sign, which warns of a condition not inherent in the road, is to be used for "CAUTION." One wonders if the average traffic official will know where to use a "SLOW" sign and where to use a "CAUTION" sign, and if, after he has made his decision, the public will know the difference. For practical purposes, are now "slow" and "caution" the same thing to the average driver? If so, a driver will react the same to either one, and why should one be designated by a diamond and the other by a square sign? This illustration is used to suggest that distinctions can be too finely drawn for the average driver's comprehension and that efforts at standardization should aim to simplify. It is hoped that your Committee has in mind the ultimate simplification of the various designations, which, in the end, can express no more than "Stop" or prohibition, "Caution" or limitation, and finally, information.

The committee's report urges the adoption of a stop sign with a red lettering "STOP," and points to the advantage of being able to eliminate the red lettering.

It is urged that the committee reconsider this action, since much, if not most, of the stop sign work of the future will be done with reflecting material, which, under the influence of automobile headlights, will cause the word "STOP" on the sign to stand out brilliantly to the driver at night. To produce a color with light, it is necessary to screen out or take away part of the light, and that which is left is the color required. To produce red, 60 per cent of the light is lost and 40 per cent is used. Under actual road test, one make of reflector stop sign with red letters was just readable at night under driving conditions at 121 feet, and with white reflecting letters of the same material at 215 feet. To produce, therefore, red lettering, it is necessary to sacrifice so much visibility at night that the standard which requires the luminous part red is of questionable benefit. The committee's decision to use a yellow background and a red lettering for a stop sign would appear to be sound since, in the proper interpretation of colors red indicates "Stop" and yellow "Caution." It is suggested for the committee's consideration that so much is to be gained by having luminous or illuminated lettering on a stop sign white; that this should be permitted, and that the reflector lettering "Stop" be bordered with red, thus satisfying the requirement that red be used.

Attention is called to requirement No. 2, entitled, "Height and Location of Movable Posts on Roadway," in which it is suggested that the center of the sign be four feet above the pavement. Immediately following this recommendation, it is suggested that if reflecting signs are used, they shall be three feet above the pavement. This would appear to be reversed, since an ordinary non-luminous sign must be down in the range of headlights to be seen, and, therefore, centered at three feet above the pavement, while a reflecting sign collects enough stray light anywhere up to eight feet above the pavement to render the reflecting units brilliantly luminous under the headlights. A non-luminous sign should never be placed above the headlight range; while a reflecting sign is effective even though above the headlight range, and, therefore, may be so placed.

The section of the Report on Stop Signs invites several further comments.

In Paragraph 4 under Rule 10, it is indicated that "A Stop sign shall be placed at a point where the message is to be obeyed. At intersecting streets, this point is on the property line of the side protected street." This recommendation is open to some question. The property line in some instances is so far back from the curb line of the Through Street that vision is obscured by foliage, street light, telegraph and other poles. From such position, traffic on the Through Street cannot readily be seen. If this rule should be adopted the careful driver would stop at the property line where the law requires, and would stop again when near the curb line where he can see the traffic he has to cross. Under this rule, if he is not a careful driver, he will cause accidents. It is suggested for consideration, that this rule be revised, and that traffic be required to stop where the best visibility of the intersected street can be obtained, and that a stop line be painted on the pavement at this point.

The Committee is to be recommended upon its adoption of the sign wording "Stop Through Traffic." There are approximately sixteen different variations of the wording "Through Traffic Stop," such as "Boulevard Stop," "Through Highway Stop," and more recently Massachusetts' proposal of "Through Way Stop." After all, whether it is a way, a highway, a boulevard, or an avenue, the reason for stopping is "Through Traffic." The expression "Stop Through Traffic" fits every case, and combines the sixteen variations into one which is universal.

Under Rule 16—"Slow Signs," it is recommended that the word "Slow" be in two-inch letters when used with "HILL" and other similar designations. A two-inch letter, to a person with normal eyesight, is readable at 125 feet in daylight; and at 10 feet under headlights at night. Restated in terms of time, this means four seconds at 20 miles per hour during daylight. At night it is of no value. It

is a question if the word "SLOW" has any value on a sign if it is put in two-inch letters. The question also arises if the words "HILL," "CROSS STREET," etc., need to be supplemented by an insignificant word "SLOW" when it helps to confuse the main message and when the main message tells the whole story.

Under "Street Traffic Control Signals"—Section 2, it is suggested that Stop and Go signals should not be operated at times when the volume of traffic is reduced. A Stop and Go signal is usually placed at a difficult corner. As the volume of traffic decreases, the speed increases. Many traffic officials have found it expedient and of great benefit when the normal operation of the signal is discontinued, to operate the amber as a flashing light. This is suggested for consideration by the Committee.

The use of two or three colors for Stop and Go signals is a question of controversy, a limited number of cities and towns having adopted the two-color. The great predominance of opinion seems to favor the three-color. Under the circumstances, the advisability of mentioning the two-color at all in a standard of this kind is doubtful. If, in the investigations made by the Committee, the subject is so obviously in doubt and not definitely clear, all reference in the standard to the use of either two or three colors might well be left out, for the reason that the publication of it in the standard will cause much confusion. In my own experience, the use of amber after green is not only finding increasing favor, but perfectly fits the traffic need. On the contrary, the use of the two-color signal or the amber after both green and red leaves much to be desired.

Under "Signal Specifications"—Rule 60, Item 2, a 60-watt capacity lamp has been specified as standard. Sixty-watt lamps in some signals which have been installed give an indication that is so poor that the signal is a hazard rather than a safeguard. In other signals, the indication is good. Any standard set up around the matter of lamps or optics used in a signal should be in terms of the intensity and distribution of the signal indication. As a matter of fact, it is the signal indication to the driver with which we are actually concerned. Properly used, a 25-watt lamp can be made to give a far better indication to the driver than a 60 or 100 watt lamp improperly used. This leads to the point that a highly desirable standard which should be adopted as early as possible, should concern itself not with the kind or size of lamp, but should establish a minimum requirement for light distribution and intensity of signal indication to the driver and to the pedestrian.

It is very gratifying to know that the Committee has seen fit to re-comment against words on signal lenses. One is always reminded of the milk wagon horse in Stamford that shied at a cat one morning at 4:30 and ran away. Two blocks down the street he came to a Stop and Go signal that switched from green to red, and the horse stopped. They vouch for this story in Stamford, and, if it is true, it indicates that horses know what red, yellow and green mean, and humans ought to. This has been a troublesome point for years.

The committee expresses the thought that only one type of signal installation should be used in each city. I should like to register my opinion that, to attain such standardization, sacrifices efficiency of treatment of many locations. If the signal is a good signal and properly designed, it will find traffic and compel attention and drivers will not have to hunt for it. In my opinion a good signal may be placed in a variety of positions on a corner to advantage. It is suggested that the requirements for standardization of location should be that the signal or signals shall be visible to the traffic approaching from any direction.

Under the "Height of Signal," the Report states that experience indicates that the bottom of the housing should be four feet to eight feet above the pavement if the signal is inside the curb line. This conclusion is open to question, because at any height under eight feet the signal is likely to be obscured by parked, stopped or moving vehicles.

The report leaves one with the strong impression that obstructions, such as va-

rious types of signals and mushroom buttons in the street, are not considered with favor. I offer as my own opinion that one of the greatest difficulties with traffic arises out of irregular movements of vehicles at intersections. These irregular movements can be prevented without interfering with the proper operation of vehicles, expediting the movement of traffic and reducing accidents. Safety zones and refuges in the throats of streets are in many cases very valuable for such work.

Rule 79—"Railroad Crossing Gates." There is a considerable problem here since railroad crossing gates are usually lighted by a small red light or lantern that appears to be so much like a tail light that drivers pass around it to the left. For this reason, most gates are broken to the left of the light. Some standard night marking and illumination should be provided for railroad crossing gates which will eliminate this difficulty.

On the subject of railroads, there are many railroad, track circuit operated, train approach signals in the roadway on streets and highways, that give an indication only when a train is approaching and constitute a real menace to vehicles at night. It is urged that a standard be adopted requiring that all such signals located in the used portion of the roadway should be equipped with a flashing amber light to operate at all times when the train approaching signal is not being given.

We hear a great deal from railroad men about vehicles running into the side of trains. Those of us who drive 20,000 to 30,000 miles a year are well aware of this situation. Again and again one pulls up just in time to avoid running into a freight train standing or moving across the road, which so blends into the background landscape, that it is not visible to the driver, and this is particularly true on rainy nights. Something should be required to render freight cars, particularly on long trains, visible at night.

In the Report, the expression "wide" as distinguished from "narrow" streets is used in a number of places without exact definition. A street which would be considered wide and suitably straight in Marblehead, Massachusetts, would be called narrow and winding in Atlanta, and a wide street in Atlanta would be called narrow by the City Engineer of Minneapolis. Narrow and wide streets should, therefore, be exactly defined.

In Rule 84, under the subject "Protection of Safety Zones," several suggestions are offered for the consideration of the Committee. The traffic approach ends of safety zones should be parabolic in shape. When this shape is used, a vehicle striking the zone is deflected. When any other shape is used the vehicle is stopped abruptly.

In connection with safety zones, the Report suggests that posts be used to safeguard the zone. This, in my judgment, is a dangerous practice, because a vehicle colliding with such a safety zone will usually strike a post with the left side of the machine, and the force of the movement of the vehicle will swing it into the safety area, and not deflect it away from the zone. Again a red signal is recommended for the traffic approach end of the safety zone. One wonders if this is not a misprint, since, under all standardization actions of recent years, including that of the present Report, red is recommended only where a stop is required. The use of a red signal on a safety zone would be, in my judgment, a most serious error.

While the subject has never been brought up for serious discussion, I wish to question one of our most fundamental traffic rules, namely, the requirement that "The man on the right has the right of way." This matter first came to my attention in an article written by E. B. Lefferts, now of the Automobile Club of Southern California, and justifies serious consideration. The history of this regulation seems to be that in Europe, where traffic drives to the left and not to the right, the regulation was and still remains that the man on the right has the right of way. We changed this rule from driving to the left to driving to the right, but we did

not change the regulation that the man on the right has the right of way. Actually, when traffic drives to the right, the man on the left should have the right of way and most drivers agree that, in their own experience, they give right of way to the driver on the left naturally, and that to give right of way to the driver on the right is unnatural. Under the regulation of "The man on the right has the right of way," a driver approaching an intersection must keep his eye on the man who is approaching from his left, because he is the man most apt to hit him. At the same time, he must look away over to his right, to see if he must give right of way to someone approaching from that direction. A driver must, therefore, look in two exactly opposite directions at one time, and it cannot be done. If, in the exact meaning of the regulation, a driver gives right of way to a driver on his right, he stops in the intersection to do it, a position which is not only dangerous but which blocks other traffic. We may never change this rule but, after thinking about it and observing its operation for some years, I have come to the conclusion that it ought to be changed and urge the Committee to consider the matter.

My endeavor in these comments has been to present constructive criticism of the Report. They are presented with the utmost respect for the difficult work the Committee has had to do and for the most excellent job they have made of it. No one who has not sat on such a committee knows the difficulties of formulating exact standards from a mass of complicated opinions, practice and ideas, nor the difficulty of reconciling the opinions of the members of the committee.

The American Engineering Council's Report is as a whole most excellently done. It is a foundation on which our future traffic standards are now stated or upon which they will be built. Contrary opinions which have been expressed relate to points which, in my judgment, must ultimately be modified; if the standard is to be fully accepted and adopted by the traffic officials, who, after all, take the responsibility for the expenditure of public funds and whose reputations depend on the results obtained. The judges in this case are the drivers, few of whom can say what is right, but who are quick to know and to say so when a traffic treatment is wrong.

In conclusion, it is important to point out that these or any other standards are subject to modification in order that they may fit new conditions or as new experience may require. In their use, there will be many questions as to the meaning and interpretation of the provisions of the standard. For these reasons, the committee's work has only just begun. It is of the utmost importance that the American Engineering Council or the Hoover Conference arrange to have a committee of, say, three men who are actively engaged in traffic work and who can be referred to, to interpret the provisions, settle questions which are certain to arise, and who will keep abreast with developments so that provisions of the standard may be promptly modified when necessary. If this is not done, this will be just one more set of standards, accepted by some and misused or ignored by others.

CHAIRMAN POWELL: Gentlemen, I think we have heard a most excellent paper, and as chairman of the committee that has been responsible for this work, I am very happy to say that quite a number of suggestions that have been proposed in the paper by Mr. Kelcey have either been incorporated in the latest revision of the report, or in some substantial manner the point has been taken care of.

The last matter that Mr. Kelcey discussed with regard to the right of way at intersections is not within the scope of our committee, and is rather within the scope of the Committee on Model Ordinance, which, as you know, has just very recently submitted its report for general consideration. Our committee can only handle the mechanical devices that are used for traffic control and does not go outside of that field.

Now we have the lantern arranged so we can go on with Mr. Cole's talk which was really scheduled for the first talk on the program. Mr. Cole, I may say, has

been one of the most active members of our committee and has been practically the chairman of a sub-committee on the drafting of the official signs which are recommended in the report. No one, therefore, is better qualified to speak on that particular feature of the report than Mr. Cole, and I take great pleasure at this time in presenting Mr. W. Graham Cole, Metropolitan Life Insurance Co., who has had that matter particularly under his personal supervision.

The A. E. C. Report on Signs and Markings

By W. GRAHAM COLE

Manager, Safety Division, Policy Holders Service Bureau, Metropolitan Life Insurance Co., New York City

The Program Committee, in arranging for the program today, has taken apart the committee report on signals, signs and markings, and had understood that your former speaker, Mr. Kelcey, was going to discuss the signal end of it and assigned to me the signs and marking end of it. However, I think we ought to feel gratified that Mr. Kelcey covered the sign part as he did from the standpoint of one not on the committee and brought out those points which come to the minds of the hundreds and thousands who will see the report from a different angle from those who had their nose more or less close to the grindstone in working on the report. However, I find it necessary to ask your indulgence to repeat in a way a portion of Mr. Kelcey's remarks, from the standpoint of a committee member presenting to you the report itself.

In the first place, as a member of the committee, and not a member of the staff of the American Engineering Council, I wish to take this opportunity to assure everyone that the American Engineering Council left no stone unturned to secure from the Nation as a whole a report of what was being done in this field. We are all bothered with numerous questionnaires; we have them come to our desks frequently. Some of them are small, fragmentary; some of them are rather inclusive; but right on top of one comes another. The American Engineering Council in undertaking this study, prepared a very inclusive report, and through its local organizations scattered throughout the country was able to collect information on this subject that has never been collected before. I do not think there is a question that the supporting material, which will be bound in the rear of the report itself, will present to you gentlemen and to the traffic engineering field of the country, the first authentic broadside presentation of existing conditions in the country in the matter of traffic control signals, signs and markings. The Council, through its member organizations, not only collected this information, but was able through engineering minds in these communities throughout the country, to bring together comments on those matters of traffic control that reflect the actual opinion of the engineers in these communities. And so I think that you have a report based on the most authentic information that can be obtained.

The committee did not feel bound in every case to make recommendations consistent entirely with the condition as found. It felt that many conditions were changing, had changed frequently and that new practices were coming into play, and the fact that a particular practice was utilized by a predominating number of cities did not necessarily indicate that it was the best practice. And so although they used as far as possible the predominating practice, they also gave expression to improvements that had been perfected and had not been installed in all of the cities.

It is the purpose, therefore, of this talk this morning to present to you the findings or the recommendations of this Committee on Signals, Signs and Markings, or that portion of the report dealing with signs and markings.

There is no question of the value of signs to the motorist. There is no question as to the value of having them standardized. I recall an instance of a motorist who was driving over a bridge in Harrisburg, Pa., and who made a turn at the crossroad as he came off the bridge, with a green light shining in his face. There was a traffic policeman of Holland extraction on the beat who hailed the man and sent him to the curb. He came over and the fellow said, "Officer, what did I do now?" "You turned on the green light." "Well," said the motorist, "Where I come from it is a rule that we must turn on the green light." "Well," said the policeman, "here it is different—when the light shows *go* you stop; when the light shows *stop* you go."

If it is true that we need a standard on signals, we certainly need a standard on signs. We all believe in signs to a certain extent, and if we could look forward just a moment and see ourselves driving around the United States, realizing that in every community in which we went we saw a particular sign, and it had the identical meaning, and it looked just like the sign we had seen in the other places, and we were to do the same thing when we saw that sign there as we did a thousand miles away when we started our trip, what a convenience it would be to drivers. What a saving of lost motion and time in finding out what to do, and furthermore what a great advantage it would be for human safety, because when a driver spends his time finding what to do instead of doing it properly, accidents are unavoidable. I think there is no need of expatiating on the desirability of standardization throughout the country so far as we can get it.

Now, as has been mentioned by your Chairman and by Mr. Kelcey, the report proper is put out as a tentative practice, as a suggested traffic practice. It is impossible at this stage to get a standard that is going to be suitable for time immemorial and will be adaptable to every condition and suit everybody's whims. Here is the first step, however, to bring out something that is as near standard as you Committee has been able to secure at the present time, and which, if used, will bring out its own inefficiency and greatly help to develop a standard which will ultimately, we hope, be utilized throughout the country.

The Committee in its considerations felt that it should give attention to several phases of signs. It should have effective signs. It should have signs that were standardized, and, because of the need of standardizing signs, it felt it was necessary to group those signs, because of various meanings, into certain classifications, which classifications could therefore be standardized.

An effective sign must have a clear meaning, be easily read, be in understandable English, and be something that will attract attention and tell the message quickly. If it is going to take time to read a sign, decipher it and understand it, you are going to delay traffic, and you are going to do a lot of things you ought not to do. A sign should attract attention immediately. If it is a sign that requires immediate obedience, it should be placed where that obedience is to be given. If it is a sign that requires caution at some future place, it should be so located to give proper warning to the motorist that he is coming to that particular place where caution is demanded. A sign should of course be visible—not only visible in the day time, but equally visible at night, particularly those signs that are giving definite local instructions on what to do, and those signs which are giving information as to how to do it and where to go.

For a day sign the color combination had to be given consideration. A sign had to be produced that would give a good visibility under average daylight conditions. So the coloring of the signs had to be given considerable thought, not only to get a combination that would be contrasting between groups, but would also give a good visibility under varying conditions. And then in order to have it illuminated properly at night, the Committee has made several recommendations in the order named: (1) That the sign have an attached light close to it that will illuminate the face of the sign itself; (2) That it have self-luminous letters to make

the sign stand out; (3) That it be placed so it can be illuminated by existing street illumination—in our modern broad highways and well lit streets, it is frequently possible to place signs so that the existing light of the street will illuminate the signs adequately. (4) By the use of reflected letters so placed on the sign and the sign so placed that the reflecting element of the sign will catch the head-light ray and reflect it back to the motorist, and the sign will then be illuminated every time the headlight strikes it. Beacon lights were considered, and it is suggested that when they are used they be used in conformity with the color meanings utilized for the signs in other places.

In order to have a good sign it must be well maintained. The Committee has just inserted a little clause calling attention to the need of maintenance. In my industrial safety work, I feel that one of the things that has gone against the reduction of accidents in industrial plants perhaps as much as any one element, is the lack of attention frequently given to signs in the plant. I was in a plant not long ago and saw a sign on a paint wagon that they were passing around between machines which said something about not smoking around that wagon, but you could not see the letters on the sign. Absolutely useless. When you have a sign you put it there for a definite purpose. If you let the sign go to pieces, you immediately indicate to the general public that somebody believed that was a good message years ago, but they forgot all about it and don't care about it today. If you are going to have a sign that means anything worth meaning, that sign should be maintained in the very best condition and kept up to date, for the psychological reason, not simply for the visibility—the psychology of impressing upon the people that the city still believes in that sign.

The sign should be properly constructed, of proper material. The Committee feels that in the construction of the sign first consideration should be given to durability, for the obvious reason I have just mentioned, and second to economy, but stressing the fact that durability is of first consideration and frequently covers economy in the long run, although it may produce the highest price for the initial cost.

The materials recommended by the Committee for signs in the order of preference are: cast metal, sheet metal or wood. They refer you to the specifications of the Joint Board of Interstate Highways of the United States Bureau of Public Roads, the American Association of State Highways Officials, and the United States Bureau of Standards for specifications as to materials and finish, including paint.

Now, in arranging for a standard sign there are several items that must be taken into account. First, the shape. If we could get a sign throughout the country that just by its shape means something to everybody, we will have a very excellent driving condition. If you could go through a town and, seeing a sign of a designated shape, you don't have to stop and read it, just think how that will help us; what an advantage that would be.

The matter of dimension is to be standardized to a certain extent. The shape is the predominant thing, but if we can have a standard on dimension, we will not have a heterogeneous supply of signs all over the country, and furthermore we will adhere to an economic principle, because mass production will be possible where the dimensions are standardized.

Coloring is very essential, just as essential as shape. If we have a combination of shape and color which means a definite thing, we certainly have gone a long way toward standardization.

For those who read we want a lettering that is more or less consistent with the use in other cities. The lettering is of importance, that is may have the same meaning here that it has somewhere else. But I said that thoughtfully—"for those who read"—it is the hope and the desire of the Committee, I think, that eventually the

shape and color will have a designation to the motorist that will have a definite meaning, regardless of whether he desires to read, can read or does read.

The height of the sign is something that affects standards, and something that should be given consideration, because if the proper height can be determined in a community, why not use that height pretty generally around the country, so the motorist will know that signs are at a given point and he will not be looking to the house tops nor down on the street bed for information. He will know just about where to obtain that information. In traveling around I have seen one-way street arrows painted on the surface of the street; I have seen them on a small post about eight feet above the ground; I have seen them on the side of a house where the name of the street is supposed to go. From the street surface to the second story of the house is the range I have seen these signs; so why blame the poor motorist who goes the wrong way on a one-way street if he is a stranger in the town.

For signs on movable posts in the roadway, the Committee recommends they be not over four feet high to the center and in requiring signs placed to catch the rays of the light, that they be not over three feet high at the center.

In the railroad signs we have adopted the specifications and wording of the A. R. A. The railroad crossing sign is the ordinary crossbar used by the A. R. A., black on white—location to be not more than 15 feet from the crossing. The A. R. A., I understand allows that sign to be placed at the side of the road or the center of the road. The Committee recommends that the center of the road is a dangerous location and should not be used. Railroad grade crossing approach, size 24 inches in diameter, with 2 lines drawn to form quadrates, with the letters R R in the upper quadrant, to be located 100 feet or less from the crossing. Where there is a street intersection between that 100 foot position and the crossing, your Committee recommends a second sign be used, calling the attention of the motorist coming from the side street that he is about to come to a crossing. The sign should be illuminated and the colors should be in accordance with the law, preferably yellow, or white if required.

If we may have the first slide: the STOP group as selected by your Committee:

(Here the signs recommended by the Committee were thrown upon the screen and described by Mr. Cole as follows:)

This sign is to be placed at the point where it is to be obeyed—namely, right at the property line. In the matter of colors we found that there were two more or less standard color designations for the STOP sign; one proposed by the Joint Board of Interstate Highways—black on yellow; and one proposed by the Traffic Signal Code Committee—white on red. The two were very divergent, and the Committee endeavored to obtain a sign they thought would meet the requirements. Our outstanding feeling was that red should designate STOP. We wanted to have the red apparent not only in the day time, but in the night time. We felt the red letters on the yellow background would be consistent with the Highway Department regulations, which is black on yellow background, in that the background would be the same. As the Highway official signs became illuminated, it would be necessary for them to get away from the black lettering and put in a black strip with red or white lettering. The Committee felt that the red lettering, although cutting down somewhat, as Mr. Kelcey said, on the visibility, would at the same time show to the motorist day or night a red designation; and we feel that it is very important to keep red as a definite commanding order to stop. So the red on yellow was selected for that purpose.

The diagram accompanying the report will have (as this slide has) dimensions concerning the size of the letters and the size of the sign.

The next set of slides is the SLOW group. They shall be diamond shaped signs; an 18 inch square placed as a diamond—the color black on yellow background—the design, the word SLOW at the top in small letters, the message in the center, and the direction at the bottom in the form of a symbol.

This particular one for Safety Zone has an arrow at the bottom, pointing to the right, and with provision that in those cities permitting automobiles to pass to the left of the Safety Zone, the arrow shall be double pointed. The same sign could be used at a street car crossing where the word CAR LINE would take the place of Safety Zone.

At the cross street, as shown by the next slide, the Committee feels in the matter of wording that the word SLOW, and later on the word CAUTION, are useful to place on the upper part of the sign for the purpose of designating and gradually educating the public to the meaning of the shapes and colors. In some of the signs, however, it is felt, because of the wording, that it would be perfectly permissible to leave the word SLOW or CAUTION out, this being one of them.

The next is the hill sign, to be placed on grades of six per cent or more.

The next sign, the curve sign, is to be placed on curves having a radius of not more than 600 feet. For turns having a radius of less than 200 feet, the turn sign with the arrow pointing in either direction.

The next group of signs, for which, unfortunately, we have no slides at the present time, is the CAUTION group, that the Committee recommends be the same color design as the SLOW group, but square in placement rather than diamond in placement. They shall be the same size, namely 18 inches; color black on yellow. Those signs will be the school zone signs, which would have the words SCHOOL ZONE in the middle, or the playground sign, having the word PLAYGROUND on it, and then the report provides for the use of that particular sign for any other condition that may be required for caution, such as "narrow bridge," "men working," "dangerous road," etc.

The next group of signs are the one-way and detour signs. The Committee recommends an arrow 30 inches long by 6 inches wide with the words ONE WAY or DETOUR, as the case may be, in black letters on a white background. It also realizes that some communities prefer to place that arrow on a rectangular background and provides in that case instead of using simply a cut out arrow, it may be painted on a black background 8 by 37 in dimensions.

The sign to be used for one-way streets and to designate that a detour is existing, will not contain information as to the direction the detour takes or the route, which will be taken care of by other signs, as is done on the highway.

The next group is the informational group, which are black letters on white background, the size depending somewhat on the wording to be placed on it, but generally to be multiples of six inches both ways, and to have the vertical dimension greater than the horizontal dimension unless otherwise specified. Those signs may be KEEP TO THE RIGHT, NO TURN, DEAD END STREET and the like.

The next slide shows the speed limit sign, which comes under the informational group; is rectangular; of same color; size, multiples of six inches. They recommend two sizes—the highest size used a 24 by 36. It is thought in many places in the city an 18 by 24 sign will be perfectly satisfactory; so we have allowed for both sizes, specifying, however, that the larger size shall be placed at roads on the entrance to a city, and that the smaller sign be used at such places as necessary throughout the city. The Committee also recommends a sign, not shown here, to designate the end of a speed limit. In the majority of cases, where one speed limit ends, another local speed limit begins, in which case the new sign designates the speed has changed. But to provide for those places where the community has a speed limit and there is no legal speed limit immediately following, the Committee has provided a sign which will show end of designated speed limit provided at that place.

The next group are the so-called restriction signs. The shape of these signs to be rectangular, to be size 18 by 12, 18 inches high. They are to be grouped according to the meaning they are to designate. The NO PARKING signs are to be red on white carrying out the idea of red meaning definitely to stop, or prohibition.

Those signs may be the one shown here, to be used near a street intersection, or one used near a fire house, in which the words FIRE HOUSE would appear; near a crossing; at a loading zone, and at a passenger zone, where a vehicle is allowed to stop to load and unload passengers, where the sign will change to NO STANDING—PASSENGER ZONE; near a fire house the word PARKING would be replaced by the word STOPPING.

The limited parking sign uses green instead of red, to be used where parking is limited, giving the time designation on the sign.

All other restriction signs are recommended black on white, with the exception of those pertaining to the pedestrian. The Committee does not feel that the cities should place signs against such practices as jay walking, which can more readily be taken care of by posters in the public safety campaign, but if there are places at intersections where it is absolutely hazardous for pedestrians to cross in a given direction, in those places small signs may be erected, rectangular, stating NO CROSSING, and we recommend for this purpose that blue letters be used on a black background.

That completes the signs themselves. The other part deals with the markings.

It was felt that markings on the streets are essential, particularly on obstructions in the bed of the highway, in order to attract attention to the obstruction that the motorist is meeting; that markings are valuable on curbs to designate certain loading requirements, and that they are valuable on streets for a number of purposes which will be mentioned; but the report calls attention to the fact that markings of any kind on street surface or curbs are subject to conditions of weather and are useless in snowfall. It recommends the use of markings as lines on pavement; colors on curbs; words on pavements or curbs, and cross-cut or checkerboard designs on obstructions.

Where the words are marked on the streets they should be very clear and concise; should be used just as sparingly as possible. There may be an advantage for a certain location to have a word or a message on the street, but the Committee feels that that usage should be very sparing and only where absolutely necessary.

There are several methods of marking. Round inserts, the committee recommends, should be of aluminum, non-rusting; steel, monel metal, brass or some other metal that will have a contrasting and bright surface to contrast with that of the other street surfaces. That this be not less than four inches in diameter, be securely attached by bolts, protrude not over one-half inch above the surface and have round edges. The report also provides for rectangular inserts which should be of a prominent color contrasting with the pavement; to be of brick, stone, rubber or metal, set preferably in line either continuous or broken, and placed so as to be flush with the pavement. Where paint is used it is recommended that the line be not less than four inches wide; that it be white or yellow if placed on bituminous pavement, and white or black if placed on concrete pavement.

In the matter of canvas markings, which have been utilized in some cities, it is recommended that white or yellow be used, and that the specifications for the canvas call for the placing of it on the pavement surface by someone and in a way that will hold up under any and all conditions. We feel that some canvas that has been used has moved around the street surface and has thus become practically useless.

In the matter of mushroom buttons, the Committee feels that those that project several inches above the sidewalk are detrimental to traffic and has recommended against their use. It has acceded to the use of them, however, at places that are barred to traffic, such as the center of a street, where rotary posts may be used, or something else to designate a no traffic space.

The Committee has taken cognizance of the flexible marker which can be made

of rubber or some other flexible material, which drops down to the street surface when struck by a car. Where they are used it is suggested they have yellow letters on black background, to be not more than 8 inches high or 30 inches long, and that they be so placed in the street as to be readily removed for replacement and in case of stormy weather, so they will not be destroyed by snow plows or other things.

In the matter of marking for railroad crossing the report adheres to the standard of the American Railway Association, that they be alternate strips, black and white, 9 inches wide on an angle of 30 degrees to the horizontal. Prominent obstructions in the roadway should be marked alternate black and white, 3 to 6 inches wide, at an angle of 45 degrees to the horizontal, or a checkerboard with squares 6 to 12 inches wide.

That, ladies and gentlemen, is a brief summary of the outstanding phases of the report dealing with signs and markings. It is the earnest hope of the Committee and of the American Engineering Council, to whom the Committee submitted the report, that traffic engineers throughout the country will consider this in the form of a hand book on best practices and will at least give it the most reasonable try out, hoping that experience will indicate the need for certain modifications and that ultimately we shall have a standard throughout the Nation.

CHAIRMAN POWELL: Should there be anyone who has any questions to ask, or any discussion with regard to this paper, we shall be glad to hear it.

FRANK L. GILLMOR (Columbia Casualty Co.): In showing those rectangular signs with the height longer than the width, the restriction signs, the diagram showed a sign with square corners. Those square corners to my mind present a slight hazard to pedestrians, in the way of tearing clothes and personal injury to children striking their heads against it, and it might be well, I would say, to incorporate some standard practice to round those corners to a two or three inch radius.

MR. COLE: That is included in the recommendations. The drawings from which these slides were made were preliminary drawings sent out for the Committee and the finished drawings have not been completed.

FRANK MATSON (Minnesota Railroad Commission): I am particularly interested in grade crossing protection. I understood Mr. Cole to say his Committee recommend that the proper distance for an approach warning sign at a railroad crossing to be 100 feet. Is that correct?

MR. COLE: Yes.

MR. MATSON: I would like to ask what consideration influenced the Committee to recommend that the approach warning sign be placed so close? In our State we find that about 400 feet is the proper distance. An automobile traveling at 40 miles an hour, which is the average road speed in our State, will go 100 feet in two or three seconds. I have not figured it.

MR. COLE: The report called for 100 feet or more, leaving it more or less to the State law. Please remember that this report covers signs in cities where speeds are lower.

MR. MATSON: Did the Committee consider any marking on a railroad crossing sign indicating more than one track? That's a problem we are working on now.

MR. COLE: That matter was given consideration and my impression of the reason in Committee was that we thought the main consideration was to call the motorist's attention to the fact that he was approaching a railroad crossing, and that he should govern himself accordingly; he should find out what was the condition at the crossing, and that if we tried to show too many designations, we would get into a multiplicity of signs.

CHAIRMAN POWELL: In cities you frequently find crossings that run to a great many tracks. If we tried to show by the number of lines on the sign the number of tracks, it would be more confusing than anything else. Whereas in the country

you have generally not to exceed four, generally only two, in the city you might run into a condition where you have eight or twelve. I know one crossing that has thirteen, and to put that number of bars on the sign would tend to obliterate it and make it confusing instead of helpful. So we discarded the whole idea, as Mr. Cole said.

BURTON W. MARSH (Pittsburgh): I believe it would be very helpful to some persons present if the Chairman, being Chairman of both the meeting and the Committee, might announce at this time when these reports would be available, as the budget making time in some communities is approaching, and I know a number of communities are waiting for this report to determine their sign program for the coming year.

CHAIRMAN POWELL: In response to that, before Mr. Marsh came in, at the introduction of the meeting I did announce we expected to put this report in press during the current month, and while I cannot answer for the printer's schedule exactly, I feel pretty sure this will be available for distribution about the 1st of November.

MR. MILLS: I should like to ask the Committee if any recommendation has been made for cities and towns for marking the names of streets. It seems to be a cause of considerable slowing up for the motorist in looking for street signs, which a great many cities have entirely omitted. Is that a function of this Committee?

CHAIRMAN POWELL: We did not feel that that came specifically within the scope of this report, because those are not traffic controlling devices, and we were confining ourselves to those devices used specifically for traffic control. I think, however, that the speaker is entirely correct that some effort at standardization in that respect would be most helpful, and it is quite possible if there was a demand made of that sort, that the Committee might supplement its present report with material on that subject later on.

A. P. VAN GELDER (Delaware Safety Council): I understood you to say that there was criticism of mushroom signs for certain places. I did not quite catch that. I would like you to make it a little more clear. We have in our city of Wilmington quite a number of mushroom signs that have been recently installed. They have a self-reflecting glass in them, and they are used at the unloading and loading stations of trolley cars. They seem to be very good in Summer. We have never tried them in Winter. I don't know how they would interfere with the snow cleaning.

MR. COLE: The Committee felt that where a mushroom button which protrudes above the pavement surface has a fairly good diameter, it was an obstruction to moving traffic if placed in the line of moving traffic. If placed on the side where automobiles would not go over it, it would have use; but where placed in the middle of the street, the Committee recommended against the practice.

MR. VAN GELDER: What would you substitute for a trolley alighting station?

MR. COLE: There is another part of the report which deals with the proper marking for alighting places of trolley cars.

CHAIRMAN POWELL: We followed explicitly the recommendations contained in the report of the Model Ordinance Committee, which has just been published. They recognize two classes of alighting zones for street cars: one with the raised platform, and the other one without a raised platform but still equally well protected. They then mentioned there are two other types used which are not recommended. One is the type which has simply a pavement area that is protected by movable signs to be taken away at times of the day when not needed, and the other is the type of pavement simply outlined with a mark and possibly with mushroom buttons as well. Neither one of those are recommended by the Ordinance Committee or by our Committee. We feel they are hazardous rather than advantageous.

MR. VAN GELDER: Our case comes in the second classification, but I do not get yet what you do recommend.

CHAIRMAN POWELL: We recommend either the raised platform or the alighting zone without a raised platform that is adequately protected by a massive obstruction at the approach end for traffic and that is properly lighted and marked, and having a sign on it marked SAFETY ZONE, such as you saw here, and then protected along the side of the zone facing traffic by adequate posts not more than 8 feet apart.

MR. VAN GELDER: We had posts. Our community did not like them as well as the mushroom button. They were all the time getting out of place.

CHAIRMAN POWELL: Permanent posts; not movable.

How the Signs Fit In

MR. MORRIS (University of Massachusetts): If I understand Mr. Cole correctly, he mentioned that they had a NO STANDING and a NO STOPPING sign in addition to NO PARKING. As parking is usually defined as stopping longer than necessary to load or unload, I was wondering just where the NO STANDING sign fitted in. What's the difference between NO STANDING and NO PARKING?

MR. COLES: NO PARKING permits you to stop a vehicle long enough to load or unload, where the driver may be off the vehicle and the vehicle left for some time. NO STANDING permits a car to be halted momentarily to let off a passenger with the driver still at the wheel. Stopping is to stop for any purpose at all. There are these three grades. In front of a fire hydrant, for instance, it is absolutely wrong to leave a car parked. It would be no danger, however, to have a car temporarily stand there, and let a passenger off, if the driver is right at the wheel. Nor would there be any hazard in having him stop there for a moment.

MR. GILLMOR: It has occurred to me that in a good many cities the trolley passengers board the car at the near corner. In many cases the bus stop is also on the near corner, making quite a congestion of traffic, and especially at the busy times of the day, around five or six o'clock in the evening. Often just a short distance away, a matter of a hundred feet, there will be a fire hydrant. It has occurred to me in lots of cases that the transportation companies would not work any hardship on their passengers to make the fire hydrant zone an alighting station for bus passengers. Probably the average fire hydrant is not used more than once or twice a year. There is always ample warning for a vehicle to get out of the way, if they hear the fire gongs coming, and in a congested location like that there is usually police protection in addition; and it strikes me that it would increase the efficiency of the street to a large extent, if the fire hydrant zone were located within 100 or 150 feet of the crossing, to use it as an alighting zone for passengers for busses, instead of loading at the corner and possibly holding the general traffic after the lights change, due to the loading of the bus.

ERNEST P. GOODRICH (Chairman Engineering Committee, National Safety Council): Here in New York the street cars stop on the near side and the busses on the far side.

CHAIRMAN POWELL: I find our time is rapidly passing and we still have one more speaker. Mr. Ernest P. Goodrich, Consulting Engineer, New York, and who has perhaps had as wide an experience in traffic matters as anyone in this country, and he is going to tell us something about when traffic signals are justified.

When Are Traffic Control Signals Justified?

By ERNEST P. GOODRICH
Consulting Engineer, New York City

At one of the early meetings of this Congress an eminent traffic expert described some of his observations with reference to traffic signals. In one case he had discovered that the installation of a signal had produced more accidents than had occurred in its absence. That is a direct challenge to the general theory that the installation of a signal will prevent accidents. Another case was mentioned of a community where an appropriation of one hundred thousand dollars was being made for the coming year's traffic installation work, but it was on the understanding that one-thirteenth of the appropriation should be used in each of the thirteen wards of the city, whether the traffic required that particular distribution or not. The Committee on Signs, Signals and Markings, of the American Engineering Council points out that the improper location of signals, or their installation if they be too numerous, is apt to breed disrespect on the part of many a motorist. If he is required to stop too often when there is no traffic interference involved, he will try to jump the signal—move on the red, and otherwise disobey the law.

In many cities the installation of lines of signals on certain streets is pushing the motorists onto other streets where the delays which are always incident to every traffic installation do not occur, but thereby creating extra hazards on those streets, particularly to children. Not long ago the writer took occasion to invite one of the traffic officials of New York City to lunch, with the object expressly in mind of asking him not to install traffic signals on all the north and south traffic lanes so that one could travel on at least one street without having to stop every two minutes to wait for the signal. Another reason for the lunch was to submit the suggestion that a different type of signal be installed in New York than is now so universal. If the progressive system were used instead of the stop-and-go, there would not be the objection which the writer had raised to the installation of the traffic signals on all the avenues.

In other words, there should be a balance between the profit and loss at any intersection or any group of intersections, if a truly engineering or scientific or economic determination is to be made as to the adequacy or justification of any signal. Judgment must enter to a certain extent; but not to the extent which occurs under the usual method of today, when the traffic official, or the mayor, or the Commissioner of Public Works or somebody else, goes out through the city and says "We ought to have a traffic signal here and there and over there;" or for an alderman when an accident takes place perhaps due to an improper crossing condition or to the location of an intersection at the bottom of a hill, to go to the next meeting of the Council and say, "I want a traffic signal installed at my corner within the next month." It may be that no accident is liable to happen at that intersection again for the next ten years; still he wants a signal at that point.

In New York, for example, the first signals that were installed on Fifth Ave. at 23rd and 42nd Streets were shown to have increased the accidents at those intersections because they were placed in the center of the streets on islands. In another city a traffic signal was installed about half way up a long hill where an intersecting street entered, and the signal had to be replaced once every three months on the average. Inevitably, wherever a traffic signal is installed, there is a loss of time to vehicles which pass that intersection, because part of the time as it is normally operated today, the signal is set against traffic and it has to wait. In a group of signals on the progressive system, the two ends of that group have the same sort of traffic loss involved. If the signals are entirely independent, each one of the signals has the same effect in slowing traffic.

Now, the value of vehicle time has been studied to a considerable extent by various engineers. Some place it at five cents a minute; some say four cents a minute; some as high as ten cents. If you have been involved in the loss of a train caused by a traffic delay, you will place your time considerably higher than five cents a minute. Many arguments have been put forward to show that in the long run a motor truck going over a road can adjust its time so as not to involve a loss due to a traffic signal. By and large, throughout the year, taking the cost of taxicabs and the cost of motor trucks by the hour, five cents a minute is a pretty good figure to assume as the cost of vehicle time including the passengers; with one cent a minute for pedestrians. But, on the other hand, by and large, all the vehicles in a community are slowed down and it costs someone money to do that. It costs in the gasoline which is burned while the motor is running; it costs in extra wear and tear on the brakes and on the tires because of the stopping and the starting, and there are other actual material costs which are involved. On the basis of sound engineering economics a traffic signal should be installed only when or where the annual costs for interest, depreciation, maintenance, operation, and evaluation of delay created, will be less than the benefit which its operation would produce in reducing and/or preventing delays and/or accidents at any installation point.

The possibility of reducing traffic delays will depend largely upon traffic density. The possibility of reducing or preventing accidents will depend upon their causes. In general, two major accident causes exist; the first is traffic density, and the second is some local physical condition such as a blind corner or a steep grade. Physical conditions must be treated independently of traffic density requirements, and are not here considered.

The capital investment of a signal installation must be estimated for each separate intersection because conditions differ widely. A study must be made of the type and design of fixtures which are required under existing and probable future traffic flows. Whether a single centrally suspended fixture should be used, or whether four, two-way, corner, three-light, post, fixtures should be employed under local or central control would make a vast difference in the first cost. Often the control of a single intersection would be useless, whereas the installation of signals at a group of related intersections would be well justified. In addition to fixture costs, estimates must be made of power lines, whether on poles or in ducts, and of the costs, if any, of cutting and restoring pavements.

The annual charges include the usual economic ones of interest, depreciation, cost of power, maintenance, and replacement (every signal is run into at some time or other) together with the estimated value of the delay-time caused by the signal, and possible increases in accidents. The total value of delay-time per year created by the signal will depend upon the distribution of traffic throughout the twenty-four hours, throughout the days of the weeks, the months of the year, the hours during which the signal is operated, and to some extent upon the cycle employed. Diagrams of typical hourly, daily, and yearly distribution have been published from time to time in the technical magazines and are also to be found in Volume III of the Regional Survey of New York and Its Environs, "Highway Traffic" (pages 76, 78, and 79). It may possibly be advisable in some instances to operate a signal only a few hours a day during only the summer touring season.

The credit items which relate to intersections where signals are to be considered include the salary of a policeman if then employed, and if the signal installation will eliminate the need of such officer. The proportional part of the time of the officer is to be computed where a reduction can be made in his previous duties. The report of the Cleveland Automobile Club with reference to a proposed traffic system for that city gives a review of the savings in police time, estimated by various Chiefs of Police in other cities, and is the best résumé with which the writer is acquainted in that particular item.

At points where accidents have occurred which could not be eliminated by other local means, it is good practice to evaluate the cost of such accidents over a period of not less than five years and take an average per year. The tentative report of the Committee on a Standard Code for Street Traffic Signs, Signals and Markings of the American Engineering Council states that 77 cities out of 85 report that the installation of signals has reduced vehicle collisions, the percentage of reduction ranging from 10 to 95. In 68 cities out of 79, signals have reduced pedestrian accidents, the reduction reported being from 15 to 100 per cent. The statistics committee of the first Hoover Conference on Street and Highway Safety gives an estimate of \$5,000 for each fatality and \$175 for each personal injury involving damage other than fatality, with \$50 for the average property damage.

There is in addition, the time loss which is experienced by traffic passing through any uncontrolled intersection, due to the entangling, the confusion and congestion which occurs when vehicles try to use such an one with fairly heavy traffic. Some years ago an experiment was made for about a week on Fifth Avenue in New York City when the police officers were taken out of the street and put on to the curb and told not to suggest to drivers how they were to proceed, to leave them to their own devices. Naturally the writer spent many hours watching the scheme. It was not uncommon to find four vehicles interlocked not alone for seconds but minutes, at the intersection of Fifth Avenue and 43rd or 44th Street, for example; a vehicle would come up behind on each one of the traffic lines, so that it would be almost impossible for that unlocking to work itself out. The policeman on the curb would then go out and make one back up when he did not want to do so and finally get things straightened out. What might be called helter-skelter traffic involves losses to the community through delays of this kind and must be evaluated. The report of the Engineering Council Committee stated that in 70 cities out of 88 the installation of signals has expedited vehicular traffic while in 46 cities out of 78 there has been an increase of street car movement.

The valuation of this benefit is intricate and time will not permit its discussion in this presentation. It may be stated, however, that where it is believed that traffic can be expedited, a valuation can be placed upon this feature by multiplying the total number of vehicles per year by the number of minutes which the traffic can save between the limits of the signal installation, and multiplying this quantity by the value of vehicle time at five cents per minute. An accurate determination of such a figure involves careful traffic tallies and their analysis, at rather heavy cost. It should be stated, moreover, that rough estimates based on inadequate information are practically useless.

An example will be illuminating. Assume \$2,000 for the first cost of installation. Assume interest at 5 per cent, depreciation at 10 per cent, maintenance at 20 per cent and cost of power at \$200 per year which is equivalent to 10 per cent. These total 45 per cent making an annual financial cost of \$900. Assume further an intersection with an average main line traffic of 10,000 vehicles per day and a cross traffic of 5,000 vehicles, during the hours when the signal will be in operation. This ratio of traffic would indicate a two to one ratio of the parts of the cycle ignoring the gaps between changes. One-third of the main line vehicles would be halted on the average during one-half of the corresponding "stop" period; while two-thirds of the cross traffic would be halted one-half of its "stop" period. Assuming that this traffic moves during 300 days per year on a 90 second total cycle, it is easily computed that the delay will amount to 750,000 minutes. At five cents per minute this aggregates \$37,500 per year. The total cost per annum is thus \$38,400.

Against this figure are to be set up the annual salary of a policeman, for example; or, if a fatal accident has happened during a five year period then an offsetting amount of \$1,000 can be applied. Again, a total traffic of 4,500,000 vehicles per year might be demonstrated to have experienced an average delay of 12 seconds at that intersection. It is easy to compute that the value of such total

would aggregate \$45,000 per year. Attention should be called to the large computed monetary cost of delay inevitably produced by the operation of a signal.

Another method of approaching this problem is by an analysis of the traffic at any intersection in the light of the reasons which have been advanced why signals should be installed. As to this matter the tentative report of the Committee on Standard Code for Street Traffic Signs, Signals and Markings of the American Engineering Council, issued under date of August 1st, 1928, in the section which introduces the subject of street traffic control signals reads as follows:

"The most generally effective mechanical device employed to increase safety and to facilitate traffic at intersections on city streets is the automatic traffic control signal. The principal reasons why signals should be installed are:

- (a) To increase the safety of pedestrians and vehicles at congested intersections;
- (b) To facilitate the movement of traffic with a minimum of delay at congested intersections;
- (c) To provide for the continuous movement of traffic throughout the length of a heavy traffic route;
- (d) To interrupt a heavy traffic stream at intervals so as to afford opportunity for cross traffic to move.

There is a tendency to use traffic control signals unnecessarily. At times they are installed indiscriminately and without a proper analysis of the conditions and probable effects. They are frequently operated at times when there is no justification. As a consequence of ill-advised use, serious abuses arise, for example:

- (a) Impatient and reckless drivers disregard the signal "Stop." This habit threatens the usefulness of traffic control signals, for their value depends upon the confidence inspired by their observance;
- (b) There is a general dispersion of traffic from main thoroughfares to unsignaled side streets, where the volume of traffic and the accident hazard, especially to children, is greatly increased."

Some discussion has already been devoted to reasons (a) and (b) and computations with reference to (b), the facilitating of traffic with a minimum of delay will be given later. The need for (c), developing continuity of movement throughout the length of a heavy traffic route was disclosed more than fifteen years ago when an extensive diagram was constructed to show simultaneously for all of the intersections on Fifth Avenue in New York City between 14th and 59th Streets, the actual time for beginning and the length of each "stop" period created by the police officers on duty. At that time each officer was entirely independent. Some moved traffic with short stop periods and others with long ones.

It was an examination of this diagram which led to the invention, by the writer, of the Progressive System, but as far as the police were concerned the diagram resulted only in the first efforts toward coordinated control by hand semaphores. Studies with reference to the economic advisability of installing a large system are fundamentally the same as in the case of a single intersection, traffic conditions at all of the intersections included within the zone of influence of the complete system being studied and the total costs estimated for the several items already listed. In this connection it should be pointed out that a group of progressive signals will generally not produce any greater numerical inevitable delay than will be the case at a single intersection which carries the same total traffic.

With reference to reason (d) given in the Committee's report, the following mathematical treatment may be of interest. In order to make a comparison between the time loss before and after a signal is installed to handle a given traffic flow either existing or as may be estimated for some future date, certain formulae have been developed.

The first problem resolves itself into finding the time taken for a crossing vehicle to negotiate an intersection (including clearances) and the time spacing (taking account of clearance) between the main line vehicles.

Let V = Velocity in miles per hour of main line vehicles.

$$\frac{5280V}{3600} = \text{velocity in feet per sec. of main line vehicles.}$$

Let n = number per hour (average) of main line vehicles.

$$\frac{5280V}{n} = \text{spacing in feet (average) of main line vehicles, center to center.}$$

Let L = Length of vehicle

$$\frac{n}{5280V} - L = \text{clearance (average) between main line vehicles.}$$

$$\frac{n}{5280V} - L$$

$$\frac{n}{5280V} = \text{time (average) between vehicles (which in practice, however, actually move in groups with gaps)}$$

If $L=15$ this becomes

$$\frac{3600}{5280} - 10.2$$

(Note): For $n=750$ and $V=20$ this time spacing = 4.3 sec. and the clearance = 126 feet.

(Note): A vehicle will "nose in" with a spacing of about 75 feet at $V=20$.

At W miles per hour = $\left\{ \frac{5280W}{3600} \right\}$ feet per sec. } a vehicle will require

$\frac{10+b+L}{5280W}$ sec. to cross a lane of width = b plus 10 feet clearance (5 on each side) + length of car. This reduces to

$$\frac{3600}{5280} \frac{10+b+L}{W} = 0.682 \frac{25+b}{W} \quad (\text{with length of car} = 15)$$

(Note): it can generally be assumed that $b=10$, so this equals $\frac{23.87}{W}$ = the crossing time

(Note): If the boulevard stop is required of all crossing vehicles, as may be considered applicable in this case, so that $W=5$ miles per hour average, this = 4.8 sec.

There will be no delays under average uniform conditions if this equals the main line time spacing, or

$$\frac{3600}{n} - 10.2 = 23.9$$

This can be solved for n .

$$\frac{n}{3600} = \frac{W}{3600} + \frac{V}{10.2}$$

$$n = \frac{23.9}{W} + \frac{10.2}{V}$$

If $W=5$ and $V=20$, this becomes $\frac{3600}{4.8+0.51} = \frac{3600}{5.3} = 680$

Under such conditions, up to 680 vehicles per hour can cross without delaying a single main line vehicle. This gives a total of 1,360 per intersection, per pair of intersecting lanes.

A different approach can be made by using the maximum capacity of a lane as developed theoretically by the Regional Plan of New York and Its Environs, given by the formula.

$$C = \frac{5280V}{L + 0.733V + 0.072V^2}$$

Where V =velocity in miles per hour
and L =length of vehicle.

In this formula if $L=15$ and $V=20$
 $C=1820$

With this number per hour the average time, center to center of vehicles, is 1.978 seconds, and the gap between vehicles allowing for clearances is 1.125 seconds.

Assuming a crossing time of 4.8 seconds, it is seen that each crossing vehicle will reduce the possible number of main line vehicles by $(4.8-1.125) \div 1.978 = 1.857$.

In other words the maximum traffic per pair of intersecting lanes at an uncontrolled intersection can be found for the numerical conditions set, from the formula,
Main line traffic $\div 1.857 \times$ cross traffic $= 1820$.

Vehicles crossing in groups will decrease the number 1.857 to some extent because the clearance required by a single car is slightly more than that required between cars moving even at a low starting speed and because the average velocity W is considerably increased when vehicles move in groups.

Ten separate vehicles would delay full capacity main line traffic by $10 \times (4.8-1.125) = 37$ seconds, but a group of ten moving at 15 miles per hour at the minimum safe spacing and averaging 15 feet in length would require 19.2 seconds.

In other words ten separate crossing vehicles would reduce the main line capacity by 24.3 vehicles, while if grouped, the reduction would be only 9.7 vehicles. This shows one reason how and why a signal installation may be justified.

On the other hand, delays due to acceleration loss, congestion caused by slow cars, turning cars, over-cautious drivers, pedestrians on the roadway, etc., will increase the coefficient 1.857, while for other main line speeds, the figure 1820 will change. For a traffic density less than the maximum above studied, other considerations enter the problem.

Imagine a single vehicle on the cross street.

If the time spacing of the main line travel is greater than the maximum possible delay, two types of movement are possible.

(a) There may be no delay over a period t —a seconds, where t is the total average time spacing center to center of main line vehicles and a is the time taken by the main line vehicle to cover the cross lane including vehicle length and clearances.

(b) There may be some delay which can vary from 0 seconds to a maximum of W , where W is the crossing time of the cross street vehicle.

I.e. t =average time spacing (c.t.c.)

c =capacity time spacing (c.t.c.) at velocity assumed

w =delay=crossing time (with clearances) for cross traffic vehicle or group.

W may start at beginning or at end of t . The average delay will be the average of these two extremes within close values or $\frac{1}{2}t$.

First main line vehicle will be delayed $w - \frac{1}{2}t$

Second main line vehicle will be delayed $w - \frac{1}{2}t + c - t$

Third main line vehicle will be delayed $w - \frac{1}{2}t + 2c - 2t$

Mth main line vehicle will be delayed $w - \frac{1}{2}t + (m-1)c - (m-1)t$
 Where m is the largest integer in $\frac{t-c}{w-\frac{1}{2}t}$

the total delay D will be $mw - \frac{1}{2}mt + \frac{t-c}{0+m-1} \frac{mc}{2} - \frac{0+m-1}{2} mt$

$$D = m \left(w - \frac{1}{2}t + \frac{mc}{2} - \frac{C}{2} - \frac{mt}{2} + \frac{1}{2}t \right)$$

Hence $D = \frac{m}{2} (2w + mc - c - mt) + d$, where d is a factor which must be

added for the lost time caused by decelerating and accelerating. (A)

This ignores the possibility that the last delayed vehicle may experience no delay for a part of the time interval, unless the fractional value of m is used as a closer approximation.

If $w+c$ is less than t, the above formula will not apply.

In that case, the maximum delay may be w

the minimum delay will be 0

the average delay will be $\frac{w}{2}$

approximately

But for a period $t-w$ there will be no possible delay.

Therefore the average delay will be only $\frac{w}{t} \times \frac{W}{2} = \frac{W^2}{2t} = D'$ (B)

If $w=t$ and $m=1$

the long formula (A) becomes $\frac{1}{2} (2t + c - c - t) = \frac{t}{2}$

and the second formula becomes $\frac{t}{2}$ which is the same, as

should be the case (ignoring the part time delay of one vehicle as was stated above).

These figures for delay apply for each crossing vehicle so that the total delay caused in an hour to the main line vehicles will be the average delay multiplied by the number of vehicles crossing per hour. The crossing vehicles also will be delayed because they must come to a full stop and because they will often or usually have to wait for a main line vehicle to move out of the way. The time loss due to decelerating and accelerating may be taken at $0.3V$ seconds where V is in miles per hour. This is to be added to the delay found from one of the two above formulae, usually the short one with a different value of w. t will still be the time spacing on the main thoroughfare.

To find the delay to main line traffic at an uncontrolled intersection, per lane;

Let N = vehicles on main thoroughfare per hour.

X = vehicles on cross thoroughfare per hour.

$\frac{3600}{N}$ = time spacing of vehicles on main thoroughfare in seconds =

Let V = velocity on main thoroughfare in mi. per hour.

$\frac{5280V}{3600}$ = velocity on main thoroughfare in ft. per second.

Let $L+C$ = average vehicle length plus clearance.

$L+C = 25$ ft.

$$\frac{L+C}{5280V} = \frac{25 \times 3600}{5280V} = \text{time increment to allow for length of vehicle and clearance} = \frac{17}{V} \text{ seconds.}$$

Minimum spacing at velocity $V = L + aV \times KV^2$
 $= L + 0.733V + 0.072V^2$ according to assumptions of Regional Plan
 $= 15 + 0.7V + 0.07V^2$ for ease of application when $L=15$.

$$\text{Minimum time spacing } c = \frac{15 + 0.7V + 0.07V^2}{5280V} = \frac{15 + 0.7V + 0.07V^2}{1.47V}$$

$$= \frac{10.23 + 0.5V + 0.0477V^2}{V} = \frac{10.23}{V} + 0.5 + 0.05V$$

The long formula (A) then becomes

$$\frac{m}{2} \left\{ 2w + (m-1) \left\{ \frac{10.2}{V} + 0.5 + 0.05V \right\} - \frac{3600m}{N} \right\}$$

If all cross vehicles have to come to a stop before crossing then w can be assumed as
 $\text{lane width} + \text{vehicle length} + \text{clearance}$

$$w = \frac{10 + 15 + 10}{5280V^2} = \frac{35}{1.47V^2} = \frac{23.8}{V^2}$$

with $V^2 = \text{about } 6$, $w = 4$. This is also shown by observation to be correct.

$$\text{Then the long formula (A) becomes } \frac{m}{2} \left\{ 8 + (m-1) \left\{ \frac{10.2}{V} + 0.5 + 0.05V \right\} - \frac{3600m}{N} \right\}$$

$$\text{Let } V=20, \text{ then } c = \frac{10.2}{20} + 0.5 + 0.05 \times 20 = 0.51 + 0.5 + 1.0 = 2.01$$

which may be called 2

The safe capacity at 20 mi. per hour is $3600 \div 2 = 1800$ vehicles

It is next necessary to find m in terms of N . With $w=4$

$$m = \frac{w - \frac{1}{2}t}{t - c} = \frac{4 - \frac{3600}{2N}}{\frac{3600}{N} - 2}$$

$$= \frac{4N - 1800}{3600 - 2N} = \frac{N - 450}{900 - 0.5N}$$

$$\text{For example, let } N=1800, \text{ then } m = \frac{1800 - 450}{900 - 900} = \infty \text{ and the long formula is also } \infty$$

In other words every vehicle is delayed when the main line is running to capacity and is interrupted by one crossing vehicle.

$$\text{Let } N=1000, \text{ then } m = \frac{1000 - 450}{900 - 500} = \frac{550}{400} = 1 + \frac{150}{400}, \text{ hence } m=1$$

The main line delay will then be

$$D = \frac{1}{2} \left\{ 8 + 0.3c - \frac{3600}{1000} \right\} = \frac{1}{2} (8 - 3.6) = \frac{1}{2} \times 4.4 = 2.2 \text{ seconds}$$

plus loss due to decelerating and accelerating which may be taken at 6.

$$D \text{ therefore} = 2.2 + 6 = 8.2$$

If $X=500$, the total delay per hour to main line traffic will be 4100 seconds, which is 500×8.2

The delay per lane of cross traffic is to be computed as follows:

Let y = time occupied by main line vehicle to traverse (with clearance) the cross traffic lane. The crossing vehicle may arrive at any time from the start of y to its end. The average delay to a crossing vehicle is then $\frac{1}{2}y$ as far as the passage of the main line vehicle is concerned. If $y < t$ there will be some periods when the crossing vehicle would not be delayed. The length of such period

would be $t - (t - y)$ and the average delay would be reduced in the ratio of $\frac{y}{t}$,

so that the average delay would be $\frac{1}{2}y^2$. If $y = t$, the average delay becomes $\frac{1}{2}y$

as above. In addition to these delays, if the crossing vehicle is assumed to be required to come to a full stop, there is added delay caused by deceleration and

acceleration. The total average delay to cross traffic is then $\frac{1}{2}y^2$ + d . This is

seen to be the same as for the main line traffic with a change of variable from w to y .

There will be a cumulative delay exactly as in the case of the main traffic if y is greater than the t for the cross traffic. This is never the case under the assumptions here made that the cross traffic never exceeds that of the main line and that main line traffic has the right of way so that all cross traffic must come to a full stop before crossing.

The total cross traffic delay D^1 will then be $X \left(\frac{1}{2}y^2 + d \right)$

$$\text{But } t = \frac{3600}{X}, d \text{ may be taken as } 0.3V, \text{ and } y \text{ as } \frac{17}{V^2}$$

$$\begin{aligned} \text{Then } D^1 &= X \left(\frac{1}{2} \frac{17^2}{V^2} \frac{x}{3600} + 0.3V \right) \\ &= \frac{0.04X^2}{V^2} + 0.3VX \end{aligned}$$

If $V=20$ and $X=500$

$$D^1 = \frac{0.04}{400} \times 500 \times 500 + 6 \times 500 = 25 + 3000 = 3025$$

$D + D^1$ then equals $4100 + 3025 = 7125$ seconds per hour, when $N=1000$ and $X=500$ with $V=20$

The long main line formula (A) can be expanded as follows:

$$\begin{aligned} D &= \frac{X}{2} \left\{ \frac{49.6}{V^2} + (m-1)c - mt \right\} + dmX \\ &= \frac{X}{4} \frac{2w-t}{t-c} \left\{ \frac{49.6}{V^2} + \frac{c}{2} \left\{ \frac{2w-t}{t-c} - 1 \right\} - \frac{t}{2} \frac{2w-t}{t-c} \right\} + \frac{dX}{2} \frac{2w-t}{t-c} \\ &= \frac{X}{4} \frac{2wN-3600}{3600-cN} \left\{ \frac{49.6}{V^2} + \frac{c}{2} \left\{ \frac{2wN-3600}{3600-cN} - 1 \right\} - \frac{1800}{N} \frac{2wN-3600}{3600-cN} \right\} + 0.6V \end{aligned}$$

The cross traffic formula is:

$$D' = \frac{0.04}{V^2} X^2 + 0.3 V X$$

Then the total delay = $QX + \frac{0.04}{V^2} X^2$, where Q is a constant.

It is seen that the coefficient of X^2 is very small and that quantity can be ignored without material loss of accuracy.

Since practically every intersection at which a traffic signal is worthy of consideration, will have a line of traffic in each direction on each street, it is evident, under uncontrolled conditions, that each of the four intersections of traffic lanes will involve possible delays. Since the formula for the delay experienced by cross traffic is seen to give appreciable results only for the factor of deceleration and acceleration, a closely approximate method of computing the time lost to cross travel is to figure only that one element of delay for every crossing signal. Since it is very rare that the traffic on the main thoroughfares is the same in the two opposite directions, it is necessary to compute the lost time for each traffic lane separately. Furthermore, such computation must be made for each crossing lane with reference to each main line lane. Such a computation will not take account of possible simultaneity of arrival of vehicles in the two cross lanes and in the two main line lanes; a formula for which is not difficult of deduction, but the use of which is found to give such small results as not to warrant its use. Furthermore, the ignoring of the element of simultaneity practically counterbalances the element ignored in the cross traffic formula.

The above formulae are to be used in estimating the hour by hour delays at any intersection under uncontrolled traffic conditions. After a signal has been installed the following formulae apply:

Let q = total length of cycle

$\frac{q}{f}$ = be the length of the stop period for traffic N

Then $q = \frac{q}{f} + q \left\{ 1 - \frac{1}{f} \right\}$ = the length of the stop period for traffic X

Let $N + X = T$

$\left\{ \frac{q}{f} + q \right\} N$ = portion of traffic N which is stopped

$\frac{1}{2} \frac{q}{f}$ = average delay

$\frac{1}{2} \frac{q}{f} \left\{ \frac{q}{f} + q \right\} N$ = total delay of N traffic

$\frac{1}{2} \frac{q}{f} \left\{ 1 - \frac{1}{f} \right\} (T - N) q \left\{ 1 - \frac{1}{f} \right\}$ = delay of X traffic

Total delay = $\frac{q}{2} \left\{ \frac{N}{f^2} + (T - N) \left(1 - \frac{1}{f} \right)^2 \right\} = D$

To find the condition which will give the minimum delay, differentiate this with respect to X and equate to zero. Ignoring constants

$$\frac{dD}{df} = \frac{2Nf}{f^4} + (T - N) \left\{ -\frac{2}{f^2} + \frac{-2f}{f} \right\} = 0$$

$$-N-(T-N)(-f+1)=0$$

$$-N-T+N+f(T-N)=0.$$

$$f(T-N)=T$$

In words, this formula means that for minimum delay the stop periods must have a ratio which is the inverse of the traffic in the larger of the lanes in each of the two cross roads. The total delay can be computed from the following formula, using the total traffic in all directions in any application to a specific case.

$$\frac{T-N}{T} = \frac{1}{f} = \frac{X}{T}, \quad f = \frac{T}{X}, \quad f^2 = \frac{T^2}{X^2}$$

$$1 - \frac{1}{f} = 1 - \frac{T-N}{T} = \frac{T-T+N}{T} = \frac{N}{T}$$

$$D = \frac{q}{2} \left\{ \frac{NX^2}{T^2} + X \frac{N^2}{T^2} \right\} = \frac{NX}{T^2} \frac{q}{2} (X+N) = \frac{NXq}{2T}$$

$$D = \frac{q}{2} \frac{NX}{N+X}$$

As an example,

If $N=2000$, $X=1000$, $q=60$

$$D \text{ per hour} = 30 \frac{2000000}{3000} = 20,000 \text{ seconds per hr.}$$

$$20,000 \div 3000 = 6 \frac{2}{3} \text{ seconds average per vehicle.}$$

This computed loss of time is seen to be less than the loss found in the last example for uncontrolled conditions if the figures in that example are multiplied by four to take account of the four points of lane intersection and if it is assumed that the traffic is equally dense in both directions on each street.

The fact pointed out earlier, that groups of vehicles cause less delay than the same number of vehicles crossing individually because of the higher average speed of crossing, points to the advantage of holding crossing vehicles so as to force them to cross in groups whenever a main line of traffic is running at nearly its maximum capacity. Obviously this is accomplished by a signal and is the justification for its installation.

The general formula for the amount of traffic at which a signal becomes advantageous may be stated as that at which (the number of vehicles per hour on the main thoroughfare) plus (the number of vehicles on the cross thoroughfare multiplied by the difference between the crossing time of a cross thoroughfare vehicle and the time spacing between main line vehicles divided by the center to center time spacing of the maximum capacity traffic on the main thoroughfare) equals (the maximum capacity traffic in vehicles per hour at the assumed uninterrupted speed on the main thoroughfare.)

At 20 miles per hour this has been shown to be $N+1.857X=1820$ for a lane on each highway. Because of the presence of two lanes each way under ordinary circumstances, and for ease of use, this formula may be taken approximately as $N+2X=1500$.

The economic justification in any given case can be determined from the formulae for the delay under controlled and uncontrolled conditions by applying proper

monetary values to the difference in annual time loss and including the other economic factors listed.

Finally, some light may be thrown on the question of signal installation by observations made by the writer in Paris a few months ago. Several hours was spent every day watching the operation of the traffic system. Two years ago very careful counts were made in London and Paris, and also in New York, to see which of those cities had the densest traffic. Two years ago New York had denser traffic than either London or Paris at the points which are supposed to be densest. This year Paris had denser traffic than any point in New York, and it was therefore interesting to see how it was handled. In the first place, the traffic policeman now takes care of the pedestrian in exactly the same way he does of the motorist. All have heard of the old idea that the pedestrian in Paris had to look out for himself. Generally speaking, he does today, because he goes anywhere he pleases. Men and women were seen to start across the Paris boulevards in the densest kind of traffic. They deserve to be killed, because it would be of less damage to the community as a whole to have them out of the way than to have them there. (In Madrid a traffic policeman on horseback was seen trying to stop men crossing traffic.) In Paris the traffic policemen come on duty about nine o'clock. One has to hunt to find them. They are somewhere in a portico or by the curb, because traffic at that time does not need their assistance. It is only when traffic gets denser or perhaps a group of pedestrians comes along in a bunch, or there is a group of taxicabs interfering with things, that the police comes out and holds up his baton and lets the people get through and then goes back to the sidewalk. When the time arrives that the majority of his time is actually in the roadway, he stays there, and he manages traffic on the individual control basis until it gets still denser. Then, up the line a little way (two or three blocks) a gong sounds and from that time on a single red light system is employed which coordinates the traffic controlled by the individual policemen up and down the avenue for several blocks. The light is one red light only. It means STOP when it is on. Otherwise one can go, and it is the most effective traffic arrangement that the writer has ever seen. It beats infinitely that of the United States, with all our light systems. It is less costly. It applies when the traffic requirements demand, and it stops when they are through.

As a final suggestion—don't trust to individual opinion as to the need of a traffic signal on any one intersection or another. Study it out on a scientific basis, on a sound economic basis, and then you can go to your Councilmen and say, "We want a traffic signal here because it is worth while here; you are wasting money if you put it somewhere else." Then you have accomplished something, it is believed, to the benefit of the traffic control of the United States.

CHAIRMAN POWELL: I am sure that I can on behalf of the meeting thank Mr. Goodrich for this very interesting discussion of a topic which up to the present time, so far as I know, has never had any reasonable scientific approach. I think that Mr. Goodrich is a pioneer in this particular field, and while some of us have been exploring in a practical way somewhat along the same line, I am quite certain that he has opened out to us the really correct engineering approach to the problem.

While I am on my feet I just want to say this about his experience in Paris. I have not been there this year since the red light system was put in effect. I was there last year while they were installing it, and there is this to be said about the Paris traffic and its regulation, signal and otherwise. It is wonderfully handled, and for this reason: They have a most effective corps of policemen and plenty of them. At the Place de la Opera I counted thirteen on duty on an eight-way intersection into a large square. We would be lucky in this country if we had three in such territory. Those men every one of them are experts, just as our Fifth Avenue policemen are here, and that's why the traffic is satisfactorily handled.

I think that in part explains the satisfactory arrangement of traffic in Paris, not entirely due to the traffic system itself.

Are there any questions you would like to ask Mr. Goodrich, or any discussion you would like to indulge in, suggested by what he has given us?

FRED C. MILLS (Boy Scouts of America): Do the overhead installations, suspended signals, cut down the cost of replacement, and have they proved satisfactory?

MR. GOODRICH: They reduce the replacement cost but there are other disadvantages which in the view of this Committee have put the overhead suspension system down about fourth in the order of preference.

MR. MILLS: May I ask this: with the traffic lights at the intersection, just about how much has it slowed down traffic as compared with policemen at that intersection, one-half would you say, or a third?

MR. GOODRICH: That varies from city to city very materially. The information which was secured by this Committee with reference to these matters is to this effect: In 79 cities signals have expedited vehicle traffic; in 9 they have not. They got no data as to the amount except in a few cases. In 46 cities there has been an increase in street car movement; in 36 there has not. In 14 cities there has been an increase in traffic on streets equipped with signals, in 15 a decrease, in 15 no change. In 42 cities there has been an increase of traffic on adjacent streets; in 16 a decrease, and in 10 no changes.

One of the reasons for not installing signals when not needed is this: In 60 cities drivers tend to anticipate a change of signals; in 23 they do not. In 77 cities signals have reduced vehicle collisions; in 8 they have not. The percentage of reduction has been from 10 to 45 per cent. In 68 cities signals have reduced pedestrian accidents; in 11 they have not, the percentage of reduction being from 15 to 100. I might say, in amplification of what I did say before, that some engineers and statisticians figure one per cent per minute as the pedestrian time value, or 60 cents per hour. Sometimes it is worth more. Again if you are going to get killed it is worth less.

FRANK MATSON (Minnesota Safety Council): I would like to ask Mr. Goodrich what he thinks of the substitution of a caution sign, such as SLOW—CAUTION in place of a stop and go signal.

MR. GOODRICH: It depends on the amount of traffic. I would use all the other devices up to their limit, before I would install a traffic signal at any intersection.

MR. MATSON: What I meant was taking down the stop and go and putting up a caution sign.

MR. GOODRICH: That would depend on the amount of traffic. If it is above the figure disclosed by that formula, leave the signal in; otherwise shut it off and put up your sign.

ALEXANDER GAGE (Assistant Prosecuting Attorney, Wayne County, Detroit): I think in discussing these very technical papers we must not lose track of the law enforcement value of an officer as compared with an inanimate signal light. That is a consideration which is not perhaps in order in this discussion, but I think it might be well to remind the members of the fact that a traffic signal cannot assist in any way to enforce the traffic laws, and a policeman if he knows his job, can.

CHAIRMAN POWELL: Last Spring we had some studies made of actual traffic on some of the intersections in our city (Buffalo) that we felt were signaled when they should not be; that is to say, the volume of traffic was not sufficient to justify the utilization of the signal. We took a period of five hours observation on different days and at different intersections, but in the middle of day, when the traffic was supposedly flowing at about its normal rate, not during the peak hours, and during those five hours of observation we undertook to determine the traffic delay to the vehicles that were crossing the intersection from both directions. We

had, for instance, on the main street a total delay of 198 vehicles for a time of 40,590 seconds, while on the cross street 82 vehicles were allowed to pass; and a careful analysis of the time records that we got from the intersection indicated that those same 82 vehicles could have filtered through the other traffic with no greater delay than one or two seconds to each vehicle. The summation of the whole matter was this: For a period of 2½ hours a total of 602 vehicles on the main streets were delayed 13,420 seconds to permit without delay the cross passage of 308 vehicles. You can easily see how figures run up in totals when you come to aggregate them; and on the basis of those studies we worked out a final analysis which indicated that Mr. Goodrich's formula was very nearly correct, except that in our opinion we could easily put that constant up to 2,000 without doing any serious damage to the average traffic intersection; but we verified his figures very closely from actual practice.

ADJOURNMENT

October 4, 1928

Traffic Engineering

ERNEST P. GOODRICH, Chairman
Chairman, Engineering Committee, National Safety Council

The seventh session was called to order at two-thirty o'clock by the Chairman, Ernest P. Goodrich.

Practical Means of Building Safety Into Streets and Highways

By **ROGER L. MORRISON**
Professor of Highway Engineering and Highway Transport,
University of Michigan, Ann Arbor, Mich.

Whether any given means of building safety into a street or highway is practical, or not, depends, of course, upon various factors, and the most important factor is usually the relation between the cost and the available funds. Some safety provisions are so inexpensive that they are of almost universal application, while others are so elaborate that they are practical only on the most heavily traveled highways, and their use, to date, has been largely confined to toll roads. Still others seem practical only for the most important streets of the largest cities. In a general discussion of the various construction features for the promotion of safety it is necessary therefore, to use a rather elastic definition of the word "practical."

A few years ago a safe road ordinarily meant one over which a vehicle might proceed without being wrecked, provided it was driven slowly enough at bad places, but now a road is not usually considered safe unless it is reasonably so for high speed traffic. Many requirements for this kind of safety are more or less well known by the majority of people, but they are so often neglected that mention of them appears to be justified in any discussion of the subject.

Ordinary Safety Provisions

Surely nothing is better understood than the inherent danger in certain surface conditions, and yet loose gravel, for instance, is allowed to take its yearly, and even daily, toll of life, limb, and property. Clouds of dust on untreated gravel and macadam roads are often serious hazards, and wood block pavements on comparatively steep grades continue to claim their victims with every rain. Unnecessarily high crowns on many roads and streets cause drivers to hug the middle and add to the dangers of passing vehicles. Obviously they increase the hazard of skidding. Pot holes and ruts are all too common sources of danger.

According to *Public Roads* for March, 1927, about half of the Federal-aid projects completed in the latter half of 1926 had a surface width of 18 feet, and nearly 23 per cent were less than 18 feet wide. Doubtless there are many situations in which 18-foot surfaces are justified from the standpoint of economy but, with ever increasing speed, it would seem as if 20 feet should be the minimum width for main roads. Almost equally important is the width of the shoulders, which should be ample to accommodate parked cars and to safeguard those which acci-

dently run off the pavement at high speed. An eight-foot firm shoulder is none too wide and side slopes on embankments should be about four to one, unless protected by guard rails, to minimize the chances of overturning if cars run off. Where guard rails are used they should be of a type such as cable or mesh, rather than wooden rails which may splinter and cause death or serious injury if forced into a car. Deep ditches should be far from the pavement.

Comparatively few highways conform to the above widths, and still fewer do so for their entire length. The majority of bridges and culverts are little wider than the pavement and are frequent causes of accident. The ideal situation would be to have all such structures as wide as the pavement plus the shoulders and the present tendency is toward this ideal.

While considering the cross-section of the highway, another safety provision should be mentioned and that is a foot-path, or sidewalk. This is not a simple matter because, to be entirely safe, walk-ways should be located beyond the shoulders and side ditches, and if they are to be used, their grades must be practically as uniform as that of the roadway. Even if built upon the shoulders they would take pedestrians off from the pavement, and that is especially important when one considers the large number of children walking to and from school.

A minimum radius of 1,000 feet for curves is highly desirable and there should be a minimum sight distance of 500 feet at all points, including hill-tops and intersections with highways and railways. There are hundreds, and probably thousands, of dangerous intersections which could be made safer at comparatively small expense, by removing obstructions to sight. It may be mentioned in passing that many railroads conduct rather elaborate poster campaigns to minimize crossing accidents and then habitually spot box cars so close to crossings that it is impossible for a motorist to see an approaching train until he is practically upon the track.

The danger of long steep grades and of curves without proper superelevation and widening, where needed, is generally recognized and these hazards appear to have been eliminated to a much greater extent than most of the others which have been mentioned. The use of standard warning signs is also becoming very general.

Super-Highways

There is a great deal of question, from a safety standpoint, as to the best arrangements of multiple lane highways, meaning highways with more than two traffic lanes, and in the absence of a large volume of accident data, very dogmatic statements are hardly justified.

On highways where, at times of greatest traffic density, the travel is largely in one direction, a three lane highway, with the three lanes clearly marked, may relieve congestion without being any more dangerous than, if as dangerous as, a two lane highway, because overtaking vehicles in the direction of lighter traffic can enter the middle line gradually and dodge back if a vehicle traveling in the opposite direction starts to enter the middle lane at the same time. There appear to be a few comparative accident records which support such an opinion. On the other hand, with congested traffic in both directions at the same time, the danger of head-on collisions seems obvious, as there is no way to regulate traffic in the middle lane, and it is hard to see how a three lane road could be used safely under such conditions.

Whether or not pavements carrying four or more traffic lanes should be divided in the middle, to increase safety, also depends largely upon traffic conditions. Certainly if the volume of traffic is usually about equal in both directions, a divided pavement will be safer, with no danger of head-on collisions, but if traffic is predominantly in one direction in the morning and in the opposite direction in the evening, then both congestion and accidents may be less on an undivided pavement. In the case of a four lane highway there

may be more congestion on a divided than on an undivided pavement unless passing is permitted on the right, as well as on the left, side of overtaken vehicles.

It is to be hoped that, before long, definite data as to traffic flow and accidents upon multiple lane highways, under various conditions, can take the place of speculation and opinions based upon limited observations. The cost of such studies is insignificant compared with the large sums involved in construction.

Intersections

When considering safety, the short distances included in intersections become as important as the long distances between them, and in many cases this is also true of economic losses due to congestion.

The importance of adequate sight distance has already been mentioned, and intersections of trunk lines with secondary roads should be protected with "stop" signs on the latter. The proper and improper use of automatic signals is too complicated a problem for discussion within the limits of this paper, even though they may be considered as construction items.

At important intersections curved pavements are often built connecting the intersecting highways so that turns can be made safely at comparatively high speeds and the situation at the main crossing will not be complicated by turning movements. In some instances rotary intersections can be used to advantage, but here again we are handicapped by a lack of adequate data upon which to base the most efficient design.

The safest intersection is, of course, a grade separation. These have been built in Detroit, Chicago and a few other cities, and the famous toll roads of Italy have no crossings at grade. Usually the only real objection to a grade separation is the cost so that, theoretically, one should be built whenever the annual cost of the installation is less than the annual cost of getting along without it. The solution of this problem would be one of simple arithmetic except that the actual value of practically all the factors is unknown and must be estimated.

Looking at the matter as a purely economic one we have on one side the annual interest, depreciation and maintenance costs of the structure, and on the other side the annual costs due to delays and accidents. To put a reasonable value upon each of these items would take careful study of each individual case and then an estimate as to future developments.

For instance, taking purely arbitrary figures, it may be assumed that the cost of a certain grade separation is \$300,000, that it will be in use for 50 years, that the average interest during that period will be \$7,500, and that annual maintenance and contingencies will be \$1,500. The total annual cost, upon that basis, would be \$15,000. If the value of time for each vehicle is estimated at the very modest sum of one dollar per hour, and the average delay to each vehicle is 10 seconds, the annual cost of delays alone will be approximately equal to the annual cost of the structure if the combined traffic upon the intersecting highways is 15,000 vehicles per day. A study of the actual nature of the traffic, the delays, and the accidents, in any given case, might show that a much smaller, or much larger, volume of traffic would be required to justify an outlay of \$15,000 per year, and of course this sum also might be much smaller, or much greater, in different locations.

There is no hesitation about spending thousands of dollars in attempts to save a few individuals lost at sea, or in a mine accident, or other disaster which is more or less spectacular, and immense outlays are made by the railroads, often under legal pressure, to place added safeguards around the lives of passengers, where accidents are few, so that it seems hardly logical to place

the installation of a grade separation purely upon a basis of economic justification. However, the availability of funds is such an important factor that there seems little chance that such structure will be installed any faster than is warranted by economics alone.

As a safety measure, the elimination of railway grade crossings is, generally speaking, more important than the elimination of highway grade crossings, and we have discouraging reports that, in spite of the many separations being built, the number of grade crossings is growing larger instead of smaller. The situation would doubtless look much brighter, however, if it were measured in terms of some unit of hazard. It is not a highway crossing a railway which makes trouble, but a highway vehicle crossing the path of a train, so that the elimination of a crossing involving 50 trains and 5,000 vehicles a day may be as important as the elimination of a hundred country lane crossings of branch line railroads. The relation is not a direct mathematical one of trains times motor vehicles, because the heavily traveled crossings are better protected, but certainly one trunk line crossing eliminated and one wood-road crossing added does not leave the general situation unchanged, even though it may appear so upon official records.

Wide, smooth, level highways adjacent to railway crossings are extremely desirable and, as previously stated, everything possible should be done to remove obstructions to a clean view of approaching trains.

Closely related to grade separations is the matter of pedestrian subways in cities. When they are used then there is no question as to their value both in promoting safety and in relieving congestion, but if they are not used they represent merely a waste of money. Indications are that some subways are very successful and that others are almost complete failures, and sometimes there is a popular demand for more subways when those already built are not used. Careful observation of such installations should develop some valuable information as to the various condition under which pedestrians will, and will not, use subways.

There are two main phases to the problem of building safety into streets and highways. The first concerns ordinary thoroughfares and here the problem is primarily one of putting into effect the principles which are already well known to most highway engineers but which are often neglected, usually through lack of funds or the absence of enlightened public opinion to support the spending of money for increased safety instead of for other purposes.

The second phase involves the so-called superhighways, and especially those intended to accommodate very high speed traffic. Here we are confronted with a new set of problems to be solved, and mistakes in their solution will be tremendously expensive, not only in money, but probably in lives, personal injuries and property damage. Judging by what has already been done, notably in Italy, and by the plans which are being made by such cities as New York and Chicago, the day is rather fast approaching when motor speedways will be built right to the hearts of the largest cities, and much painstaking research will be needed to determine how to get the vehicles quickly and safely to their destinations, and what to do with them when they get there.

CHAIRMAN GOODRICH: As to passenger subways, I made a special trip in London a few years ago over to the subway intersection called the Elephant and Castle, where they have a multiple point intersection with very heavy traffic. It was so dangerous to pedestrians and they had had so many accidents, that they spent considerable money in making a passenger subway arrangement underneath the intersection.

All of the different entrances go to one space, perhaps as large as this room.

and I was very much interested to see how many people were down there. I counted three children on roller skates and myself as the total.

As an example nearer home, there is one over here on the intersection of Thirty-fourth Street and Sixth and Broadway. The railroad company has an underground passenger station which some of you might be interested in examining.

It is so arranged with reference to turnstiles that you can go down the stairs under Thirty-fourth Street and up the other side parallel with either Broadway or Sixth Avenue. You can also go down on this side of Broadway and Sixth and cross and up on the other side, and I have occasionally told my assistants to go down there and see if they could see anybody making use of that subway for other than station purposes and I never have found anybody who makes use of that particular facility to keep off of the street. There is more excitement in crossing the street the other way.

BURTON W. MARSH (City Traffic Engineer, Pittsburgh, Pa.): I would like to supplement the two cases cited by the Chairman, just to show how the present day pedestrian point of view is against the use of pedestrian subways.

In Pittsburgh we have a railroad station, the Pittsburgh and Lake Erie, which is a lower level than Smithfield Street. There is a very excellent, well lighted subway leading from the point where you must leave the station to the side of Smithfield Street which goes into the city over the bridge. You must go to that side in order to get to the street car, but the fact is that a very small proportion of the people will use this well lighted passenger subway, which requires that they climb no more stairs.

They will leave it entirely undisturbed and go up the roadway and just take their chances of going across which is very dangerous.

We also have another case in Pittsburgh on one of our heavy, fast-moving arteries, a boulevard. This was provided for an important intersection where there are a good many children crossing to go to school and also quite a number of people draining a certain district. It is almost never used. Part of the trouble there, however, is the conditions. It is not as good as it should be, but those cases do further supplement the Chairman's statement that in the present temper of the public mind the pedestrian subway, to my mind, has a very limited application.

MR. MILLER MCCLINTOCK (Harvard University, Cambridge, Mass.): I should dislike to see this discussion of separate grades for pedestrian traffic left in quite so pessimistic a condition. I agree in general that where you have erected a structure which requires expenditure of a considerable amount of additional effort as against the mere opportunity to take a chance, you usually take the chance rather than spend the effort.

Therefore, structures designed to make pedestrians use separate grades, must be designed in such a manner as to make it appear easy.

There are under Michigan Boulevard in Chicago two pedestrian subways, both of which are well constructed, policed and lighted. The one at Monroe Street connects with the suburban station of the I. C. Lines. It used to be necessary for persons who were going from the west side of Michigan Boulevard to this station, as they do in large numbers, if they wished to use this subway, to go down the steps, walk under the Boulevard, climb and then go across and then down again to the depressed platform of the railway station. Only 5,000 persons per day used this subway, a considerable number however.

Sometime after it was constructed the Illinois Central made a connection between the eastern end of this subway and the same grade down and without any steps, to a platform of the station. The last check we made showed a use of about 25,000 persons a day, showing how the greater ease resulted in very much greater use.

I have been in rather close contact with the pedestrian tunnels in Los Angeles in connection with their schools. They are called School Tunnels. They are used only at those places where there is heavy traffic and fast traffic in the immediate vicinity of schools and where it is not necessary to erect stop and go signals. These are widely used by school children. The school authorities do report (this is substantiated by actual experience) that a very considerable number of children who are crossing those streets do use the tunnels. There you have a child mind and opportunity to discipline.

W. B. POWELL (Buffalo): My experience in London, and I was a resident there twenty years, was that at least the times I used the subway it was very largely used.

Of course, it is a very bad intersection, and the reason why it is used so largely may be because the underground has entrance in the passageway also. You can go out underground and get out into any street you want, but certainly that subway is used very extensively.

CHAIRMAN GOODRICH: I want to explain, perhaps, that my various remarks after Professor Morrison's very interesting paper were to give the pessimistic side of those various things and I hoped that you would kick. There are other subways in London which are perhaps better used than the one at Elephant and Castle.

I should like to add not alone in reference to tunnels which are sometimes suggested for pedestrian travel but bridges also, that I have a photograph of a bridge which once existed on Broadway down the intersection of Fulton Street, a very congested intersection at one time and even more so than today. The picture shows one man leaning over that bridge and looking down on the people on what is called Death Avenue in Manhattan. The bridge was maintained for a long time over the railroad tracks.

I have stood there myself by the hour and have stationed assistants there to count the people who went over that bridge rather than cross this railroad trackage and truck delivery space, and have counted as many as three persons an hour using that bridge with 300 crossing on the surface.

At Forty-second Street and Fifth Avenue where there is a very large amount of traffic, ramps would be better than stairways, and in order to get people to go downstairs it would be wise to provide in the open space under that intersection all kinds of free advertising devices. Somebody who wants to introduce a new breakfast food could go down there and give away samples, and somebody else has something else for free distribution. Put them down there which is a good place to concentrate them for other reasons and at the same time attract people to go down there.

At the Forty-second and Fifth Avenue intersection the suggestion was made of carrying underground sidewalks from Fifth Avenue clear down to the Grand Central Station. That would probably be an inducement although a rather short subway from Twenty-third Street on Fourth Avenue, which was originally designed by the builder of the building as spaces where people could walk and could see displays and show windows which are placed down there, has proved absolutely useless.

MR. POWELL: The subway from Thirty-third Street and Sixth Avenue over to the Pennsylvania Station is very freely used, and you will recall the Stark case many years ago when they first put the bridges over West Street. Immediately they were very generously used and have had constant service ever since.

HENRY J. MINEUR (J. M. Horton Ice Cream Co., Inc., New York City): I can verify what the last speaker just said because I come by way of the Central Railroad of New Jersey and every morning and evening go across the river on the upper part of the ferry boat, and the upper parts of ferry boats are very much used and very few of the passengers go downstairs. In other words it is the main entrance and everyone takes advantage of it.

CHAIRMAN GOODRICH: We are concentrating this discussion on only one of the minor items in Professor Morrison's very interesting paper.

NORMAN ANDERSON (Ohio Bell Telephone Co., East Cleveland, Ohio): Is any stress being laid on the junction between the pavement and the shoulder?

I was reading in one paper about a man in Hagerstown, I believe; in passing a truck and trying to get back to the road the machine was overturned and he was killed.

PROFESSOR MORRISON: There is a good deal of difficulty there. I remember when they first started to build concrete pavements to any extent, fifteen or more years ago, there were all kinds of schemes of fluting the edge, etc., and trying to get away from the rut there.

I don't know of any remedy except constant attention to keep it so that they can run off and on without danger.

CHAIRMAN GOODRICH: We will have to interrupt this discussion now to take up the third paper on the program this afternoon.

Mr. Straus, of Macy Co., has suggested, as far as New York is concerned, a very interesting partial solution of one of our problems of trucking, and we will be more than happy to hear what he has to say along that particular line.

Off Street Loading and Night Deliveries

By PERCY STRAUS

Macy & Company, New York City

I have taken the privilege of enlarging my subject so as to include night deliveries with off-street loading. Both plans are the outgrowth of traffic congestion. Each plays into the hands of the other. Off-street loading will involve considerable cost. Night deliveries can be accomplished with little or no extra cost.

Off-street loading is the loading and unloading of trucks on private property instead of at the curb. It has three purposes: convenience, safety and reduction of congestion; incidentally, it has also a safety factor. It has been practiced for a number of years and in varying degrees by some express companies, some department stores, wholesale houses and manufacturers. Its purpose is to overcome the inconvenience of loading across a sidewalk with the attendant risk of pilferage and injury to passer-by, the delay involved in interference by sidewalk traffic and the congestion resulting to vehicular traffic of the parking of vehicles while loading at the curb.

To indicate how off-street loading is operated I am going to tell you what the corporation with which I am associated has done to accomplish it. When we were located at 13th to 14th streets and 6th avenue our method of receiving was to have the trucks that brought us merchandise back up against the curb, then to carry packages and cases to the receiving elevators. Our delivery wagons also backed against the curb, the drivers would bring packages from the basement in hand trucks, assort the packages on the sidewalk and then place them in the wagons in the order in which they were to be delivered. Furniture deliveries were similarly handled, with the additional risk of damage by rolling and carrying heavy pieces across the sidewalk. The trucks that were used for transporting packages to outlying delivery depots, for delivery next day in the suburbs, were also backed against the curb. These trucks often remained for hours at the curb while the loads were being assembled, as they could not leave until the last package of the day's sales had been packed, entered and loaded. This system is still used by a large number if not most of the large stores of the city. Variation is the change from horse-drawn to motor vehicles.

Today, our own method is radically different. For receiving, a platform approximately a hundred feet long has been built on 35th street at the west end of the building, far enough back from the building line to permit the largest truck to back up to it without obstructing the sidewalk. In addition there are two large elevators capable of raising the largest trucks to the floors on which merchandise is received, thus saving in the case of full truck loads, the expense of unloading first onto the platform, then into the elevators. Thus the receiving of merchandise can be carried on without blocking the sidewalk, except for the time necessary to back across it and at considerable saving of time to the truckman.

At present for package delivery purposes two basements of a building 125x200 are used. Motors are taken down to them by two short-run elevators. The saving of time, wear and tear on packages and protection from rain and snow, cold and heat has justified the cost. Packages are carried by moving belts with only one rehandling from the sales floor to the platform on which they are separated into loads for each wagon. The drivers can assort their loads protected from the elements and with the assistance of labor saving devices that speed up the process.

In addition, the removable bodies of large trucks that transfer the packages to delivery depots for suburban customers are loaded in one of these basements. Similar methods differing only in detail are employed in those depots and at the warehouse from which furniture and bulk merchandise are delivered. At none of these are the sidewalks or streets used except for vehicles while in motion. That this method is a distinct contribution to the relief of traffic congestion will be realized when it is known that the number of motors loaded daily for delivery of packages, bulk goods and furniture varies from 188 to 290 (for store and warehouse totals, including all depots, are 271 and 453) per day and the number of trucks that come to the main building to deliver merchandise vary from 200 to 500 per day. If this number of vehicles could be accommodated at the curb it would result in a congested condition of the streets near our main building even worse than it is today, and that would appear to be an impossibility.

Department stores in Chicago have solved their problem by transporting all packages in bulk from their stores to remote delivery stations as we do with our suburban packages.

It may be contended that such methods, while adaptable to large institutions, could not be applied to small merchants and manufacturers, particularly in cases of multiple occupancy of buildings. This no doubt is true, but adaptations suitable to varying conditions can be achieved.

If the transportation engineers of the country were asked for a solution of the problem I have no doubt it would be solved for the small shipper as it has been for the large one.

In addition to the question of *method* of off-street loading, there is the additional one of expense. Where there is congestion of traffic sufficient to justify it, the rental values are so high as to make the cost of the necessary space a deterrent factor. Then, also, an emergency exists which justifies the city to interfere and insist that every step be taken to relieve the danger and cost of congested traffic. The limiting of the heights of buildings restricts the rights of owners of real estate no more than would the requirement to provide space for off-street loading. We will soon awaken to the fact that the need for the latter is as great as that for the former, and when that time arrives the necessary ordinance will be passed.

Although the apparent cost would be great there is an entry on the credit side of the balance sheet that is far from negligible, if not actually large enough to overcome the debit entry of first cost. This is explained by Mr. B. F. Fitch an authority on transportation in a letter which he has permitted me to see in which he wrote:

(A) "Dealing with heavy duty trucks, which are universally in service for wholesale loads, and as the missing link in transportation between premises of shipper and carrier, I can state with authority that the fixed expense of a commissioned vehicle, under single shift operation, is not less than \$5,000 per annum. In addition there is the variable wheelage cost, dependent upon mileage, which covers such items as parts replacement, shop labor, gasoline, oil, tires, etc. That can be estimated at a minimum of 25 cents per mile, and a maximum of 45 cents, the established records between being in ratio with administrative experience.

"These heavy duty trucks, built to the limits of legal restrictions, viz., 28 feet overall length, eight feet overall width and 12 feet, six inches, overall height, make possible, on conventional chassis, body dimensions 18 feet long and eight feet wide, or 144 square feet of platform area. If you divide this 144 square feet into the fixed expense, viz., \$5,000, of each commissioned heavy duty truck, it is evident that the annual cost per square foot of commissioned motor truck platform is approximately \$35. When you compare this with realty rates of from 60 cents warehouse to six dollars maximum office rates per square foot of floor area, it is evident the expense of motor truck platforms for rehandling and short-term storage purposes is prohibitive, but, under prevailing conventions, essential at New York, hence, the high cost of trucking.

"This fixed overhead of \$35 per nine hour day for each commissioned truck reduces itself to a minimum cost of three cents per minute, whether the vehicle is running or idle. When running only, there is an additional cost to be added to this three cents per minute of 25 cents per mile.

"My clocked observations in innumerable cases lead me to believe the average heavy duty truck is delayed at least one hour for hand unloading and reloading of contents, and this delay occurs at both ends of the route. Hence, there is an average of one hour idle time per trip, which, multiplied by a minimum of three cents, pyramids into a transportation cost of \$1.80 per load before you start to move it. If moved one mile at the prevailing average of truck performance, six miles per hour on Manhattan, the actual time consumed in transportation is ten minutes, which multiplied by three cents, plus the wheelage expense of 25 cents, produces an actual transportation cost of but 55 cents per load, burdened with the non-productive termini item of \$1.80 per load.

"Mathematically, if termini time of trucks can be reduced to five minutes, one truck can be made to do the work of three, but actually, with proper provisions, the reduction in number of licensed heavy duty trucks on the streets will make possible the maintenance of ten miles per hour speed, so that in reality one truck can be made to do the work of four, and when that transpires, there will be no traffic congestion of commercial vehicles."

Mr. Fitch continues:

(B) "At present every individual, firm and corporation, appears to think they are getting something for nothing if they utilize public thoroughfares for spasmodic short-time vehicle storage, up to the limits established by traffic regulations. In reality, if the larger institutions had recessed loading platforms, it would be possible to load and unload interchangeable automobile bodies as we do at Cincinnati while the truck is enroute,—thus, increasing the potentialities of all vehicles approximately 400 per cent, with resulting decrease in trucking expense.

"The investment covering rental cost of ground area so appropriated to loading and unloading docks, plus frozen capital in demountable bodies and mechanical devices for interchanging same, is but a small percentage of investment and maintenance expense of the larger plurality of vehicles, made necessary to accomplish the same results by present practice.

"When trucking activities are so recessed from the streets, the increase in curbstore frontage will prove the best possible attraction for automobile patronage.

That argument each merchant can best figure out for himself, but a consistently followed campaign to educate the public at large on this subject will accomplish much in the absence of our ability to autocratically impose recessed loading docks in all buildings.

"After the benefits are demonstrated by progressives, public sentiment will change, and the change will make possible mandatory ordinances. When that develops you will find marked relief to traffic problems, because thoroughfares will be open for continuous movement of automobiles, with a smaller number of slower acceleration trucks to retard the traffic flow."

Permit me now to turn to the question of night deliveries. That is the suggestion that all wholesale deliveries within the congested traffic zone, say below 57th street, be made during the hours when those streets are not otherwise busy, say between 8 P. M. and 8 A. M., the exact period depending on the varying conditions. Its purpose is to remove from the streets that part of the traffic which can without hardship be carried on at night, so as to release the streets to that extent for the use of that traffic which must be in motion during the day. To a certain extent that method is being followed today, but only in those cases in which the point of origin and the point of destination are both in control of the same interests. Instances of this, are the American Railway Express which transports its packages at night from one of its distributing depots to another and department stores which send their suburban packages at night to their suburban depots for distribution to their customers next day.

To increase the use of this method the following suggestion has been made: That all wholesale deliveries to business houses, including hotels, from docks, freight stations, and other business houses within the district specified should be made at night. It requires no great financing and it can be introduced rapidly with the co-operation of the common carriers, trucking companies, business houses and trade unions. It has two distinct parts, 1. The inter-city plan which covers the moving of commodities into the city from points beyond its limits, by railways and steamships or carried directly from point of origin to destination in motor trucks. 2. The intra-city plan which covers the moving of commodities whose transportation originates and—or finishes within the restricted area of the city.

As I have just said: The night delivery plan requires no financing nor much time in which to introduce it, it needs merely leadership which would bring about the cooperation of all factors concerned, the railroads, the steamships, truckmen, business houses and trade unions. It would reduce the day-time traffic of the streets by spreading the street load over the twenty-four hours, thus making more efficient the use of, by far that greatest percentage of the municipally owned part of the city. It would save time to all concerned by speeding traffic through avoiding congestion. Today traffic is slowed down and congested by slow-moving heavy trucks, not only when in motion, but even more when drawn up at the curb or when maneuvering to back up or when actually backed up against curbs. Whenever I have traced the congested street conditions on avenues or side streets I have invariably been able to trace it to those same causes.

(C) This plan should be welcomed by railroads and steamship terminals. The flexibility of hours of work under this plan makes it possible for the terminals to increase their capacity for the handling of commodities without the necessity of structural changes. It might even be workable to schedule the loading and unloading of freight at the terminals at different hours during the night and morning for different sections of the city. In any case, the increase in hours during which work might be done should make it possible to handle freight in a more methodical way. The minimizing of confusion which now exists at times at many freight terminals because they are forced to handle a larger tonnage than their facilities are equipped to accommodate, would speed up truck loading, and thus enable terminals to dispose of stored freight in order to make room for other

incoming shipments. This would redound to the advantages of the terminals and the truckman, and finally to business houses which would get their expected shipments more promptly.

The intra-city part of night loading, prescribes that commodities which are to be trucked from any point within the city into the congested district, shall be brought together at a dump or dumps during the day and sent to their destinations in the congested district during other than the usual business hours.

This lends itself to economical handling. All shipments going to one place of business or to a section may be loaded into a trailer or skid. This plan would make it possible for a few good loads at night to take the place of many single or small shipments during the day time. The successful installation of this plan would go a great way toward solving traffic problems by reducing the number of trucks going over the same routes.

Only those commodities should be collected at dumps which can be transported that way without adverse results to business. Many cotton and linen merchants of the city have expressed a willingness to have their shipments handled in this way provided the expense permits.

Preliminary cartage figures show a saving can be effected by handling yard goods by the dump system. Transportation charges, under this system, including assembling at a central point, are cheaper than sending small shipments into busy districts during the day time.

Rates paid by converters range from \$.65 to \$1.50 per case and \$.25 to \$.30 per package.

A straight rate of \$.23 per hundred has been quoted for handling merchandise from converters' establishments to dump and then to stores at night. (Cases do not average over 300 pounds.)

A survey made by the Port of New York authority shows that many trucking concerns and nearly all the railroad and steamship companies are willing to give the inter-city plan a fair trial. Of course, there must be sufficiently large tonnage shifted to night loading and unloading to make it worth while for the terminals to keep open. Considerable work has been done to make known to all just what the plans are, and how they will affect each one concerned. Many letters have been received from manufacturers and wholesalers indicating their willingness to cooperate. The majority of the large department stores have been interested in the plans and have expressed their willingness to do whatever is necessary to help the traffic situation.

In our organization we have found it of great advantage to keep our receiving platform open from 7 a. m. to 7 p. m. during the normal seasons, and from 7 a. m. to 10 p. m. during the rush periods. We are ready to shift our receiving hours as soon as enough business houses, terminals, and truckmen come to the realization that the time has come to take the step.

To quote Mr. Fitch again,—he says:

"The following three simple procedures will accomplish the desired results, less capital expense demands:

"(1) Night trucking of commodity and railroad freight. (Proviso: Large lots or bulk loads, not shipments of smaller consigners.)

"(2) An almost universal development of recessed loading platforms, at the plants of all large receivers and dispatchers of truck lots of freight.

"(3) Inland railroad terminal stations served by motor trucks, in lieu of railroad pier stations served by car floats, scientifically located with reference to traffic densities, instead of the present inflexible locations which impose upon shippers long expensive longitudinal truck hauls on Manhattan, which are the result of industrial extensions further and further removed from pier locations."

This last suggestion I will not take time to discuss. In conclusion I am going to

draw on that same authority Mr. B. F. Fitch again. In one of the series of letters previously referred to, he writes:

"I will ask you kindly to bear in mind that spasmodically our present problem, which is considered impossible of solution except at huge capital expense, has previously from time to time recurred in history and has solved itself less any capital expense. Thirty years ago there was more congestion on Summer Street in Boston than there is today, and also more congestion in the Boston Hay Market district than there is today. Sixty years ago there was more congestion at Fulton and Broadway than there is today—even a pedestrian overpass was necessary.

"Public cooperation and newer implements or devices for individual service have progressively solved all such problems. Group transportation opportunities of the horse bus eliminated a larger plurality of the vehicles of individuals, and in sequence, street cars of increased passenger capacity extended that. This history, with marked effect on surface transportation, has extended through and has been realized by elevated, subway and other developments, up to the present motor bus era.

"The bus and the truck as flexible units, not involving right-of-way investment and capable of greater passenger carrying capacity and freight tonnage capacity than automobiles and horse drays, are automatically decreasing the number of vehicles on the street. Hence, it is evident, after a careful historical review of the traffic problems of all cities, that newer developments, easy of individual adoption, have from time to time in operation adequately solved problems which until the advent of these newer devices were considered of an engineering and construction nature.

"Scientific increased usage of motor buses and heavy duty motor trucks will alleviate this situation even under a single shift operation. Hence, needless to say, under a double shift operation there is still a side factor of safety in the traffic flow capacity of our thoroughfares."

Of the two plans night delivery is the easier to introduce. It calls for no investment except that of initiative and leadership. It would relieve traffic congestion by removing from the most congested streets in the busiest time of day, the type of vehicle that occupies most space and travels slowest. It would release curb space for necessary parking. It would reduce the cost of heavy trucking by increasing speed and thus reducing expense and the result would be safer and pleasanter streets by day and useful instead of fallow streets by night.

CHAIRMAN GOODRICH: This is a very interesting discussion of a problem which is here in New York and extends to other cities as well.

I want to ask for only one discussion of this before Mr. Straus goes as he has another engagement, and I would suggest that the figure of eleven per cent as the total relative area of the city is very small and must include the outlying districts like Queens and Richmond because in Manhattan there are thirty-two per cent.

I would like to ask Mr. Simpson if it is in Detroit that a man has developed a night distributing scheme with keys to the warehouses of his patrons.

HAWLEY S. SIMPSON (Traffic Engineer, Newark, N. J.): There is no such organization there unless it has been established in the last two years.

CHAIRMAN GOODRICH: I am misinformed about Detroit. I have been told of this arrangement. A truckman developed a night distribution scheme, and he arranged with the freight houses which are normally open at night on the one side to give him delivery, and he arranged with his clients to take a key to their warehouses, which were rebuilt to a certain extent, so he could unlock the door, slip into a compartment of that warehouse the material which was destined for that particular plant, lock it up, and go on to the next company. They could unlock

the door from the inside and take out the merchandise that was delivered at night.

I was told that it was satisfactorily worked out for something like a year. I am sorry I cannot give you the exact location, but it is in exact line with what Mr. Straus suggested.

One thing more. There is good precedent for this night trucking. Way back in Rome in the time of Julius Caesar an order was issued that fuel could be distributed only at night. Then done by slaves on their backs normally; and they wanted the daytime use of the streets for chariots and people who were walking, but there is an indication of something which has had long precedent.

MR. STRAUS: All we need is Julius Caesar.

V. T. BOUGHTON (Engineering News-Record, New York): To what extent would you plan to carry out that night delivery, that is to these little shops on Thirty-fourth Street? You wouldn't consider them in the night delivery?

MR. STRAUS: For receiving of their merchandise I would.

MR. BOUGHTON: How would it be arranged? Would they have to keep somebody on duty at night?

MR. STRAUS: I think it would have to be arranged so that certain districts would receive their merchandise at certain times of the night. If you have been through here after six o'clock in the evening, you know that it is pretty dead. Almost all the side streets up to Forty-Second Street and possibly beyond that are practically deserted at night, and it would be easily arranged that their receiving clerk, or whoever they have do that work would come later in the morning and continue on later in the evening. Of course it would have to be arranged in multiple occupations that one individual receive the merchandise for the entire group.

I believe that shipment of these small stores, just like shipments of the large stores, by express or freight, should also take place at night.

Of course, it is out of the question to make deliveries to the householders at night. If that were possible it would solve department store difficulties tremendously. If we could get our wagons through the streets when they were not congested we would do away with large numbers of them.

MR. SIMPSON: I wonder if Mr. Straus has any figures on the relative risk of theft of merchandise from trucks engaged in night delivery and those engaged in day delivery.

MR. STRAUS: When this proposition was first suggested I wrote to a good many different organizations which are mentioned, and it was brought out by one of the members of the trucking association in a discussion of this suggestion that this was a possible difficulty. It was then taken up with the police department and they said they had no hesitation in saying that they could safeguard the streets at night just as well as in the daytime.

MR. SIMPSON: The reason why I asked that question is that when this proposition was brought up in Detroit the railroad terminal men said they would arrange to accommodate night delivery, and even expand their terminals as the introduction of night delivery would double or triple their business.

The truckmen said they would gladly carry on their work both day and night if the retailer and wholesaler would demand it, but they didn't see where they were going to obtain any saving because there would be so much thieving.

MR. STRAUS: There was a time not so many years ago when drivers were held up on the streets but with the increasing efficiency on the part of the police we don't hear of that.

MR. SIMPSON: I should like to ask Mr. Straus also if he can give me some information on the question of off-street parking for customers' cars within the period of time that they are shopping in the stores.

MR. STRAUS: That is a matter that has been very much discussed. I think

Franklin Simons is the only store in the city that is doing it, although it is done quite extensively in other cities.

We have discussed it and have made up our minds that we had no more right to pay for parking of customers' cars who come to us in cars than we had to pay transportation costs of people who come to us on trolleys or taxis. It would immediately create a privileged class of people if we paid for the parking of their cars, and we made up our minds it wasn't within our sphere. That, however, is just our point of view. Incidentally an extremely difficult one.

I doubt very much if it is so much a problem in New York as in smaller cities where they use their automobiles more for shopping.

CHAIRMAN GOODRICH: We want to thank you, Mr. Straus, for bringing this to our attention and explaining it as you have. It was a very illuminating discussion.

MR. STRAUS: I hope if there is anybody from New York who has an opportunity to press for that solution of night delivery, they will do it, as it is one way to give us some traffic relief in a hurry.

CHAIRMAN GOODRICH: We have a man here with us this afternoon who is very much interested in saving life. He is Mr. J. J. Hall of the Automotive Equipment Association. He has a scheme for a campaign and it will be well worth while to hear what he has to say.

J. J. HALL (Automotive Equipment Association): The Save A Life Campaign came out of Hoover's conference in 1925. Our Association had two men who attended that conference and when they returned a Committee on Safety was appointed.

The gentlemen on this Committee have done an outstanding job. First, they found out that you can group all causes of accidents under two heads: the human element which covers the greater number, and the faulty mechanism of the automobiles. So they tried to concentrate on these two real causes of accidents. They also found that the burden of highway safety has been resting upon the shoulders of the motor vehicle departments and it is impossible for them to cope with the problem today with too inadequate an organization. The state of New York has nearly 800,000 automobiles and only 75 inspectors.

Through experience in Grand Rapids, Michigan, our plan was brought up to what it is today. First the inspection as to faulty mechanism of automobiles was put under police supervision only, and it was proved that they could cover only 2,000 automobiles. The next year by enlisting the automobile dealers under police supervision they covered something like 30,000 automobiles in the same length of time. It also was brought out that in our safety work we must be spectacular and must use circus tactics if we want to attract the attention of the multitude of motorists and pedestrians.

A little over a year ago this plan was taken into the state of New York and Governor Smith issued the first proclamation setting aside the entire month of August, I believe, or July, asking all motorists to submit to a free inspection of their vehicles.

Then came the problem of building within a month's time a physical organization under the Department of Motor Vehicles. With the assistance of garages, service stations, etc., we provided something like 6,000 stations located in every town and hamlet through the state of New York. That made it possible for motorists to get inspection promptly. If a car was absolutely safe, the owner was given a sticker similar to this one which is now being used. That is part of the circus tactics. You must let them know that you have a campaign on. We check for seven things: brakes, horns, steering mechanism, mirrors according to the law of the states, etc., and at the end of the campaign it was found that over 40 per cent of the motor vehicles checked were found defective in one way or another.

We enlist the following agencies for support: First the automobile clubs, and in Pennsylvania the Keystone Club did an outstanding job for us in Philadelphia. Then we get the radio and the moving picture industry; we get them to send their cameramen to the state house and take a picture of the Governor signing the proclamation and the motor vehicle men inspecting the first car. In Pennsylvania it was estimated that the safety reel was shown to five million people in Pathe and Paramount weeklies. Then the press gave us something like 50,000 square inches of free publicity in Pennsylvania.

In New York we checked 1,250,000 automobiles and in Pennsylvania while the figures don't show this because it was hard to get back these reports from the dealers, anybody down there will know we did even better than in New York. It is estimated that we covered one million cars.

Here are some of the startling figures that were found. These are from the reports the inspection stations must give back to the state:

Brakes needing adjustment were found in 214,183 cars. Brake relining, 67,637. Lights needing adjustment, 450,912. Lights replaced, 33,118. Horns adjusted, 22,000. Horns repaired, 7,890. And here's a thing that is overlooked in safety work and is of vital importance—steering mechanism adjusted, 49,000. And steering parts replaced—many of the drivers didn't know that their steering mechanism was being held together by the last thread of the worm—22,545 new steering mechanisms replaced in those cars. Mirrors adjusted, 16,000, and those driving without mirrors contrary to the Pennsylvania law, 50,727. Windshield wipers adjusted were 29,000, and those driving contrary to the law 36,000. License tags corrected—tags down behind bumpers which in case of an accident could not be seen, 45,582.

Another thing we are checking for now is operator's licenses and this is putting a lot of money back in the state treasuries. You would be surprised how many are operating without an operator's license.

The deaths in Pennsylvania were 155 in April 1927, and with the cooperation of every agency possible and 7,292 inspection stations, that dropped down to 65 in 1928.

I talked to Commissioner Dill of New Jersey just before coming over here, and he told me that their deaths were 102 the month of September last year, and about 68 this month. Twelve states have adopted this policy and every state we have been in has asked us to come back again.

WM. S. CANNING (Keystone Auto Club, Philadelphia, Pa.): Mr. Hall stated that he was unable to give the number of vehicles in Pennsylvania inspected under this campaign. I cannot give it myself but in the last week of the campaign in driving 100 to 250 miles a day in various sections of the eastern half of the state, I counted every vehicle as I went by, those parked, some in the garages and some on the road, and between 85 and 90 per cent of these vehicles bore stickers showing that their cars had been inspected.

MR. HALL: We must adopt spectacular methods to attract the attention of every one, and when those stickers start to appear on the cars, as Mr. Canning just told you, it has a psychological effect upon everybody in the state, because it is staring the man behind the wheel in the face and is a constant reminder to him to be more courteous, more careful and more considerate. That psychological effect has had more to do with the success of these campaigns than any one thing.

W. B. POWELL (Buffalo, New York): I should like to ask if it is not a fact that having had the car inspected and gotten one of these stickers, which is in a sense a certificate of merit, many drivers are then prepared to go ahead and drive indefinitely thinking that their brakes are going to continue to be in order. A month after that sticker has been put on, they may be out of adjustment.

MR. HALL: The motor patrols of Pennsylvania recognized the stickers for two months after the campaign had closed.

While 75 per cent of the people react voluntarily, the other 25 per cent cause a great deal of trouble. The big problem is the "junk" that is on the road. This is the element that goes down to the junk shop and buys a car for ten, fifteen or twenty dollars without a top or windshield, and then crash into good cars and abandon the car and leave it. If there was a law requiring inspection every six months, it would bring that element right up to the surface and they would have to get off the highways. I don't know of any other plan that will remove the junk from the highways.

A. K. GAGE (Assistant Prosecuting Attorney, Wayne County, Detroit, Mich.): In reference to this paper that wasn't presented this afternoon, "The Value of a City Traffic Engineer to the Legislative Body," I think one of the things that the Safety Council can do and you gentlemen who represent the best thought in your various communities is to make a concerted attempt, well organized, to bring the legislative bodies of your cities and states to a proper realization of the value of a city traffic engineer to that community.

I mentioned this to several of my friends who are responsible for meetings, and they said, "Well, that is rather an embarrassing proposition, to ask professional men and business men to try to put across with the political body, the legislative body, a plan for further development of their professional activities."

I don't want to be disloyal to the wonderful city in which I live, but we had a very distressing example, it seems to me, in Detroit of the lack of appreciation on the part of our city council of the fine work that was done by Hawley Simpson and by his successor Harold Gould in the preparation of a comprehensive traffic survey.

At one of the opening sessions of this Congress the other day I made bold to remark that I thought Professor McClintock had overlooked the point that a traffic survey was somewhat analogous to an inventory, and consequently was more or less temporary, and I suggested to him that the best practice in many industrial plants today is to aim toward a perpetual inventory and keep constant check of outgoing and incoming merchandise and material.

If that is true in industrial plants, it certainly might be applied to the analogous situation of a survey of traffic conditions in a city. Of course, you have changing conditions throughout the length and breadth of your municipalities and states, but those changing conditions can be noted and provided for in your perpetual inventory.

We had a situation which I personally regretted when our good friend, Hawley Simpson, was permitted to get away from us. He went down to Newark, where I understand his efforts are being properly appreciated. And then we had that work continued by another good friend of mine, Harold Gould, who carried it on to a definite conclusion and produced a very fine piece of work from an engineering standpoint as well as from a practical side. It seemed to me a regrettable fact that the city council members seemed to lack appreciation of the material they had at hand. They would refer to it and yet they didn't seem to realize that it was worth while.

I would like to see some effort put forth to present this thing to the legislative bodies in our municipalities and in our states, to have them realize that we must have these facts and that a proper expenditure for this purpose is one of the most economical things that can be done at this time to get these facts and to keep them up to date. I think that is one of the things that the Public Safety Division of the National Safety Council ought to give their efforts to accomplishing in the next twelve months, if possible.

ADJOURNMENT

October 5, 1928

Open Meeting of the Committee on Personality and Public Accidents

SIDNEY J. WILLIAMS, Chairman

Director, Public Safety Division, National Safety Council

The eighth session was called to order at nine-thirty o'clock by Sidney J. Williams, Director, Public Safety Division, National Safety Council.

CHAIRMAN WILLIAMS: Inasmuch as the Chairman of this Committee has not yet been appointed by the President of the National Safety Council, I am calling this meeting to order and will state briefly how we came to have a meeting of this sort.

We, all of us, have been interested for a long time in learning more about the personal phases and the personal causes of accidents. All have agreed that it is a very important subject and that the personal element in causing or preventing accidents is greater even than the mechanical element. But that is about as far as we go. We talk about carelessness and inattention, but we do not know what they are, how they operate and how they are to be prevented, except through the mass education that we use in safety work.

A few months ago through action of our Public Safety Advisory Committee it was decided to set up a special committee which was given the name of the "Committee on Personality and Public Accidents." Our staff was asked to undertake some preliminary study of the subject, at least to find out what was known on the subject in this country or anywhere else and if possible to outline a plan for finding out something further.

We realized then and now that this would be difficult, and one reason why nothing more has been done on it so far is that the subject is very vague. Where are you going to start and how are you going to get at this question of personality and personal characteristics?

A Question to Be Newly Discussed

Without going any further into the subject matter of the discussion this morning, this committee was set up. This is the first time that the committee or any group has been called together to consider the question, but in the meantime our staff has carried on some preliminary work which has been in the hands of Mr. Baker who is here this morning and who is a member of the Engineering Bureau of our Public Safety Division at Chicago. Later on Mr. Baker will make a short report of what the staff has done so far, the plans that the staff has in mind, and we then want to have a general discussion. We want to have comments not only from the committee members who are here, but any of the rest of you who have anything to contribute, so that we can come out of the meeting at the end of the morning with a little more definite idea than we have now on the practicability of our going forward with certain investigations which we have in mind.

We have asked Dr. W. V. Bingham, of New York, to open this meeting with a paper which will be the only formal address on the program, and which will deal with some of his very interesting experiences in connection with work along this line which he has been doing for some of the public utilities corporations.

So I will introduce Dr. W. V. Bingham, who is Director of the Personnel Research Federation, New York City, and who, as many of you know, has been doing work in applied psychology in relation to industries and other enterprises, for a number of years.

Personality and Public Accidents—A Study of Accident-Prone Drivers

By W. V. BINGHAM

Personnel Research Federation, New York, N. Y.

Personality and Public Accidents is a challenging topic. It focuses attention on the people who are most apt to have accidents,—the "accident carriers," to borrow a medical term. These men are usually the ones who spoil our no-accident records. They injure themselves and their fellow workmen.

The Accident-prone Driver

These prone-to-accident men, when employed as street-car motormen or bus drivers have a large share of collisions. When operating automobiles or trucks or taxicabs, they fail to avoid some of the many hazards of the streets, or do the wrong thing in a sudden emergency, with appalling results in personal injuries, deaths, and property damage.

For many years the world has been exasperated with these persons, has blamed and berated them, warned or cautioned them; but the statistics of public accidents keep right on going high and higher. What should be done about it?

First we must pause, as we are doing today, to ask whether we have gone at the problem of reducing highway accidents in the best possible way. We shall find, I think, that we have not yet got to the root of the matter. We have not made full use of what is now known about individual differences between people in their tendencies to have accidents. We shall also find that we need a great deal more information than is now available about these prone-to-accident persons, and how or whether they can be changed into safe operators.

The Chronic Repeater

Perhaps the most neglected causes of highway accidents are to be found today in the physical and mental makeup of men who repeatedly have accidents.

Psychologists, physicians and safety engineers who have examined the facts about individual differences in relation to safe operation, are in agreement that many of these unsafe drivers can be made over into safe, competent operators through use of the right incentives and right methods of re-training and supervision. At the same time it must be recognized that a small but dangerous proportion of the accident-prone drivers are so constituted that no amount of special effort can fully compensate for their constitutional handicaps. Should such men be permitted to drive automobiles?

The subject is intensely practical. It bears directly on the whole question of state policies and procedures in the examination and licensing of drivers, and affects the practice of the courts in dealing with traffic offenders. Many managers of street railways and owners of fleets of trucks recognize how closely it touches upon their methods and standards of hiring, of training, of discipline and of supervision. They want, if possible, to detect the prone-to-accident person in advance, and then either cure him or put him where there are no hazards.

The subject is of deep concern to casualty underwriters as well as to employers and public who have in the long run to foot the bills. It concerns parents who are anxious about the lives of their children, and indeed all of us who either walk or ride in the streets. Everyone wants to put a stop to the rising tide of accidents. One neglected but necessary step to this end requires thorough researches into human personality in relation to the causes of accidents. Only so can our efforts to prevent accidents be planned in the light of full knowledge.

Two main questions to be raised are, first, what are the differences between people who frequently have accidents and those who go through the same hazards without accidents? Second, what can be done to cut down accidents among these prone-to-accident persons?

The second question can surely be answered better after we have found the answer to the first. And yet, strange to say, the vast literature of the safety movement contains to date only a relatively few pages devoted to reports of researches on accidents of individuals known to belong to the prone-to-accident group. The next few years will surely see a substantial addition to this fund of literature. We cannot afford to be without it.

Personality of the Driver

Fortunately the psychologists, physiologists, physicians and safety engineers have not left us entirely in the dark as to the constitution of the accident-prone personality—the “accident carrier.” Indeed it is commonly recognized that some people seem to be temperamentally unfitted to face the complications involved in driving a vehicle safely through crowded traffic. Others are hampered by poor muscular coordination, or else have unusual difficulty in driving safely because of bad eyesight or hearing. Some whose eyes are good, nevertheless do not readily notice and interpret the really significant items in the constantly changing picture about them. A good operator needs to be able to perceive accurately and also to distribute his attention; he must not become too concentrated on one line of thought or action, incapable of spreading out his awareness to include all the little apparently irrelevant features of traffic situations. He will promptly notice the parked car is about to start out from the curb as he is approaching, or the pedestrian who is making the slightest gesture in the direction of stepping off the sidewalk into the gutter, and so on.

A good operator needs to have a grip on his emotions, in order not to get excited or panicky when the unexpected happens. His reaction-time must not be excessively slow; although the researches of M. Lahy, in Paris, have shown that irregularity of reaction-time is a more serious symptom than mere slowness.

And he needs a certain minimum of intelligence. This minimum is quite low. An intelligence level sufficient to enable a man to learn the correct responses and size up the situations through which he drives, has been found to be that of the so-called moron, the high grade feeble-minded. Above this level there is little relationship between intelligence and freedom from accident, but below it the possibility of training a man to be a safe chauffeur is slight.

These and other kinds of defects are conveniently classified into two groups. First, those defects which are temporary in nature, or remediable, like lack of the skill which comes through practice. Second, those defects which are constitutional or permanent.

Within this second group we should recognize that some permanent disabilities can nevertheless be compensated for. There are drivers who are deaf or one-armed or color-blind, but who, through development of exceptional skill and caution, can operate more safely than the average person.

There are certain illnesses, both temporary and chronic, which seriously affect the capacity to avoid accidents. For example, one of the most dangerous prone-to-accident drivers is the person who suffers from a mild form of epilepsy called psychic epilepsy. He is himself often quite unaware of his defect, for it does not show itself in convulsions like the better known form of the disease. Indeed its insidious symptom is nothing more than a brief lapse of consciousness, like a moment of sleep with the eyes open, which usually passes among friends or family for mere inattention or occasional absent-mindedness. The late Dr. Thomas W. Salmon called particular attention to the apparently unsuspected prevalence of this

form of disorder of the nervous system, and to its grave importance as related to highway accidents.

A motorman once drove his street-car through an open draw-bridge. He escaped alive but does not know how the accident happened. One wonders whether he and many others who have been hastily labeled as criminally negligent may not be sufferers from this insidious form of epilepsy.

As a matter of fact, it is not known how rare or how prevalent this disease is, throughout the population. Among 181 high-accident men, mentioned below, not one seemed classifiable under that heading.

Physicians and psychiatrists should have ample opportunity and ample funds to examine a large and representative sampling of accident repeaters, in order to determine the frequency of this and other mental and nervous disorders and their relation to highway accidents.

And while medical men are learning all they can about illnesses, high blood pressure, constitutional predispositions and other physical conditions in relation to accidents, the psychologists, too, should be called upon to examine these same accident-prone individuals, to measure their keenness of eye-sight and hearing, their ability to judge speed and distance of moving objects, their scope of attention and susceptibility to distractions, their quickness and accuracy in motor reaction, and their resistance to fatigue. Susceptibility to surprise should also be tested, for the prone-to-accident driver is sometimes entirely skillful and competent except when he is placed under the emotional strain of sudden emergency; then he loses his head.

These are some of the characteristics regarding which too little is known, and which should be investigated in the course of a thorough research into the personality of accident-prone drivers.

A Practical Study of High-Accident Motormen

A study of prone-to-accident men has recently been made under the writer's supervision on behalf of the Boston Elevated Railway, one of the members of the Personnel Research Federation. This investigation illustrates the practical value as well as the scientific interest of such studies.

The investigation was begun more than a year and a half ago at the suggestion of Mr. Edward Dana, general manager; Russell H. Sears, attorney; and James Smith, superintendent of transportation. Shortly after it was started we were fortunate in securing the help of Dr. C. S. Slocombe, who has been largely instrumental in carrying it forward and in putting the results to practical use in accident reduction. Dr. Slocombe is a New Zealander. He studied in London under Professor Charles Spearman, the distinguished British psychologist, and came to this country about three years ago. This is his second year as a member of the staff of Personnel Research Federation.

The industry in which the study has been made is a metropolitan street railway employing 8,000 men, including 2,900 motormen and bus operators. Its purpose in asking the Personnel Research Federation to undertake the inquiry was to see whether accidents could be reduced through individual study and treatment of accident offenders.

This railway has a large accident bill, in spite of the fact that its accident record is low in comparison with the records of other great metropolitan street railway systems. In other words, it was not because of an exceptionally bad accident situation that its management decided to undertake this investigation. Using the best methods that have been in current use for safety education, training, supervision, group rivalry, etc., they had been able to reduce their accident rate to what would ordinarily be considered a low level; but the bill for damages and claims on so large a system still amounts to a very large total sum. The question was whether this bill could be reduced by adding yet another approach to the program of accident reduction.

A preliminary statistical study was made of the complete and detailed personnel records of 200 employees. This was published in the *Personnel Journal* for December, 1927, under the title, "Men Who Have Accidents." Differences in ability to operate street-car or motor bus with safety were found to correspond with differences not only in training and in length of experience, but also in physical condition as indicated by blood pressure, and in skill in saving electric power as measured by automatic coasting recorders attached to the street-cars.

It was found that these results tended to confirm Miss Newbold's, in England, to which Mr. De Blois referred Wednesday in his address. She had found that industrial accidents do not distribute themselves impartially, by the law of chance. They happen to some people more often than chance would indicate. Moreover the men who are found in the high accident group in one year tend to be there in succeeding years.

Significance of Minor Mishaps

Fortunately for our study of prone-to-accident men, the street railways keep full and detailed records of minor accidents as well as of those which result in personal injury or serious property damage. This fact made it possible to ascertain still another point which is very important for safety engineering: It is the man who has more than his share of mishaps or trivial accidents who tends in the long run to have a bad accident.

In plants where an accident is defined as a lost-time accident and no full detailed records are kept of minor injuries or trivial accidents, the information is lacking to enable the safety engineer to identify, follow up and cure the prone-to-accident man before he has a lost-time accident. That situation, fortunately, did not prevail in this street railway where records are kept of every incident, even though it is merely scratching the paint off the fender of an automobile, or a person falling in the car because of jerky operation. If the more than ordinarily prone-to-accident employee is to be discovered in season, before anything really serious has happened to him, it is useful to keep records of minor accidents and of non-chargeable accidents also. The more information, the better.

Studying "Non-Chargeable" Accidents

A bus operator had a number of non-chargeable accidents. In each instance he had been exonerated, because, when the circumstances were looked into, it was found that his bus had been struck in the rear. It seemed clear that it was not his fault. It was the fault of some truck driver or automobilist. Each accident had been reviewed immediately after its occurrence, and recorded as a non-chargeable accident.

But, when all these records were brought together it was found that always the bus was hit in the *left* rear, never in the right rear or directly in the rear. Instantly this fact pointed to some fault of operation. This man had the habit of driving close to the curb, as is proper. But when he sees a car parked ahead of him, he drives up close to it and then suddenly turns left to go around it instead of beginning earlier to ease out into traffic.

The driver was not aware of that habit and no one would have been aware of it or realized that this particular defect of operation needed to be called to his attention, if records of these "non-chargeable" accidents had not been accumulated and studied systematically.

Preparing for Accident Reduction

Such preliminary studies as these led to a fresh attack on the accident situation in one of five main divisions of the street railway system. In this division the records of about 500 men were canvassed, and 181 high-accident men were selected for individual study, diagnosis and treatment.

In the meantime we had been making a comprehensive job analysis. We took the motorman's training and learned at first hand how it feels to face the need of making schedule through exasperating traffic conditions. I take off my hat to the motorman, having tried his job.

Mr. S. S. Brooks, recently of our staff but now dean of men at the University of Montana, worked for two months as a motorman in order to get a detailed description of duties, which runs to more than 40 closely typewritten pages. The motorman's job is not as simple as it looks. The description starts from the time when the operator has to begin to inspect his equipment, five minutes before he takes a car out, and carries him right through all the details of starting and stopping, making change, issuing transfers, opening and closing doors, watching for greasy pieces of rail, so as to apply the sand before the car skids, bringing the car to the end of the run, changing ends, putting down various records, coming back on schedule time and handling various emergencies along the way. By the time one describes in detail all the things that a motorman has to know and do, it runs into quite a pamphlet.

Diagnosis and Treatment

A check list of twenty five points of operation was made, as an aid in noting the more important details regarding a motorman's skill and manner of operating; and forms were devised as aids in recording and analyzing accidents in relation to the rest of the man's record—his illnesses, lateness, complaints, errors in reporting, disciplinary actions, commendations, etc. Arrangements were made for special medical examinations whenever they were indicated.

No inflexible program of examination and treatment was adopted, but every high-accident man was handled as an individual. Dr. Slocombe puts it picturesquely when he states that there were 181 cases and 181 methods of examination and treatment.

The motorman was ordinarily observed in operation. A special instructor rode the car with him a couple of hours a day for at least two days. Meanwhile his entire list of accidents was classified according to type, and studied in detail for clues as to what was wrong and why he was having more than his share. A conference or clinical interview with Dr. Slocombe and one or more of the instructional or supervisory officers then led to a tentative diagnosis and a prescription for treatment.

No two of the high accident cases were exactly alike. One man needed special re-training and close follow-up on certain details of operating his brake. The next needed a new pair of glasses. The third was developing cataract. A fourth was lax in the matter of closing the door before starting the car, and had a proclivity for running ahead of time. The division superintendent dealt with him and an inspector helped to effect a cure.

One man, over-fatigued, under-nourished, irritable and distraught, a widower with several children, was found to be in an unfit condition to operate a car because he was trying to be mother and cook as well as breadwinner. He was helped to make a temporary adjustment at home to relieve the situation until his eldest daughter, a senior in high school, graduated and picked up more of the burden.

Results

Many of these high-accident men became better than average operators and have remained so. A very few among the older men were pensioned, transferred to other work or dropped.

In general, the older man is the safer operator. This holds for all age groups including the group of those who have been with the company for more than thirty years. Some of the men with the finest records during the past year are about seventy years of age. It is not until the effects of senility really begin to show

that the question of pension needs to be raised; but it should then be raised promptly, no matter whether the man is seventy or seventy-five or fifty-five.

The ten months which have elapsed since this effort began is much too brief a time to give an indication of the permanency of the effects. It seems safe to say, however, that more than one-half of the group selected as high-accident men have been definitely cured of their accident proneness as shown by their record since last December. All but 10 per cent have shown definite improvement.

At the same time the effect of this close attention to high-accident men on the part of the Safety Advisor and the instructional and supervisory force had had its favorable effect on the other men and in the other divisions of the railway; so much so, indeed, that accidents during this year on the entire system of surface and bus lines are 17 per cent fewer than during the previous twelve months.

The particular division in which these efforts have been concentrated has steadily maintained each month since last December a safety record at least 25 per cent better than the other divisions.

On September first these operations were extended to the high-accident men in a second division and the management is watching developments here with the keenest interest.

Causes of Proneness to Accident

Dr. Slocombe has made a classification of the principal causes of accident proneness among 160 of the high-accident men, as follows:

Physiological defects were the principal characteristics of sixteen of these. This is exactly ten per cent. Of these, four were cases of senility, actual deterioration that comes with extreme age. The other twelve were various defects of a medical sort, including particularly the kinds of disorder of which high blood pressure is an indication, such as nephritis and arteriosclerosis.

Of the other ninety per cent of the high accident men, it is interesting to note that in thirty cases, or nineteen per cent of the total, the principal cause seems to be lack of understanding of factors constituting accident hazards of the highway. They had not learned to recognize, for instance, the significance of smoke coming from the tail of an automobile that is parked along the curb ahead, indicating that the driver is warming up his engine and is apt to shoot out into traffic at any instant. Little items of that sort these men had not learned. Such a lack of understanding of factors constituting accident hazards seemed to be the outstanding defect, as has been said, in nineteen per cent of these 160 cases.

The chief defect in fifteen of the men seemed to be poor judgment of speed—their own speed and the relative speed of other vehicles.

In nineteen cases it was faulty judgment of distance, evidenced by repetition of some such type of accident as that which happens as the motorman's street-car is rounding a corner and does not clear an automobile parked nearby.

Taken together, poor judgment of speed and distances accounts for a total of twenty-one per cent of the entire group.

The three classifications mentioned include a half of the cases. The other half distribute themselves among a number of psychological defects other than defects of judgment of speed and distance and lack of understanding of accident hazards.

Wrong attitude towards work, management or supervisor, accounted for three cases. Poor sensori-motor coordination, for nine cases. Excessive perseveration, seven cases.

Inability to distribute attention, seven cases. Oscillation of attention, seven cases.

Slowness of reaction, five cases. Excessive susceptibility to fatigue, five cases. Insufficient experience, fourteen cases.

Nervousness and fear, five cases. Excitement and worry, two cases. Impulsiveness, a tendency to act too quickly in a situation, three cases. Irresponsibility, four cases. Chronic hurry, six cases. This leaves three miscellaneous cases unclassifiable.

One Cause of Collisions

Perseveration is a formidable term but its meaning can be easily illustrated.

A motorman had a good accident record until a year ago last Spring when he began to have collisions. He had five of these collisions about a month apart. This automatically brought him into the high-accident group so that his case was brought up for special consideration.

An instructor rode the car with him, checked him on twenty five points of operation, and returned to say that he was entirely skillful and capable, and that there was nothing to indicate need for re-training or further instruction or follow-up. Nevertheless this man had had five collisions in as many months.

Dr. Slocombe had been studying those collisions to see what elements, if any, they had in common. They belonged to one type, namely, straight front-end collisions. This man somehow avoided all the other kinds of accidents, but he repeatedly ran into something directly in front of him. There was another characteristic common to all five of his accidents, namely, they all happened Sunday afternoons.

This seemed easy. What was the man doing on Saturday nights? He was at home with his family. He was not the sort of man who goes on a weekly carouse; so that was the wrong lead.

It finally occurred to Dr. Slocombe to check that man's record to see exactly what his work was hour by hour throughout the week. A motorman has to take out all sorts of cars. Different types of cars are sometimes used during rush hours, during the middle of the day, etc. On each of these different types of car the man has been trained, has had ample practice under supervision and has passed an examination for competence.

This man's schedule called for him to operate various sorts of cars, but it turned out that all of them were *medium weight* cars except on his Sunday afternoon run, when he had one of the enormous heavy cars. The minute that point emerged, the answer was clear. One can readily appreciate what is involved. It is like changing from a Ford to a Cadillac. To be sure, there are many motormen who have similar schedules and who do not have these collisions. What is the difference between this man and men with similar duties who are able to carry over their skill and to change their habits quickly to fit a new situation, like the attendants in the public garages who handle so many different makes of cars with various sorts of controls, and who bump so few fenders in the process?

This motorman has the type of nervous system that is characterized by excessive perseveration—a tendency to keep on acting in a given way, once started in that way.

This is sometimes a constitutional characteristic. For example, if one looks at a rotating disc which is half white and half black, it will flicker until the rate of rotation is increased to the point where the black and white merge to a smooth gray. The disc has to speed up to a certain rate before the response of the retinal nerve-endings to one white stimulation carries over and is still active when the next white flash comes along.

A man who has an excessive tendency to perseveration will see this flickering disc change to a smooth gray at a slower rate of rotation than you or I would. His nervous system has the tendency to continue active in a way once begun, longer than the ordinary nervous system does.

In a case of that kind, it is too expensive to undertake to train the operator to compensate for this constitutional peculiarity. It is better to change his schedule. That is what was done in this particular case. To be sure, even that step is somewhat expensive of time. It required a conference with the division superintendent to convince him it was worth doing. There had to be some argument with the schedule maker, and finally a long conference with the head of the local trade union in order to reassure him that this was not setting a vicious precedent in viola-

sort of thing that has been done for the Boston Elevated in the study that Dr. Bingham described. If we are to make any progress in this field it will require more of that sort of work by and for individual large companies, as well as any sort of research that may possibly be set up directly through the National Safety Council or through any research organizations not directly connected with large companies.

The next item on our informal program this morning is a brief report by Mr. J. S. Baker, of the National Safety Council staff, of the plans that have been formulated thus far. I hope you will listen to this critically and later in the discussion advise us as to the value and practicability of these plans.

J. S. BAKER (National Safety Council): I have been asked to make this brief report of the work of the Staff in connection with the study on personality and public accidents in the absence of any chairman, as yet, of the Committee which is directing our work in that line.

Dr. Bingham has very well described the importance of such work. He has pointed out how the classification of causes of accidents can be reduced largely, especially with respect to those individuals who repeat accidents, to a matter of personality rather than to a description of the circumstances.

Our aims in conducting any study into this are several. First we want to know whether certain individuals have more than their share of accidents. Second, what we can do with the present accident statistics gathered by state and municipal motor vehicle departments in segregating the accidents into various groups according to their personal causes. Third, what we can do to investigate scientifically and more accurately accidents that actually occur.

The first part of our work has been to enlist the support of the State Motor Vehicle Departments in Connecticut, Massachusetts, and New York, to keep tab or prepare for us a report on accidents that have already occurred to individuals having more than one accident.

We are not in a position at the present time to follow this intensively, but New York State's form for reporting accidents is to include in the near future a question regarding the number of accidents the individual has previously reported. This will be tabulated on punch cards and in a year or so we shall obtain some excellent data on exactly how many accidents certain individuals have had.

We expect that the State Motor Vehicle Department of Connecticut will be able to furnish us some similar information of a higher character because of the completeness of their records and the possibility there of not only checking what the individual says and tabulating on punched cards, but by actual examination of group and individual records of those who have had more than one accident to see if they have had the same type of accident.

The only thing that we can gain from this, considering the many deficiencies of present accident-reporting systems from the standpoint of analyzing them with respect to personal causes is the fact that certain people are prone to accidents. Dr. Bingham has pointed that out in his talk this morning in connection with railroad operators. If we can show that that is also true of motor vehicle operators, and I think we can probably show that it is more true, we shall have a strong argument for the passage of motor vehicle driver's license laws.

The second phase of our work has been to make up a list of personal causes of accidents. Disregarding the causes of accidents as classified from existing statistics we looked at it merely from the standpoint of the person involved. If you like to, you can consider any accident as having a personal cause. Even such accidents as are attributed to brakes being defective or steering gear being defective, you can pass back and say that the individual who is responsible for the condition of the car was also responsible for that accident, and personal negligence on the part of some one was therefore the cause of the accident.

In this classification, which is entirely tentative and subject to correction, we

tion of the trade-union agreement which provides that every man shall have the privilege of choosing his own route in order of seniority. But all this expenditure of time was worth-while; for it put a stop to these front-end collisions on Sunday afternoons.

It is better in such a case to go to some pains to rearrange a schedule rather than to undertake to train the man to be able to shift readily from one type of car to another.

There were, all told, seven out of 160 cases of prone-to-accident men in which this tendency to excessive perseveration seemed to be the most distinctive factor of their accident proneness.

The Psychological Approach to Safety

The classification we have used for grouping together the various causes of accident-proneness is not presented as complete or as highly reliable. But it indicates clearly the wide range of personality differences and defects for which one needs to be on the watch.

Only major factors in a man's proneness to accidents have here been considered. In saying that nineteen cases are due principally to faulty judgment of speed or distance, it is not implied that this was the one and only defect in those nineteen cases. For the purpose of this presentation, Dr. Slocombe in each instance, indicated what was in his judgment the outstanding or most important single consideration. But actually each individual high-accident man is a case by itself. It refuses to be pigeon-holed with other cases because so many special considerations arise that make it different from any other. So, both in the matter of diagnosis and of treatment, what may be called the psychological approach is required.

The psychological approach to safety is the approach which places special emphasis on the individual. It recognizes the great variety of individual differences. In dealing with each motorman or each truck driver or each automobilist, he is recognized, not as one of a mass, but as a distinct personality, unique.

When this psychological approach to the problem of the high-accident man is taken, there is no need to abandon the mass approach to the whole group of employees. It is unnecessary to sacrifice any of the values that come from using all of the educational appeals and other important aids to safety which the experience of the safety movement in America has evolved. Rather, this is one additional line of approach, which seems to attack the present safety problem at its most vulnerable point, at the point where there is the greatest hope of making an impression on the accident situation, because it tends to concentrate effort and attention on those particular employees who are responsible for the larger proportion of the accidents.

This psychological approach to the accident problem through study of the individual is not unique in the public safety field. The Milwaukee Electric Railway has followed it for years, and other transportation companies, both here and abroad, have found it a fruitful approach.

For those who read French readily or who can put a librarian to reading French, attention is drawn to the recent volume by J. M. Lahy, Professor at the Sorbonne and Director of the Technopsychological Laboratory of the Paris Tramways. The book is entitled, "Psychophysiological Selection of Workers: Motormen and Bus Operators."* In Germany the publications of Karl Marbe of Würzburg and Otto Lipmann of Berlin are outstanding in this field.

The articles by M. S. Viteles in the *Personnel Journal* for August and October, 1925, Vol. IV, pp. 100 and 173, admirably summarize the work done up to that time.

The ingenious work of Dr. Snow a few years ago in the Yellow Cab Co. of Chicago, is well known.

*J. M. Lahy: *La sélection psychophysique des travailleurs: conducteurs de tramways et d'autobus.* Paris. Dunod, 1927.

One of the most recent and significant of these investigations is being carried forward at the present time under the direction of V. V. Anderson, M. D., consulting physician and psychiatrist in the R. H. Macy & Company Store, here in New York. For a year and a half Dr. Anderson has been studying their delivery men in this individual clinical way—this combination of psychology, psychiatry and common-sense human interest—with the result that here also a substantial reduction in labor turnover has been effected, better morale has been introduced into the delivery force, and a good many difficulties of supervision are removed.

Before this session is over, others will describe their experience in using the psychological approach to the accident problem. Among the more important experiments are, one in Detroit in cooperation with the traffic court; a study being planned at the University of Ohio under the auspices of the National Research Council; and one in Pittsburgh, the plans for which this Committee has been called to consider today.

Long ago the quaint superstition was abandoned that a man is prone to accidents merely because he is unlucky. No one today will admit that he really believes in luck. As one gets to close grips with this problem of personality and accidents, he finds some other familiar concepts going into the discard, too.

One of these is *carelessness*. As our Chairman indicated at the beginning of the session, carelessness is a broad, vague term that cloaks a large variety of accidents. No supervisor should ever be satisfied with merely blaming a man for being careless. Let him ask instead, "Why was he careless?" And when that question has been fully answered, a much more informing and helpful explanation of the accident will be at hand, with a definite way of preventing its recurrence. The closer one gets to the real facts about men and accidents, the less use he finds for broad general terms like carelessness, recklessness, pure cussedness or bad luck.

Still another concept, indispensable to the claims attorney and the casualty company, has little value for the analyst of causes of accidents, and that is the concept of *blame* or fault. To raise the question as to who was to blame for an accident, is usually beside the point for our purposes and only stirs up an emotional cloud instead of helping to locate the real causes.

It is better to follow the question, "Just how did the accident happen?" not with the question, "Whose fault was it?" but with the question, "How could it have been prevented?" or, "What must we do to see that this doesn't happen again?"

The time is ripe enough for a thorough, scientific investigation to bring to light many much-needed facts about prone-to-accident individuals. Two years ago, as Chairman of the Committee on Causes of Accidents of Mr. Hoover's Second National Conference on Street and Highway Safety, I strongly urged the necessity for such researches. I am delighted that the National Safety Council has now taken definite steps to interest safety engineers and men of science in undertaking these basic studies of personal constitution in relation to accident proneness. In my judgment this marks a turning point in the whole safety movement in America.

My congratulations go to Mr. Sidney J. Williams, Director of the Public Safety Division of the Council, to Mr. J. S. Baker, his assistant, and their colleagues of the staff.

CHAIRMAN WILLIAMS: Dr. Bingham has brought out a number of very important points, which I think impress all of us with the fact that in this study which has been made in Boston the practical point of view was kept in mind at all times, along with that of the scientific investigator. I cannot help feeling that there is a very decided suggestion there for all of the large corporations that are in the membership of the National Safety Council, and which, like the company he referred to, have a heavy accident cost in terms of dollars, even though their rate may be lower than other companies that have done less of the standard type of safety work: namely, that any such large corporation can well afford to do the same

have divided accidents into three major groups according to the method which may be applied in treating them.

The first of these is handicaps. Handicaps which the individual cannot be expected to overcome. These are physical and mental deficiencies. Among them are deficiencies of eye-sight which cannot be corrected by glasses; general lack of strength; mental disability.

The Doctor has already spoken of certain of these, as he said the mental disability may be in the form of disease or of a low degree of intelligence. And in all cases any individual so handicapped should be refused the privilege of driving on the highways, because he will unquestionably endanger his own life and probably that of others.

The second group are causes which may be treated by educational methods. The persons in this group are sufficiently normal physically and mentally to drive properly but have not had proper training or the proper instructions in the hazards of driving. Under those come such items as general education. There are a few accidents caused every year by the fact that a man cannot read. There are signs directing him to stop or go slow or not to turn left. He doesn't know what they mean and gets into accidents.

A great many accidents, I believe, are caused by improper training as motor vehicle operator. We all know that there are no set standards for the general public to meet in learning to drive automobiles. Many individuals are instructed by relatives, by automobile salesmen, by garage mechanics, and their instructors themselves are not expert drivers. The result is that relatively few people ever have had impressed upon them the mechanical habits that must be formed to make good drivers. Few people have had repeated drilled instruction in manipulating a motor car accurately so that when an emergency arises they do instinctively the correct thing.

Many people are ignorant of motor vehicle laws. If you take almost any good motor vehicle law, such as those represented by the Model Traffic Code or the Model Municipal Traffic Ordinance, and read through the provisions of that law and then follow to the letter those instructions, you would be a fairly good driver. In other words those motor vehicle laws have been well planned and are just about the best driver's manual that could be put out. People who are unfamiliar with them are subjecting themselves to accidents. Education in the motor vehicle laws will prevent accidents.

Then there is another class of education which is more technical and which also has an effect on accidents. I mean the mechanical aspects of a moving vehicle. When you consider that an automobile has possibly sixty horse power tucked away under the hood, the individual controlling it doesn't realize what fifty or sixty horse power means in energy and you can see that he is likely to have an accident. If you were to give a man fifty horses to drive simultaneously he would be much more careful than he is with considerably more power in an automobile.

Few people realize that the stopping distance of an automobile is increased as the square of the speed. That is, an automobile going twenty miles an hour takes four times as far to stop as one going ten miles an hour. The same thing is true of collision damage. The energy stored in a vehicle moving at twenty miles an hour is four times that moving at ten miles an hour. The damage done to an automobile in a collision is proportional to the energy stored.

If those things were clearly known by automobile drivers—how much sooner they must start to stop when they are driving sixty miles an hour than thirty, how much more damage is likely to be done—they would take much more care in their driving.

The third classification, and in this classification is the great majority of accidents, is called the lack of will to prevent accidents. In it are the mental causes which are generally classified as inattention or carelessness. Individuals who have

accidents due to these causes are normal physically and mentally, have had adequate training as motor vehicle drivers, understand the motor vehicle laws, but for some reason they don't drive properly and in a short period of time become involved in an accident.

Among these is failure to allow for the fallibility of others, which means that a driver is good himself and he unconsciously assumes that other people are equally good.

He may have an over-grown idea of his rights. That is, he feels that it is his right to drive across an intersection on a green light without looking. He feels that having the right of way as established by law, he does not need to take care.

Then there are certain predispositions. Among these are intoxication, over-fatigue, properly better expressed as monotony. A man may fall asleep from such conditions.

Then there is preoccupation. A man is day dreaming.

Hurry is a great cause of accidents. We don't know how great.

Then there are a great many causes of distractions. A man is conversing with somebody in the automobile, and his mind is not on driving. It is on what he is talking about. He is trying to light his cigar, or trying to pass around the cigarettes. He may be distracted by back seat driving. He may be adjusting his clothing or has lost something, or something is the matter with his machine. He may be watching something on the street, people on the sidewalk. He may have to stop at a certain place and is watching street numbers, or other automobiles.

This entire list, as I said before, is entirely tentative. It is merely an indication of the kind of information we want to get in analyzing accidents from the personal cause. We shall be glad to have any suggestions or modification of it.

The next question, naturally, is what methods can be employed to get such information. Obviously the methods of reporting accidents of the various state motor vehicle departments fall short when it comes to analyzing accurately these things. The very methods that are used by these systems in gathering the data depend upon the police and individuals themselves. You must go further.

In order to do that we have set up in Pittsburgh machinery to do that. I say we have set up because it is practically assured that it will soon be in operation. This is a bureau for examining individual drivers who become involved in accidents. We will there take motor vehicle drivers who become involved in accidents, especially commercial drivers, and examine them by means of psychology and psychiatry. The psychiatrist will be furnished by the department of public welfare of that city, the psychologist by the university.

These men will first be examined psychologically. Their reaction time will be studied, eye-sight, hearing, and so on, and then they will be passed on to the psychiatrist who will examine them further. The reports will be tabulated in terms of one primary cause, or possibly two, and a number of secondary causes. The primary cause will be that one thing which had it not existed would have prevented the accident. The secondary causes will be those which contributed to the accident.

Also will be tabulated the type of mental or physical difficulties that the individual has experienced which have no immediate connection with the accident but which may possibly cause it indirectly.

This is all new work and in starting an investigation of personality of automobile accidents we feel that we have a big task to undertake. It is like starting to build the Panama Canal with a spade. We want all of the help we can get from all of the organizations. We don't want to duplicate the efforts of anyone else. We want all the suggestions that you here are able to give.

CHAIRMAN WILLIAMS: This meeting is advertised as an open committee meeting, and that is what it is. The Committee is small and some of the members who were promised that they would not be asked to make long distance journeys are not here. We have a telegram from one of them in Chicago regretting his

inability to be here, but all of you who are here and have shown your interest by attending, we desire you and anyone else to contribute anything you can do this discussion.

The subject is before you now. Has anyone a question he would like to ask Dr. Bingham or Mr. Baker, or any experiences to contribute bearing on this subject? Have you any advice or suggestion to give the National Safety Council and this Committee and this Staff in carrying out any work of this sort?

C. B. SCOTT (Bureau of Safety, Chicago): I am a member of the Committee and unfortunately I have another appointment. I am sorry to have to leave the meeting, but I have something on my mind I want to say before I leave.

I am intensely interested in this phase of accident prevention work, and I feel that it is strange that we haven't gone further into it during the years of effort along accident prevention lines.

As I sat there and listened to Dr. Bingham and Mr. Baker, it didn't seem impossible to me for some kind of concerted action to be taken by which industries could get a great many of these facts. There is a wide field of possibility for the average safety engineer if he directs his research work in that direction, and while I appreciate the value of such a study of the public safety problem I predict that the day is not far distant when we will do much more of it in connection with our industrial safety problem also.

The experiences of some twenty years of accident prevention work have convinced me that we have overlooked the possibilities along these lines. It is not the fault of the National Safety Council or anybody else. It is just that natural tendency of ours to get things that are somewhat easier done, to select the line of least resistance in our work.

CHAIRMAN WILLIAMS: I hope by the time of our Congress next year we shall put this subject on one of the general industrial programs.

I have felt, as Mr. Scott does, that there has been a prejudice on the part of a good many practical minded fellows, and so far as I have had anything to do with preparing this program, my thought was that we should start modestly.

As Mr. Scott said, there is certainly a good deal that can be done, and I would take the liberty of adding this: The results in Boston as described by Dr. Bingham sound simple. They arrived at practical findings, but the work had a very definite scientific foundation and was done by a man with years of scientific training, and while I feel that safety engineers in industries can do a lot by just turning their minds in this direction and thinking in these terms a little more than they have in the past, I hope that this thought won't be carried to the extreme of thinking that any safety engineer in any industry can do as good a job as Dr. Slocombe did in Boston.

I just want to add as the other side of Mr. Scott's thought, that we do need these jobs set up by men with the scientific background as well as the practical turn of mind that produces concrete results, and may I say again that I hope some of the larger companies will follow the lead of the Boston Elevated and set the work up in that way as a part of their regular safety appropriation and with the confident expectation that they will get their money back.

Is that a fair statement? That the Boston Elevated has gotten its money back through the reduction of accident costs?

DR. BINGHAM: A man from the Boston Elevated force is here and possibly he should answer that question.

JOSEPH L. TROY (Boston Elevated Railway Co., Boston, Mass.): It has paid the Boston Elevated Railway Co. Dr. Bingham is a little bit too modest in his talk in showing results. This year they expect possibly 4,000 collisions reduction, and considering the fact that all other street railway accident problems are increasing on account of the increased traffic congestion, I think had Dr. Bingham gone a little deeper he could have shown you much more satisfactorily the results obtained.

CHAIRMAN WILLIAMS: No psychologist or scientist or anybody else needs to apologize for a job that will bring returns as quickly and obviously as that. Advertising men and sales managers have been using the technical advice of psychologists for years and it really is about time that we safety people wake up on it.

J. A. DICKINSON (Milwaukee Electric Railway & Light Co., Milwaukee, Wis.): Dr. Bingham has mentioned the fact that psychological and psychiatric tests and studies have been carried on in the Milwaukee Electric Railway & Light Co. for some years.

I believe you will be interested to know that a worth while test is now being carried on in the industrial division in connection with station operation. The station operation men, are men who operate and control the machinery and lines from the power plant and sub-stations.

A selection test has been set up, following which as a criterion a group of about twenty men were selected among our station operators. These men were rated by two of the supervisory staff. They were then given psychological tests and it was found in all except two instances that they checked up with the supervisory staff's opinion. In these two cases the men were comparatively new. They had been in the employ of the company only a few months and the supervisory staff rated them slightly below the results of the psychological test. Because they had not been with us long enough, they did not rate them high enough.

CHAIRMAN WILLIAMS: Is there anyone here connected with the National Research Council or with the study at Ohio State University? If not I would like to put into the record the fact that the National Research Council through a committee is setting up a research study to be conducted through some of the people of Ohio State University at Columbus. They are in conference with us on the subject, and they have the same objective, namely to make some sort of a study of drivers who are involved in accidents.

They probably will use in some respects methods quite different from ours, which is a good thing because nobody can expect to hit the nail right on the head the first time.

At this time I must apologize for leaving the meeting myself for a little while on account of another engagement. I am going to ask Dr. Bingham to take the chair and you go right on with this discussion.

(Dr. W. V. Bingham assumed the chair.)

L. A. DEBLOIS (New York City): If I had known that Dr. Bingham had any such contribution as he made today I should have done my best to have brought him over to the big industrial meeting Wednesday afternoon, because I am impressed with the fact that we must bring this phase of accident prevention work much more forcibly before safety engineers than we have done heretofore, to get serious consideration from them.

We need more information on the distribution of proneness, if I may use that expression, under different hazardous conditions. We want to know whether this proneness exists with the automatic driver, with the train operator, with the quarrymen, and so on. Is it persistent in human experience? If so we have increased our argument tremendously.

I think we want also to know very much more about the corrective measures to be given—the possibility of doing what Dr. Bingham has told us the Boston Elevated has done. Is that possible in another industry that has its own special hazard? If so, we then have our course laid out for us.

But we want to know also more about the methods whereby that proneness may be reduced. We are dependent to a great extent on mass education. That is what we are doing in the safety movement. How much can we do through mass effort, and how much must we go into the more expensive field of individual correction?

MR. GORDON (Bureau of Safety, Chicago, Ill.): Dr. Bingham has referred in his paper to concentration and lack of concentration. You probably have heard

of the professor who, while sitting at his desk deeply absorbed in some problem, took his cigarette from his mouth and pitched it in the waste basket, causing a \$75,000 fire, failing to take into consideration all his surroundings. Too concentrated upon one particular thing.

We had a motorman standing at the front end of the interurban car at ten o'clock in the morning on a bright sunny day looking straight ahead, slam into an express wagon stalled on the track that you could see for a mile. Failure to concentrate upon his own job and to take into consideration the surroundings.

We cannot always have a foreman alongside of the individual workman to watch his every move. As I see it, it is an individual matter, as has been stated here, and we must reach the individual. Get him to use his own brain, and get the proper mental attitude. That is what we are endeavoring to do through our group safety meetings.

Not long ago a man went down Halsted Street in Chicago, where the children have no other place to play than in the street because they are tenement residences. The street was literally covered with children and this fellow, whom the papers referred to as a "Wop"—I don't like the term—went through that group of children thirty-five miles an hour. They scampered and fortunately escaped injury. The man was arrested and gave as his excuse that he wanted to get there "queek." No regard for the safety of those little ones. What was back of that was wrong mental attitude.

We have a rule that requires our trucks to stop at all railroad crossings, and they carry such a sign on the rear of their trucks. It is a positive rule and yet some men will not do it. The matter is wrong attitude. The "I won't" fellow. That is the fellow we must reach and win him by all possible means to a right attitude toward the whole situation.

I don't believe we shall ever stop railroad crossing accidents until we get the thought into the mind of the fellow or the woman behind the wheel that it is an individual matter at railroad crossings. Not to depend upon gates, wig-wags, bells, flagging, or anything else. They all fail. Railroads are properly marked to indicate to the drivers that they are approaching a railroad crossing; that is all that is necessary for safety of the automobile driver and we must approach the railroad crossing accordingly.

Two fellows from Chicago going through one of the smaller towns recently saw a train coming and waited. The train went whizzing by and the gates didn't go down. Rather peeved they said to a by-stander, "Don't they put these gates down for a train?"

He said, "Didn't they go down?" and when they said, "No," the man said, "There must be something wrong over at the shanty. I'll go over and investigate," and he went over there and found the watchman dead. Had they depended upon those gates for their protection, it would have been just too bad, as we say.

A policeman in one of our cities noticed that the gates didn't go down for a train. He went over to investigate and found the watchman asleep in the daytime, shook him and tried to awaken him and found he was so drunk he didn't know what he was there for. And we put our lives into the hands of men like that! I won't say that they are all alike.

Between two and three o'clock one of our automobiles was struck. The driver depended upon the gates for protection. No one was hurt, but the automobile was so badly damaged they couldn't proceed. The crew reported it to the officials and the supervisor rushed out there in a few minutes. He asked the driver where the watchman was, and he said, "We haven't been able to find him."

"Well, I wonder what has become of the fellow. He's supposed to be here all night." And they went to the man's home to inquire to see if his folks knew where he was, and they said, "Yes, he's in bed asleep."

They asked him why he left his crossing when he was paid to stay all night, and he said, "I figured there were so few automobiles and so few trains late at night that it was foolish to stay there." That's the type of minds we are dealing with at railroad crossings!

Two high school boys approached one of our steam railroad crossings. The tower man was down watching the men adjust the weights on the gate. The train was coming. You could see it a half mile away around the curve, coming a mile a minute, a lot of noise and kicking up a lot of dust. The two high school boys drove their car immediately in front of this oncoming train and both were instantly killed. Had these boys used individual care, it wouldn't have made any difference that that flagman was on the ground where he shouldn't have been, of course, or whether he was in his tower.

LEWIS MACBRAYNE (Massachusetts Safety Council): I want to answer the question that Mr. DeBlois asked. We have collected in Massachusetts considerable information among motorists involved in accidents and find the same is true there, that minor accidents lead to major ones, as Dr. Slocombe found in Boston.

I am familiar with Dr. Slocombe's work. The operator for whom that work was carried on, is one of the very active members of the Safety Council, and I think there is a conclusion beyond what the speaker discussed; that Dr. Slocombe has found that when you make an impression in this pool of accident characters, it slowly fills up again.

I don't believe that we have eliminated the problem when we take that twenty-five per cent and work them back to the normal accident proneness. Other causes and other men slowly creep in again who will form a new pool. So it becomes a very permanent and very important work.

I believe that the next step we are going to take, and I make this in the nature of a prediction, will be the extension of this study of motorists on a very large scale. I think we will see very soon some advanced state willing, through its legislature, to call up for examination all drivers who have had accidents, rather than those upon whom the responsibility was fixed, to give them an examination as to whether or not they are not disqualified to drive.

We have 30,000 people in the state of Massachusetts who were involved in accidents last year resulting in personal injury. In that group are the accident characters and if we can find them and take them off the highways, we shall accomplish something. And I think this session is very important, is probably leading in that direction—the study of the accident carriers who are now on the highways.

J. W. McCLOY (*Electric Railway Journal*, New York City): Possibly I misunderstood one of the speakers in saying that there was a heavy increase in electric railway traffic accidents. I believe from studies made recently that in spite of the largely increasing number of highway accidents the number in which street cars are involved, either blamelessly or otherwise, is actually decreasing. Of course, all the credit goes to the trainmen.

CHAIRMAN BINGHAM: To them goes the credit and to the supervisors who are more and more attentive to the training and supervision of the men.

I want to forestall one or two misapprehensions that may have been raised as to the share which the psychologist or the safety engineer has and the share which the front line has in dealing with the high accident men. No diagnosis or prescription of treatment is going to be of use without the foremen, the supervisors, the inspectors to follow through with it—men who are intelligently in sympathy with this line of approach, who understand what it is all about and who are skillful and competent in doing their end of the follow-up work. To them belongs the credit, as well as to the men themselves who improve their accident records.

Part of our duties in this particular street railway have been in connection with

the development of the necessary supervisory skill, and attention to follow-up work on the part of many supervisors.

One other point. Mr. DeBlois has emphasized the importance of the morale produced through mass effort and education and stimulating group conferences. The great value of that kind of effort is partly due to the fact that it helps the supervisors to bring more individual pressure on the men they supervise. From the very beginning of the safety movement, a great deal of individual work has been done by the foremen, without any thought of psychological terminology. They have been eager to cut down accidents. They have watched this particular man and noticed, not that he has had a serious accident, but that he occasionally drops a tool or jams the gears, or ruins a little more work than his neighbors, or starts his motor rapidly and blows a fuse. None of these mishaps results in what could be called an accident; but the foreman knows that this man is a potential accident man. So he brings pressure to bear on him. He tries to get the right attitude into him and the necessary competence, and if he fails, if he cannot change the man's attitude, he changes his job. He puts him where he will not have to face so many hazards. In doing so the foreman has as a matter of fact been practicing this same applied psychology, and in a sensible way has gotten good results.

That is one reason why the safety movement has had the success it has. On top of the mass education, the foremen and the supervisors have been superimposing this individual effort.

Sometimes the superintendent or the supervisor has looked into the man's family circumstances. He has discovered the worries, the causes of irritation, the pessimistic reveries that are leading the man to be absent minded and careless. He has done what he could to help straighten out family difficulties, perhaps with a little loan of money or some rearrangement that has relieved these worries.

Supervisors have been applying this kind of common-sense psychology throughout the years. To give it a new name or technical high-sounding phrase does not change the essential nature of the safety activities that have been under way; and so I consider that these more technical systematic approaches now being undertaken are simply intensifications of that same effort. Its procedures are refinements of a process that is essentially common-sense.

D. A. DREW (R. H. Macy Co., New York City): I would like to ask if in your study of the Boston Elevated Railway you took the age of the applicant for the job of bus driver into consideration, and did you make a study of about what time of day the majority of your accidents happened?

CHAIRMAN BINGHAM: I am glad to hear from a department of Macy's which has been doing very significant work in this safety movement.

Except for the accident peak in the afternoon rush hour, the figures on time of day are far from conclusive. They are disconcerting in some respects because we do not find any close relationship between length of time a man has been at work and his proneness to accidents. Even the men who are working overtime hours do not seem to have any more accidents in their overtime than during the regular hours. If there is a bad effect from fatigue it apparently carries over to the next morning and distributes itself through the next day quite as much as it does during the overtime hours.

As to age, that has really not been much of a problem with us because we have no very young men on bus operation. In recruiting the bus operators the first opportunity goes to the men who are already senior motormen. If they want to go to the training school and qualify as bus operators (which pays a slightly higher hourly rate) they may do so; and so our bus operators are for the most part mature men, already experienced in street car operation. There is no such problem with the younger men as you have in your delivery force.

Will you tell the group what your findings have been on that point?

MR. DREW: Before we go into this I would like to ask Miss Engel, who is in charge of the psychology department, to tell you something of their work, and then I will tell you of our plan of salary for our drivers and the way we are trying to cut down our accidents through our motor school.

MISS STELLA ENGEL (R. H. Macy Co., New York City): We haven't done much with the age question, but we did make a study of about 150 drivers over a period of six months and found that the men under twenty-three years of age who constituted about fifty per cent of our force, were contributing seventy-five per cent of the accidents. We haven't gone further into the study to know exactly how much of that is due to the age factor.

MR. DREW: Our helpers before they are permitted to go to our motor school for training, must go through a psychological test which is given by Miss Engel. If the man qualifies after having taken the psychological test and Miss Engel thinks he would be a likely chap for a driver, he comes to our motor school, which is located at Long Island City.

We give him three days of instruction, and three days of instruction will take care of every phase of practically every condition of the roads and streets of New York, and then he is given a final test by Miss Engel. If he passes that test he is permitted to go on a test with an instructing driver. This instructing driver is with him for six days. At the end of six days we have a very conscientious follow-up on that boy. If he is doing a good job we commend him for it.

We have what we call a spot check, and if we see him any violating any traffic rule or any regulation set down by our concern, he is immediately told about it. We don't wait until he gets in that night and settles with the superintendent of delivery. We reprimand him in a nice way and try not to be too hard, because they are only kids after all.

It might be interesting for you to know that of a group of about 135 men driving out of the delivery department in New York City, this year, we have only employed one driver, that is since the first of February to date, and we feel reasonably sure that we will be able to get through until the first of December before we have to hire any extra drivers to take care of our Christmas season.

We are doing everything in our power to make the help stay with us and decrease our turnover by giving them advancement. That advancement is going into the driver class. After a man has been a driver with us three months, we have a salary review which is taken care of by the superintendent of delivery, the assistant general manager in charge of the delivery department, the assistant general manager in charge of the budgets of the store, and myself, the director of the motor school of training. We all meet and review the man's case and decide whether he is worthy of an increase or not. The important thing is whether he has had an accident. If a man can drive for three or six months without an accident, he is worthy of an increase and he gets one. If he doesn't get an increase, he is told why. It may be because of some violation on the road, something that might have resulted in an accident. We also take other things into consideration, such as damage to merchandise, etc.

We have eliminated our bonus system and substituted our salary review system, which we believe has brought about wonderful results, as a man knows he will get paid for what he does. If he does a poor job, at the end of six months we automatically let him go. In other words, a man must be able to get the increase at the end of six months. If he is not able to qualify to get the salary due, there is somebody else in the division who can do a much better job and we give that fellow a chance.

LAWRENCE K. BORGES (New York Telephone Co., Brooklyn, New York): I have often read articles on this so-called psychology test, and of the many articles that I have read very few of them are alike as to just what a psychology test should or does consist of.

I wonder if any of you people who have had some experience with these psychology tests could tell us just how they are made. Do you just use questions or do you use some of the new apparatus that is spoken of in some of the journals and magazines?

CHAIRMAN BINGHAM: We have representatives here from two companies which have had experience both with the personal interview type of inquiry and with the type of examination which involves the use of apparatus. The standardized test aims to simplify the task and give the prospective operator, or the driver a standardized situation in which it is possible for him to indicate precisely by his performance how quickly he can respond, how quickly he can discriminate and how accurately he can do his job.

Miss Engel, won't you tell us what the main psychological tests are you are now using? We haven't time for a full description of all of them. I just want the group to be aware of the fact that there is no one psychological test for expertness as a motorman or for safe operation. We have to use quite a variety of tests or standard tasks.

Miss ENGEL: We are using several types of tests. We also use intelligence tests and happen to be using the Otis test right now and we also use Terman test of intelligence.

We have an apparatus built to test reaction time in responding to various lights and signals on the flash boards.

We are also just starting to experiment with a special relations test, that is a train moving at a certain speed having the operator control one and the examiner control the other.

We are giving vision tests and also have a complete physical examination.

The apparatus is quite complicated and I don't think I can give you a description of it here.

CHAIRMAN BINGHAM: You use as your reaction apparatus the front end of an automobile?

Miss ENGEL: We use the front end of an automobile with gear, brake, pedal, clutch and one light.

CHAIRMAN BINGHAM: One light means put your foot on the brake, another means press the accelerator, and so on. The different sorts of situations that the driver has to meet are simply presented to him under conditions where it is possible to measure the speed and correctness of response to those situations.

I want to add just one note. In this effort toward reduction of accidents through approach to the individual differences of people who are operating on highways, in automobiles, street cars or busses, we are at the same time engaged not only in reducing accidents but in bringing about a better occupational adjustment of many of these men—making them more competent in their work, giving them greater satisfaction in it, and greater earning power.

If they are constitutionally unqualified for this work it is a real kindness to them to move in the direction of getting them adjusted to something which they can do more satisfactorily to themselves and to society. In other words the safety movement and the movement for occupational adjustment are two phases of the same effort towards increased happiness, satisfaction and earning power of the workers of the world.

ADJOURNMENT

SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL



Education Division

October 2, 1928

The Technique of Safety Education in the Elementary and Secondary Schools

ROBERT J. FROST, Chairman
District Superintendent, New York City Schools

The first session of the Education Division at the Seventeenth Annual Safety Congress was called to order at nine-fifty o'clock by the chairman, Robt. J. Frost, District Superintendent, New York City Schools.

CHAIRMAN FROST: I want to say it is quite a new sensation for the chairman to appear at the Waldorf-Astoria at such a very early hour in the morning. In my regular life, or daily life, it is my custom once in a while to address school assemblies. I felt very much this morning like saying "Good morning children," but I presume that would not be just right. Let me say it is most gratifying to see such interest taken in the matter of safety.

I think you have all had opportunity before you entered this room of traveling through the corridors, seeing the other parts of the convention that were going into session, and also observing the exhibit. It simply puts this thought into our minds—that while the millions of workers are at their daily tasks in the various industries of our city, here we are at the invitation of a group of—well I would call them "Altruists"—the finest kind of altruists—to discuss the best ways of conserving life and limb of the millions who are not able to attend this convention this morning. I say, when a small group of men and women band themselves together to think out some way of conserving the life of the millions of others who cannot be present, that is what you would call real altruism.

Practical Cooperation for Safety

But of course there is another side to it. There is something practical in what a good many of these men and women are doing. Some are interested in mining; some are interested in the automobile line; some are interested in the railroads; and, of course, it is to their own benefit and advantage to see what they can do to teach the general public the matter of safety. Now I don't know who or how many in this hall can recall the high-wheeled bicycle, but I recall that as a boy. I remember the old lucifer match; I remember the old oil lamp. All of these things have passed away, giving place to what we call "safety matches," "safety bicycles," and I suppose we could say "safety lamps" or the electric bulbs.

The object of this morning's gathering is to see what we can glean from the

papers and talks of those who are to speak—just how we are to carry the message out to the various divisions, departments and schools that we represent.

Now we may talk safety; we may talk rules for safety and safety devices, but if there is any failure in any one of the safety elements, the safety device may be worthless. What we want as school people is to educate the young and the old to use the human intelligence, to use their brains, to be ever on the alert, to keep thinking of what should be done in case an accident should happen.

Now as to the schools of New York. I am assigned here by Superintendent Wm. J. O'Shea. As his representative it is not in my province to say anything that is too much in laudation of the New York City schools to the exclusion of the schools of other cities. I think the schools of every city in the country are on their guard to teach the children what should be taught in the saving of life and limb. In New York City we have a Safety Committee. We organized a course of study in fire prevention and safety—we link the two together—and in all grades of our schools teachers are instructed and directed to give the lessons that are outlined in this course of study. We have a course of study designed for classification I-A and up to 8-B. We have in the lower grades jingles and rhymes, the little things that children remember. In the upper grades we have the civic side of safety emphasized. We tell the children that it is their duty to guard their lives and to guard and protect the lives of others. We tell them it is incumbent on them as good citizens to study the safest way of doing the ordinary daily acts.

There is a committee of District Superintendents appointed by the Superintendent of Schools, and I just wish to read a little outline of what this committee recommended and what is going on in the schools.

Safety Work in the Public Schools

By ROBERT J. FROST

District Superintendent, New York City Schools

The safety of school children in the streets of the city of New York has had the earnest and continuous attention of the Department of Education.

Dr. William J. O'Shea, Superintendent of Schools, taking notice of the increased mortality among children in the city streets, directed that public meetings be held on the evening of December 9, 1926, in all of the seven hundred schools in the five boroughs. These meetings were held under the auspices of teachers and principals; speakers of note were invited to be present, and all of the parents were asked to attend as guests.

The activity had also the advantage of cooperation from the various radio stations, with a very decided expression of interest by the Reverend S. Parkes Cadman, in his Sunday afternoon radio discourse.

Dr. O'Shea requested that a committee of the District Superintendents of Schools, representing each of the five boroughs, be appointed, and this committee has been in monthly communication on the matter since that time.

The Police Department of the city of New York has maintained an earnest cooperation with the school authorities in correction of conditions, and a monthly statement is sent to each of the 23 District Superintendents in the five boroughs, recording the time, place, and character of accidents and fatalities. These reports serve as constant reminders to the school principals and teachers, and are used as the basis for admonition to pupils.

At the latest meeting of the committee of District Superintendents, held on Friday, June 8, the following statement of unanimous opinion was adopted, and its transmission directed to Dr. William J. O'Shea, Superintendent of Schools:

"It is the concensus of the committee that our studies of the problems of the safety of children in the streets show the urgent need for more play spaces. It is suggested that all play spaces around school buildings be left open, if possible.*

"The committee suggests that police legislation should be enacted providing that right corner turns should be stopped when the right of way is straight ahead.

"The committee desires to suggest that you be asked to publish and issue an appeal to parents which will show the causes of accidents disclosed by our committee, as noted in attached memorandum, urging upon parents closer supervision of their children on city streets, and that you ask all district superintendents and principals to speak of this matter at coming graduation exercises.

"The committee was united in the opinion that the work done by principals and teachers in the schools in this matter is commendable, and that the present urgent need is for the education of parents in a realization of the dangers to children, the fact being that most accidents occur outside of school hours."

I have an announcement—a telegram from one of our speakers, the first on the program, Mr. Frank A. Bouelle, Assistant Superintendent of Schools at Los Angeles, saying he will not be able to attend the Congress. In place of Mr. Bouelle, Mr. E. B. Lefferts, manager of the Public Safety Department, Automobile Club of Southern California, will deliver the first address or paper.

E. B. LEFFERTS: A telegram is always a very brief communication, and I know from the interest that Mr. Bouelle took in the proposed deliberations here in New York that it is a source of a great deal of regret to him that he is unable to be here and enter into the discussion this morning. He has sent me his paper, and having been very closely in touch with the work as carried on in Los Angeles and Southern California, I think that I can answer most questions which might occur to you as a result of his presentation of what is being done on the Coast.

Safety Teaching Through Extra Curricular Activities

By FRANK A. BOUELLE

Assistant Superintendent, Los Angeles City Schools

Many of the earlier attempts in safety teaching in the public schools were based solely on the so-called extra curricular activities such as annual safety days and safety weeks, when the idea of safety was stressed for a brief period and then forgotten for the remainder of the year. Such observances might have been considered sufficient to meet the problems of a former era, but they lack the scope necessary to meet present day conditions.

The last decade has witnessed more changes in the ideals and goals of society than any other period in the history of recent times. The strides made in industry, due to the stimulus of war needs, have had a reflex in nearly every field of human endeavor. We are now in the midst of a great mechanical age, with all its benefits and responsibilities. The tremendous advances in industry have come about largely as a result of the multitude of discoveries which have been made in modern science. The end of this progress seems remote, due to the prominent place given to science and its discoveries in modern thinking.

While standards of living have been raised and more time for leisure has resulted through the advances made by science and industry working together, it is also

*On June 14, 1928, 241 of these after-school outdoor playgrounds were made available to the children in the five boroughs.

true that problems have arisen as a consequence which are compelling serious consideration from every community. The constantly increasing number of accidents and deaths due to the introduction of modern machinery has become one of the major problems of the present age. Decided progress has been made in some fields where the problem has been attacked in the right way. Much remains to be done, however, judging by our continued bad records of accidents in other fields.

The modern school is distinguished from its predecessor in that it is for the first time in history making a serious attempt to relate the work of the school to the problems of modern life. It is here that we may find a justification, if any were needed, for the introduction of the subject of safety education in our school curriculum. Many school systems have already responded to the urgent call and a good beginning has been made. Development in the schools has lagged, in some instances, due to lack of an available technique. Different sections of the country have approached the problem from the standpoint of their varying needs and as a consequence practice has shown considerable variation.

An attempt will be made in this brief discussion to outline some of the methods being used in Southern California to carry on a program of safety education.

The present school law of California makes no provision for a general program of safety education. Only thrift and fire prevention, which may be considered as phases of safety education, are mentioned in the list of prescribed studies. Hence, strictly speaking, most of the work in safety education now being done in our schools is extra curricular. Already preliminary steps have been taken to amend our state law, with a view to the incorporation of safety education as a required subject in the elementary schools.

In spite of the lack of provision in the state law, insistent demands on the part of the public and educational leaders have caused most school districts and cities throughout the state to find a place for safety education in their school programs. The southern part of the state, comprising 13 counties, has perhaps a more unified plan of work than any other section of the state, due to the well directed efforts of the Automobile Club of Southern California, which has carried on a safety program through its Department of Public Safety for a period of years. This organization has afforded teachers and school officials an opportunity to pool their experiences and adopt those methods which have proven the most successful in actual practice.

The first serious attempts to teach safety education were made through the medium of the extra curricular activity variously designated as safety patrol or safety committee. The duties and responsibilities of such organizations are about the same throughout the country, though they may vary in detail. The general aim is to arouse the interest of the child through actual participation in the activity. Safety committees are usually given charge of the traffic in the halls, and cooperate with the playground teachers in requiring proper use of playground apparatus. Both boys and girls serve on safety committees, thus insuring the active interest of the whole school in the common problem.

Such committees also assist to some extent in the street traffic. Committeemen are never permitted to stand in the street to direct traffic. Their activity is limited to the curb line for it is generally felt that the direction of traffic is a man's job and should not be delegated to children. Several unfortunate experiments where children have been assigned as traffic officers have convinced local authorities that the hazards are too great for most children in the elementary schools to assume the risk involved. Where an officer is on duty, however, committeemen prove a very valuable adjunct by controlling the children, thereby relieving the officer to that extent and enabling him to give more attention to the flow of traffic.

Members of safety committees have also been assigned to the forty pedestrian subways recently constructed by the city, thus helping in their continual use by pupils.

During the past summer, safety committees were organized on all the ninety

vacation playgrounds, with the result that only a few accidents were reported in this activity.

At the present time safety committees have been organized in most of the two hundred ninety-three elementary schools of Los Angeles; in all of the twenty junior high schools and in several of the thirty-one senior high schools. No completely satisfactory type of organization has been worked out for the senior high schools up to the present time, and this will account for the smaller number of safety committees in this group of schools. Plans now under way will doubtless improve this condition in the near future.

While the extra curricular phases of safety education have received considerable attention during past years the most notable advances in recent years have been made in a different field—that of correlating the work in safety education with the subjects of the curriculum itself. As this phase of safety education will probably be discussed by others, only a brief resume of this work will be made here.

Beginning with the kindergarten, largely through games, the children are taught the safe way to do things. One game which is much used is known as the "Traffic Game." A street intersection is outlined on the classroom floor. One child then acts as a traffic officer, and others as street cars, automobiles and pedestrians. Upon the blowing of a whistle by the traffic officer the traffic moves, and the pedestrians are governed by the general traffic movement, as all pedestrians are required to do under the traffic regulations in our community. Sometimes the children are invited to bring their little scooters and toy automobiles to make the game more realistic. The "Lost Child Game" is another game in which the child is taught his name, address and telephone number, the purpose of which is obvious.

Dramatization is much used in all the grades, pupils oftentimes writing their own safety plays. Different grades take part in the presentation of the plays at school assemblies. Members of one school recently visited a traffic court room in order to obtain first hand information about court surroundings, and court procedure, thus insuring a correct stage representation. By such methods the work in safety education is made a real problem and related to modern life.

Language affords a splendid approach. Children occasionally write essays about accidents which have happened at home or on the playground, or danger hazards which they have observed in the community. Some schools have organized clipping bureaus and pupils are invited to bring newspaper clippings of accidents which are used in connection with work in language.

The thought must be made clear that nowhere in the program of safety education are gruesome features of accidents emphasized or made prominent. The creation of a fear complex is always avoided and the work is based on the idea of teaching pupils the proper way to do things, which is the safe way. It is a program of "do" in the right way rather than one of "don't" because it is wrong. Oral reports are prepared on the way to prevent accidents on the playground, in the home, and on the street. Upper grade pupils are invited to give talks to the lower grades, and in this manner a direct contact is established between all members of the school community.

In civics, besides the study of traffic regulations and their strict observance, pupils have been encouraged to search for the sources of information regarding accidents, their location, and cause. Reports of the police department, coroner's office, and other government agencies have been obtained and studied. In some cases it has been possible without interfering with the business of these departments of government to establish direct contact with someone who could furnish valuable information pertaining to accidents. Statistical data obtained from these sources have been used as the basis for problems in arithmetic.

Nature study is another fertile field offering a wealth of materials. Safety education is in reality but a part of the larger problem of conservation. This includes not only human life but animal and plant life as well. Two of our most

important sectional problems in conservation, those of reforestation and protection of water sheds, are receiving particular attention locally at this time, due to the number of forest fires which have devastated large mountain areas. Classes in reforestation have actually been organized in the schools. Thousands of trees have been planted on important water sheds to replace a portion of those lost through forest fires. Nature's devices to protect animal life such as may be found in the lizard, the turtle, the deer, the rabbit, and the different species of birds, furnish appropriate material for many interesting discussions.

Some phases of history teaching lend themselves to discussions in safety education. Take, for instance, the problems confronting modern communities in transportation matters. Los Angeles County with its 700,000 automobiles faces a problem that was utterly unknown in this country as recently as a quarter of a century ago. It has been said that to truly appreciate history it is necessary for the student to identify himself with the period about which he is studying. Hence a study of the intricate problems of modern life can be made to help the student better to understand the problems of former generations.

As part of the geography work some schools have had pupils write letters to children in other lands, telling them about conditions on the streets and highways in this country, together with their own work as members of safety committees. The answers usually bring forth a reply describing the methods of transportation and difficulties of traffic, if any, in the other country, and sometimes enclosing pictures showing the peculiar conditions existing in the foreign land.

Over 50 per cent of the accidents occurring in our local schools happen on the school grounds. By enlisting the active interest and support of the department of physical education, progress has been made in reducing the number of such accidents. A pamphlet giving the safe way of using playground apparatus has been worked out by this department and placed in the hands of teachers of this subject and squad leaders of physical education classes. The results during the past year indicate that there has been a reduction in the number of certain types of playground accidents, especially those on playground apparatus.

There are in Southern California at the present time over ten thousand active members of safety committees. This large organization represents a practical application of the work in citizenship being carried on in our schools. The children are led to a better understanding of the purposes of many of our governmental activities because of the active part taken by them in their various school safety organizations. The work done by pupil committees on health, traffic control in the halls, cafeterias, and on the playground, monthly fire drills, inspection of fire fighting apparatus, should have a very direct bearing on their whole civic outlook. At least it has given them a direct participation in some of the problems which they must face only a few years hence as adult citizens.

It may be of interest to give a brief description of the school accident work as carried on in this city.

Every accident which happens to pupils from the time they leave home in the morning to the time they return to their homes from their respective schools is reported on the official accident report blank provided for that purpose. The report is made out at once by the teacher under whose jurisdiction the accident occurs, and is sent to the principal's office. The completed accident report is then sent to the office of the assistant superintendent in charge of safety education. They are there checked and at the end of the school month a summary is made, which is forwarded to the heads of the various administrative and supervisory departments. Copies of all accident reports received during the month are sent to the various departments involved, where an immediate investigation is made to discover causes and remedies. This plan has proved effective in reducing accidents in certain departments, where accidents indicated an upward tendency. It has also served to call attention to certain accident hazards which have been corrected at once by

the proper officials. Continuous study of the school accident problem has already brought about the elimination of three pieces of playground apparatus which were causing many accidents and were of doubtful value from the standpoint of physical education, namely, the see-saw, the high slide and the high swings.

A number of schools are using the plan just described for keeping track of the school accidents happening under their immediate jurisdiction. Members of safety committees make it a part of their business to investigate the conditions that appear to be responsible for accidents and make recommendations to the principal of the school for their correction.

Another feature of our safety work has been the organization of the Superintendents' Safety Committee, composed of supervisors, principals, teachers and members of the business department. At the present time the committee is composed of thirty members. Every department which is in any way connected with the problem of safety is represented in the membership of the committee. Meetings are held monthly, and plans are discussed to further the work of safety education in our schools. Members of this committee are responsible for the making of the present course of study in safety education, which is used throughout Southern California.

The exhibits on display at the conference will indicate some of the methods being used to carry on the safety program in Southern California schools. Methods vary in different cities in our country, and doubtless many ways will be suggested by other workers to reach the goal in which we are all interested.

Much progress will be made in safety education through conferences such as the present one where the results of the active workers in the field may be presented and evaluated. The National Safety Council deserves much credit for giving a place in its program for such discussions.

In conclusion, it is perhaps impossible to eliminate all danger in the life of today. A hazardless life might prove to be most uninteresting and empty. The aim of safety teaching, it seems to the writer, should be to teach children the folly of taking unnecessary chances which are certain to result in injury to themselves or to others. Appreciation of relative values should be stressed early in life so that the child will turn instinctively to the right way of doing things; thus our work in safety education through the elimination of all the avoidable accidents possible will have done its part in helping humanity to live happier and more useful lives.

MISS A. GERTRUDE JACOB (New York): I would like to ask whether in teaching High School students you would not emphasize the result of accidents or give illustrations of bad accidents?

MR. LEFFERTS: By that do you mean to give an actual photograph of all the details of the accident, or simply the results?

MISS JACOBS: Would you give a concrete example of the shirtwaist factory fire that happened in New York and give an illustration of what happened and show how fire drill would have helped?

MR. LEFFERTS: Describing how these people were burned to death would not help. It would emphasize the need of a fire escape. But it would not be necessary to emphasize what they went through. We give them the result. Here is a table, for instance, that is being used in the Junior High Schools for correlation in mathematics. It shows the different types of accidents that have resulted fatally in the City of Los Angeles in 1926 and 1927. Those figures are used in mathematics. But it is not going into all the gruesome details as to how the accident happened with the idea of scaring the child into not doing it. That is what I think Mr. Bouelle meant.

MR. HARRISON (Milwaukee, Wis.): We found that with the Safety Patrol or Safety Squads a question of responsibility arose. I notice Mr. Bouelle said nothing

about the organization being responsible. I should like to know if there is any case on record that would give an answer to the question. Is there any evidence to indicate that the child has recourse against the principal for being placed at any particular place?

MR. LEFFERTS: I can answer that for California. In our state the Board of Education is responsible for the child from the time it leaves home until the time it returns home at night, and if an accident happens to that child they are individually and collectively liable. In one of the schools a child was burned at an incinerator on the school grounds which evidence showed had not been properly guarded. Damages were collected from the Board of Education for their negligence. Some communities have had a release signed by the parents to release them from liability. We haven't felt in Los Angeles that traffic regulation was a job for the child to take but that it was a community responsibility and not a school responsibility. In one or two instances it was tried and the child was knocked down and injured. No suit was brought against the school in those instances. But this put a damper on the use of children in our communities for traffic regulation.

MISS HYACINTH RIGGIO (P. S. No. 172, New York): I notice that in your report it says "the education of the parents," and I was wondering if in your schools you educate the parents?

MR. LEFFERTS: We have the Parent-Teacher Association which has practically a one hundred per cent registration. They put on a program every month in some of them, and at least once a year in the others. The Parent-Teacher Association assists in that way.

CHAIRMAN FROST: The second number will be handled by Mr. Albert Loewinthan, Principal, P. S. 30, that is the Yorkville Junior High School, Manhattan.

Work of New York City Schools in Educating for Safety on the Streets and in the Home

By ALBERT LOEWINTHAN

Principal of the Yorkville Junior High School, New York City

I take it that I am to present to you as broad and as wide a scope of the work done in the New York City schools as possible. We are all groping for knowledge. We are all looking for information to aid us in this task of safeguarding the lives of our school children. It is our hope that what has been done in New York City schools might be helpful in the educational activities along the line of safety in other cities.

According to a statement made in this program, about 20,000 children of school age are killed throughout the country each year. The statement is also made that, at least, 50 per cent of these lives can be saved through safety education and that this work can be done without additional teachers and without additional time. To me, it seems that that statement is a truism, for here in New York City, by virtue of the expensiveness of the work on safety education, much has been done to relieve the situation. I know personally and intimately of the work done in Public School No. 30, Manhattan, and I know that the intensive application to work in safety has netted splendid results so far as our children are concerned.

What has New York City done in educating for safety in the street and in the home?

On May 14, 1924, the Board of Education of New York City, adopted a course of study and syllabus in Fire and Accident Prevention, which outlined the work that was to be done in the schools throughout the city. It might be possible for

those who are interested, to get a copy of that syllabus by applying to the Board of Education, 500 Park Avenue.

It was just about that same time, that Dr. William J. O'Shea, Superintendent of Schools of New York City, animated by a desire to spread the news of safety work and to have a medium for the exchange of ideas on safety, upon authorization of the Board of Education, had the *Safety News* issued in the interest of the safety of the children of New York City.

On November 17, 1926, Dr. O'Shea issued General Circular No. 16 on the "Safety of School Children." In it the Superintendent of Schools made it clear that both police department and public schools had conducted active campaigns for many years to impress upon the children and adults the importance of exercising extreme care in crossing streets. Here is what the Superintendent of Schools said:

Safety of School Children

"As you know, both the Police Department and the public schools have been conducting active campaigns for many years to impress upon children and adults the necessity of exercising extreme care in crossing streets. To increase the efficiency of this campaign, arrangements have been made with Commissioner McLaughlin whereby the Police Department will send to me every month a report showing the number of children under sixteen years of age who are killed or injured as the result of accidents on the streets, arranged so as to show the number of accidents in each school district and the causes of the accidents. By this means we hope to bring home more closely to principals, teachers and citizens generally the loss of life and the large number of serious injuries to children which result every month—indeed every day—in our streets."

These reports submitted by the Police Department were turned over to the District Superintendents and discussed by them with the principals at various principals' conferences. In that way the matter of safety was kept alive in all schools.

General Circular No. 16, issued November 17, 1926, goes on to say "although the schools are called upon to perform many functions, there is no work more important for them than the teaching of lessons of safety to our children. Nothing is sadder than the sudden death of a child, taken from his parents without warning; blasting his hopes for a future career and leaving a memory of grief that will last as long as the parents live. Many of the children who are injured will carry for the remainder of their lives the effects of their injuries. While other aims of school are important, yet we must emphasize continually this campaign of safety. Because, if by our efforts, one child is saved from death, or serious injury, the work of the public schools will have been of decided benefit. Special attention should be given to our course of study on safety. This should be supplemented by motion and still pictures; safety games and plays, special talks and lessons on safety and many other devices. Will you please call the attention of the parents of your pupils to this matter, because the cooperation of parents is of prime importance."

Thus, the Superintendent of New York City Schools calls the principals and teachers of New York City to arms in clear trumpet-like tones to do battle for the safety of the children of New York City. The fundamental aim in this campaign of safety is definitely and clearly outlined.

In General Circular No. 18, issued November 30, 1926, titled "Safety Movement in Schools," the Superintendent of Schools wrote, "in view of the large number of children who are killed or injured in street accidents, it is desired to extend the safety campaign as far as possible. Therefore, you are requested to hold a meet-

ing of parents and others interested in schools, at your school on Thursday, December 9, at 8:00 o'clock p. m."

In this circular the superintendent offered suggestions for program; suggestions for publicity; outlined points suggested for discussion. The following points were outlined for attention:

- a. Principals were asked to refresh their memories by reading the syllabus on Fire and Accident Prevention, 1924.
- b. Reference was to be made to the tabulation on mortality and casuary prepared by the Police Department.
- c. Special stress was to be placed on the adaptation of these facts to our own locality. This data was to be discussed by the District Superintendent at his conference.
- d. A clear and explicit explanation for the regulations for the movements of children, i. e., either going to and leaving school building and a call for cooperation by parents in the observance of these regulations was to be made.
- e. The agencies for cooperation in lessening the dangers were to be discussed thoroughly, i. e.,
 1. School
 2. Police
 3. Family

Principals were asked to stress the responsibility of parents in the matter of safety. The parents should be impressed with the need of following up the safety movement and not allowing interest and attention in it to be relaxed.

The Superintendent of Schools wrote,

"The school relies for improvement in condition largely on parent's cooperation. It is in truth a problem for parents, it bears upon that which is their dearest possession—their own children.

Teachers will be asked to make it a habit as they do in the daily health examination to caution their pupils before every dismissal—1. care in crossing street corners. District superintendents will make the monthly reports issued by the police department the subject of discussion at their conferences monthly with principals.

Principals in turn will make the data the subject of their conferences with their teachers, the purpose being to permit at no point hereafter any relaxation in our efforts."

That was the purport of the circular of November 30, 1926, issued by Dr. William J. O'Shea, Superintendent of Schools to district superintendents and principals. It made definite the ideas conveyed in previous circulars and it placed a decided responsibility upon the schools and their organizations to teach effectively the lessons of safety.

On April 19, 1927, in General Circular No. 38 issued to district superintendents and principals by the superintendents of schools, the school safety campaign is again stressed:

- a) There is a paragraph about accidents to school children in the streets.
- b) There is a caption headed: increase of accidents in March.
- c) There is a statement giving the principal causes of accidents.
- d) There is a definite call to set aside April 26 as a day for safety instruction.

The statement is precise and definite.

The superintendent of schools says: "Will you please, therefore, set aside Tuesday, April 26th, as a day for calling the attention of all children to the dangers of the streets and to the cautions as to safety which you have imparted previously. Please have talks given in every assembly room and by all teachers to their classes. Please emphasize the dangers of roller

skating in the roadway and playing in the roadway, and call to the attention of children the simple precautions which were set forth in previous communications on this subject. If there are playgrounds near your school encourage the children to use them. Observation shows that in many cases large numbers of children are found playing in the streets although the number of children using the playgrounds is not equal to the accommodations provided in some playgrounds. If there are special danger points near your school call the attention of the children to them. Repeat the simple rules which you made previously as to the corners at which they should cross dangerous streets. Other matters that should be presented to the pupils as part of the day's instructions are left to your own judgment and knowledge of neighborhood conditions.

Valuable information on this subject will be found in the following:

25th Year Book of the National Society for the Study of Education, Part I—Published by Public School Publishing Co., Bloomington, Ill.

"Safety Education in the Elementary Schools," by Ruth Streitz—Published by the National Bureau of Casualty and Surety Underwriters, 120 West 42nd Street.

"A Program of Education in Accident Prevention," Bulletin 1,922, No. 32, Published by the Bureau of Education, Department of Interior, Washington, D. C.

These pamphlets contain full bibliographies.

See also:

General Circular No. 16—November 17, 1926.

General Circular No. 18—November 20, 1926.

General Circular No. 19—December 2, 1926.

General Circular No. 20—December 8, 1926.

General Circular No. 21—Items V and VIII—December 10, 1926.

As a direct result of the inspirational utterances of the Superintendent of Schools, a great deal of constructive work has been done in the matter of educating for safety on the streets and in the home. It is impossible to give in the short space of twenty minutes an account of what has been done in safety education in our Metropolitan City with its more than 1,000,000 school children, over 30,000 teachers and about 700 school buildings. Because I feel that my talk in this brief period can hardly do justice to the scope and sweep of the work in New York City, I have prepared a number of mimeographed sheets giving in detail the work that has been done in one of our schools in New York City. I know that that work represents a cross section of the endeavors of the schools of New York City and I offer it to you for your information and kindly consideration.

The first of these mimeographed sheets gives an outline of the Safety Program planned for this term, September, 1928, to February, 1929, in Public School No. 30, Manhattan, the Yorkville Junior High School. The plan shows how week by week the matter of Safety Education will be kept alive and varied and how without giving extra time, without requiring extra teachers, without entailing extra expense, safety will be taught.

Then there is presented a progressive day by day record of the work carried on in the school from March to June, 1924, that work culminating in a Safety Demonstration and Exhibition under the auspices of the National Safety Council. Then, too, there is an outline of curricular activities by grades, correlated with the course of study and curricular activities by subjects. There is also a statement giving a comprehensive plan of, the safety demonstration and exhibition held in Public School No. 30, Manhattan, under the auspices of the National Safety Council, including an outline of the general projects for school work from 3A through 8B. Extra curricular activities in the form of Safety Court and Safety Patrol are explained.

I have on hand a limited number of copies of the "Safety News," published by a Committee of Teachers of the City of New York, and a pamphlet showing the organization of the Street Safety School Patrol, printed by the New York Automobile Club, and approved by Dr. William J. O'Shea, Superintendent of Schools.

CHAIRMAN FROST: I am sure we are very grateful for Mr. Loewinthan's talk.

MISS A. P. LAWRENCE (P. S. 40, Bronx, N. Y.): I want to know if the responsibility of the school begins when the child leaves the home and ends when the child returns home, or does it begin when the child is given into the hands of the teacher and end when it leaves the teacher?

MR. LOEWINTHAN: I am not so versed in the law. It is possible that our Superintendent is better versed.

CHAIRMAN FROST: The question was "Has the school responsibility from the time the child leaves the home until it returns." In New York schools we assume no responsibility once the children are dismissed and out of the care of the teacher. Then the Police Department takes up the care of the child. Dr. O'Shea forbade any of the Safety Patrol to go out and act as patrolmen. Of course, if a child is sent out by authority of the school to a certain place, then the school assumes responsibility, or I judge the law would hold the school liable.

MR. LASHER (Georgia Car Co., Atlanta, Ga.): May I ask in what grade you start your work of artificial resuscitation?

MR. LOEWINTHAN: From 7-A to 9-B. We have a Junior High School and this work is taken care of by the Health Department in cooperation with the school swimming instructor.

CHAIRMAN FROST: The next number on the program is by Mary O. Pottenger, Supervisor, Elementary Education, Springfield, Mass.

The Place of Safety in the Elementary School Curriculum

By **MARY O. POTTENGER**

Supervisor, Elementary Education, Springfield, Mass.

In discussing the subject which has been announced I shall attempt to consider

1. Child fatalities and their causes.
2. The relation of safety to education.
3. The school of the present as a medium through which safety instruction may be effected.
4. Educational methods.
5. Present day practices in educational systems.
6. Results of safety instruction and desirable outcomes.

I. During the year 1927, of the 95,500 fatalities in the United States approximately 20,000 were children under 15 years of age. The National Safety Council in a study of the death rate of children ranging in age from infancy to fifteen years came to the following conclusions:

0 to 4	5 to 9	9 to 14
1. Bronchial pneumonia	1. Accidents	1. Accidents
2. Diarrhea	2. Diphtheria	2. Tuberculosis
3. Accidents	3. Tuberculosis	3. Heart disease

These figures at once compel the interest and thoughtful consideration of educators.

The causes of these accidents may be attributed to young children's unconsciousness of danger, the adventurous spirit of youth, and the multiplicity of situations in modern life which involve danger. The last factor named determines much of the subject matter of safety instruction.

II. The fundamental aims of education would enable the child to adjust himself to the social group of which he is a part and to present-day living conditions. Moreover, they would fit the child to meet the needs of the future. This involves a steadily growing experience and in a measure, power to direct the future. Any condition which affects the child's present experience and his future success and happiness is of educational significance. Any condition which may thwart his development presents a problem for solution by those who are in the business of education. There are no more serious problems than those which have to do with the child's successful adjustments to his environment with relation to safety. This responsibility is recognized by those associated with the schools and in a large measure is being assumed by them.

III. Almost as great a contrast is seen within the walls of the schools of the present compared with the schools of the past as is seen in comparing the homes and the streets of the present with the homes and the streets of the past.

The school of the present places its emphasis not on formal instruction but on activity as a basis for learning. This type of school affords opportunity for children to engage in individual and group interests. We believe that children learn through living together, playing together, working together; through engaging in experiences first hand; through attempting to solve their own problems; through making their own mistakes, achieving their own successes, and having these successes do to them what success does to you and to me.

This type of school has become flexible in the nature of its program and its time schedule. The time schedule in the past was limited by the five hour day. The distribution of time was made among the various subjects without regard to their social values. So many minutes a day were allotted to each subject, arithmetic taking the lead. The program did not permit time to vary nor special interest to be pursued. The present time schedule, while limited by the five hour day, has transferred the emphasis to those subjects which are of greatest social value and is sufficiently flexible to permit individual and group interests to be pursued.

The tendency of the past was to organize each new field of subject matter into a subject of study. At present the reverse is true and we find fusion in place of differentiation, units of teaching involving related subject matters in place of unrelated lessons in geography, history, civics, etc. Convinced as we are that these methods are based on the best psychology of learning known to us at present we believe that safety should find its place in the curriculum, not as a separate subject, but when and where it is related to the problems under consideration, e.g., it is closely related to the social studies. It is used as a medium for development of oral and written language. The safety problems of the community become arithmetic. It is an important factor in physical education for skill in the control of bodily movement may be the means of saving life.

IV. Spectacular methods of teaching safety are responsible for much discredit which has fallen on safety teaching. We have mutilated our Mother Goose Rhymes, indulged in an inferior type of songs and plays, and generally lowered our standards of teaching. When we base safety teaching on the same fundamental principles which apply to all good teaching we may hope to live down this record.

I would suggest three methods of safety instruction which in my judgment are in keeping with the best teaching procedure.

First, making safety a part of the school program whenever the subject matter of safety is related to the subject under consideration, e.g., in the social studies, storm warning and the work of the weather bureau in reducing hurricane disasters,

safety precautions taken by Commander Byrd in his trip to the South Pole, equipping machinery with mechanical devices for reducing industrial accidents as a factor in industrial geography.

Second, teaching safety in actual situations where the need for safety is apparent, e. g., the child on the street in relation to traffic or the safe use of playground equipment.

Third, the organization of safety patrols and junior safety councils. This method being discussed by another, I only hint at its importance.

V. Educational work in safety in the following cities:

St. Louis—Old and new courses.

Kansas City.

Detroit.

Louisville.

Newark.

Worcester

Springfield—Mass state course.

Place in curriculum.

Illustrative program.

VI. At the present time our information is not sufficiently reliable for judging the measure in which safety teaching in the schools is responsible for reducing accidents to children, nor can we measure the degree to which safety habits formed in the elementary grades carry over into the junior and senior high schools. There are too many factors to be considered and adequate statistics are not available. There are indications, however, that this work is not without its reward in preserving life and reducing those accidents which result in permanent injuries thus handicapping children for life.

In addition to reduction and eventually to the elimination of preventable accidents let us hope that safety teaching may develop right attitudes which make for a high type of citizenship, namely, willingness to assume responsibility for the safety of self and others, willingness to cooperate in organized efforts to secure safety, interest in the social significance of safety, and respect for law and officers of the law.

CHAIRMAN FROST: No questions? This is taken from the New York pamphlet "Course of Study and Syllabus in Fire and Accident Prevention." "No set time is required to be assigned on the daily time schedule for this instruction. Better results are to be obtained from skilful correlation with the various subjects already in the curriculum."

The next lecture will be ten-minute talks, and unless there is great need for it we will have to dispense with the discussion owing to the time. The first talk will be "The Social Studies" by H. Louise Cottrell, Head Teacher, Stockton School, East Orange, New Jersey.

Social Studies

By MISS H. LOUISE COTTRELL

Head Teacher, Stockton School, East Orange, N. J.

I have chosen to open my brief discussion this morning with a letter written by our City Engineer in East Orange to a Sixth Grade boy.

"Master Nelson Benedict, Stockton School, East Orange, New Jersey. My dear Master Benedict: Your letter asking for material for a safety exhibit was received, and I have been in some doubt as to how I can help you. I am anxious to do what I can, however, and would suggest that you call on me at my office

at the City Hall some afternoon between 3:00 and 4:00 o'clock so we can talk it over. Yours very truly, W. D. Willigerod, City Engineer."

The spirit of that letter from a busy city engineer to a Sixth Grade boy explains my presence here today. Across the river are groups of Sixth Grade boys and girls who learn each year to know their community better, not merely a lot of facts about it, but the meaning of community life—what it does for them—how it does it—what the community has a right to expect of them and how they may fulfill their obligations. Thus the sixth grades make a study of the organized agencies of the city. Did you ever stop to think how many different departments of the city are really organized to protect life, health and property? Unconsciously then, those children are developing social attitudes related to safety, directly or indirectly. I am here merely as their spokesman to tell you a few of their class activities which have helped to develop these right attitudes. The average sixth grade child has a most morbid idea of safety. He likes to tell you about and bring in clippings of terrible accidents. Therefore, the emphasis is placed on deeper appreciation of accident prevention, to be obtained in a positive, wholesome way.

Accident prevention, like any other teaching, requires definite planning. The teacher, however, must be ready to seize any opportunity to utilize unexpected happenings in the classroom to make such teachings vital. For example, last year the reading of a composition written by a Boy Scout brought forth criticism from members of the class. A safety rule had been broken. It was a composition regarding a hike that he had taken. Since, in the brief remainder of the period, several boys could not be convinced that hitching on the side of automobiles was wrong, the children decided that their "Help, Study and Obey Club," the sixth grade civic organization, should take up the matter, and their teacher feeling the need of an entirely different attitude on the part of some members of the class toward safety, and noting the enthusiasm of the class as a whole to continue the discussion, decided on something more strenuous than a club program—namely a correlation of all school subjects with highway safety. My remarks today will be confined simply to those safety activities correlated with the Social Studies.

I was surprised the next morning after the reading of the composition to have one of the smallest girls say to me, "My cousin is a policeman, so Edwarda and I went up to the police station yesterday to find out about accidents in East Orange." Her informal report made a splendid introduction to the next town and city life lesson.

The children were so enthusiastic that they decided to form groups to make a city survey, as had been done before in solving another problem. These are the questions each group was to answer: "What is the city doing for me?" "How is it being done?" "What does the community expect from me?" "How may I assist?" Let me tell you what these groups did.

Several of the boys at the invitation of Mr. Willigerod, the City Engineer, spent part of an afternoon going about the city in his automobile. At his suggestion they were armed with paper, pencil and cameras. Next day they showed the class the drawings they had made. For example, a corner rounded off to make it easier for autos to turn corners. In a few days the photographs appeared—rough pavements on hills to prevent skidding, new traffic lights, and so on. I wish I had a copy of the report those boys made to the class. It certainly gave them a better idea than they had before of what the Street Department was doing to prevent accidents.

The group who visited the Recreation Department came back with maps showing where the various playgrounds were located and a series of pictures of playground activities to show how much more attractive such places are for play than the dangerous streets.

The Police Department played its part too in this city survey. From that centre much of the information was obtained for the "spot maps" which the children made,

showing where accidents happen, where the traffic lights are located, where traffic officers are stationed, and so on.

Later, when the Stockton Traffic Court was organized, it was to the traffic officer that the newly elected "clerk" turned to get the proper wording for the very necessary summons. One night the judge and other members of this little school court attended the City Traffic Court. Judge Stasse had the children sit right near him and gave them a great deal of help and attention. When asked what changes they would make in conducting their own proceedings after a visit to a real traffic court, the youthful "judge" replied: "I am going to make everybody stand up when I come into the room and I'll have to have a 'gravel' (gavel)" as he put it, "to pound the desk with." It was a rather amusing but disappointing answer. However, that group must have received some training in citizenship far beyond the immediate purpose for which the Safety Council was organized.

The writing of letters helped the children to establish contacts outside of city limits. From such state organizations as the State Motor Vehicle Department and the State Highway Commission, which are interested in the protection of lives, came hearty cooperation and much printed material which made a splendid addition to the June Safety Exhibit which brings the safety work to a close each year. The letter of one child, who was a member of a committee working to find out what the commercial world was doing to prevent accidents, brought to the building a representative of a certain company with a real traffic light. Can you imagine the thrill those boys had in the opportunity to manipulate a real safety light? And he drove home lessons in safety that a school teacher could never hope to accomplish. I have some times marveled at the amount of time busy men have been willing to give these children. It is probably because they have come to realize the value and possibilities of the endeavors of the schools to reduce accidents.

The experiences drawn upon are common to adult as well as to youth. Is not safety teaching then a most important means of developing a sense of social and civic responsibility? Would that the social outcomes could be measured; the desire to help rather than hinder; the cooperation in collecting valuable facts and information; contacts with local and state officials, also agencies, all working for the same worthy purpose—the saving of human life.

The problem of "How May I Best Help Others?" was solved by a month's campaign, conducted by the sixth grade to teach and influence the lower grades. I haven't time to go into that but here was a social attitude of another type being developed—the contacts of older children with younger children. In helping the younger to protect themselves they were learning to respect social responsibility.

And now let me turn rather abruptly to another phase of the Social Studies work. History is no longer learned as a succession of dates and battles; nor geography as so many isolated facts, definitions and locations, but what is more vital—how man, despite obstacles, formed a better civilization. Let me mention some of the situations, which naturally arise in a Social Studies course, which may be utilized to help a child to meet the hazards of the complex life about him.

Good roads have had much to do with progress. In olden times the nations who built the good roads became the great peoples of the earth. Rome became the leader of the world because she was crossed and re-crossed by good roads. France in the late war owed much of her success to the condition of roads. The development of our own country parallels the history of road building—deer paths—pioneer roads. (At this time the children enjoy the poem which tells of the difficulties Farmer John had in getting to town on a rainy day and includes this stanza: "They sink, now just the horses' ears, still struggling through the flood; now nothing but John's hat appears above that sea of mud.") Then the national roads, and our fine modern highways. This led up to the problem last year—"Is the State of New Jersey justified in spending millions of dollars on new highways and repairs

for the old?" The following conclusions may be drawn: Good roads and safety devices help to prevent accidents, but since a great number of accidents still occur on good roads, the people are to blame. Accidents will not decrease until the people choose to be safe. Should not such study bring the subject of highway safety closer to the children?

There is other Social Studies materials which is related directly or indirectly to safety problems today. Mr. Lew R. Palmer says: "The history of safety can well be said to parallel the history of man." What were the dangers of the Cave Man? How did he meet them? The common thought—safety—was emphasized in the lives of these, as well as other early peoples—whether it was animals, disease, cold, hunger, the powerful forces of Nature—fight they had to and conquer they must for self-preservation. And so civilization progressed.

Just at this time—as Fire Prevention Week approaches—the history of fire, which is the history of progress, is introduced. Starting with the simple story of how sparks flying from two stones struck together changed the life of the Cave Man, the children are led to see how man learned gradually to tame the "red monster" and make him his servant, thus developing one of the greatest forces of nature—that, if properly treated, Fire has been, and still is, a great friend of man. Then, in the proper places, is emphasized the thought that by education and science other dangers have been overcome—many diseases, fear of the sea, water supplies, etc. But, in turn, other problems of safety have arisen—autos, electricity, railroads and science and education are continually striving to solve these problems. Should not the study of civilization from this viewpoint make the child realize that safety has been and probably always will be a major problem with all, and take away that feeling that safety is merely set after set of dry rules to keep children from doing things they want to do? And that, after all—"The desire of a man to be careful is the greatest safety device known?"

CHAIRMAN FROST: We will now hear from Mr. Thomas F. Power, Assistant Superintendent of Schools, Worcester, Mass.

The Development of a Unit in Safety Education, Usable from Kindergarten to Grade 9

By THOMAS F. POWER

Assistant Superintendent of Schools, Worcester, Massachusetts

Before an exposition can be given of the development of a complete unit in safety education, several premises must be assumed or established. This address assumes two propositions: first, that from economic and psychological points of view there is a need of educating children for safety; second, that there is a responsibility upon school people to place safety education in the curriculum. The latter assumes the further premise that educating for safety is justifiable pedagogically. These two major assumptions and the minor one can be proved and have been proved in other addresses and in other papers by others and by the speaker, as well. The major objective of this address is to demonstrate how to develop one particular unit throughout the eight grades and in relation to the already established subjects of the curriculum.

In May of this year, the speaker secured and distributed through the public grammar schools of Worcester, Mass., statistics on accidents to children on railroads of the United States, including New England, and particularly on a certain railroad operating through Worcester. In brief, these figures showed: total number of children killed and injured while trespassing on railroad property, and the classification of these by causes, that is, the tables showed "what" happened and "why" they happened—throughout the United States. Similar tables were

arranged for accidents on some railroads in New England; and other tables for accidents to children on a particular railroad through Worcester.

The speaker bulletined all these data to the 900 teachers of kindergarten and grades 1 to 8 with the instruction that the material be treated as lesson material in safety according to the suggestions and procedures supplied in our safety course, issued in 1927.

A summary of how the material was used by the teachers is as follows: booklets were made by individual schools, rooms or pupils containing examples of the correlation of the data with handwork in the kindergarten and primary grades, with language work in the primary grades, compositions in English in the intermediate grades, drawing in the intermediate grades; problems in arithmetic involving simple processes in intermediate grades, letters in English, construction of safety rules, construction of graphs, broken line, bar and circular, more difficult problems in percentage, etc., etc., in the upper grades.

A typical school booklet would be constructed as follows: a clipped picture from a National Safety Council Calendar of a railroad engineer looking out of his cab would appear as a preface. The title is "Will they stop, look and listen?" This was cut out by a kindergarten child. Other kindergarten offerings were simple drawings of one or two railroad cars drawn by a locomotive. Grade one offered other simple drawings of railroad trains, but gave the pictures titles, such as, "Stop, Look, Listen." Grade two presented compositions of three or four sentences on such topics as "The Railroad Crossing Near Our Schoolhouse," "The Ambulance," etc., calling attention to accidents from crossing the railroad while the gates are down. These compositions were illustrated with colored crayons. Problems in simple, easy processes of addition and subtraction were made and worked out by pupils in grades two and three. A few examples of these are: in Massachusetts 41 people were killed and 47 injured. How many more were injured than killed? In Rhode Island 11 people were killed and 7 injured. How many were killed and injured? In walking along a railroad, 444 people were killed and 459 were injured. How many were killed and injured? What was the difference between the number of those injured and of those killed?

In grades 4, 5 and 6 pupils wrote letters of personification; imagining the locomotive could talk to school children and tell what it sees as it goes over the tracks. One example will serve the purpose here: "Dear children, yesterday, I was going to Springfield. I saw two boys picking up coal on the tracks. I snorted and puffed at them, but they did not heed me. They did not run until I was a few feet away from them. If they had not started to run they would have been killed. So please keep away from my yard. It is a dangerous playground. Yours truly, Eddie Engine."

Here are some rules for safety worked up as a class project in grade 4. These were copied as formal exercises in penmanship.

A Soldier of Safety

1. Keeps away from railroad tracks.
2. Looks both ways before crossing tracks.
3. Does not hop on or off moving cars.
4. Heeds the warning of lights and bells.
5. Never walks on tracks.
6. Waits until gates are up.
7. Keeps out of the freight yards.
8. Never picks up coal on the railroad tracks.
9. Stops, looks, listens.

Under the title "Cross Crossings Cautiously," the following composition was sent in from grade 4.

"One day when Careful and Careless were going to school, they saw that the gates were down, over the tracks. Careless thought that he would be late for school. So when Careful had turned his back to see an auto that was coming down the road, Careless thought it his chance. He ran under the gates. He thought that he could get across safely but the train was too quick for him. The first thing he knew, he was in the hospital. When he came home again, he said he would never be careless again. This accident could have been avoided if he had not run under the gates."

Grade 5 wrote compositions on how the school safety patrols assist children in crossing railroad tracks near the schoolhouse, and on other railroad dangers near our school.

Grade 6 constructed a line graph on graph paper showing the percentage of the causes of railroad accidents referred to in the bulletin which I circulated. The pupils worked the percentages beside the graph. Another graph showed by colored lines the number killed and the number injured throughout the country.

From grade 7, bar graphs were sent in showing the total number killed on a railroad that operates through Worcester. The lettering on these graphs was made an exercise in drawing.

The graphs from grade 8 were circular and showed the percentages of the causes of the accidents. The construction of these graphs followed the working of such a problem as: What per cent of the total fatalities was caused by each type of accident?

This necessarily short paper serves to show how material relating to accidents serves the aim of elementary school objectives and procedures. Such material is not contrary in either respect to the generally used material of the grades. It introduces no extraneous matter. It is modern, fresh, interesting matter to both pupil and teacher. It does help to build an atmosphere which influences consciousness and habit-formation that has practical results in conserving life and preventing the maiming of children.

CHAIRMAN FROST: We will have to dispense with the discussions. We will proceed with the little talk by Miss Emma A. Schad, supervisor, intermediate grades, Baltimore, Maryland.

The Work in English

By EMMA A. SCHAD

Supervisor, Intermediate Grades, Baltimore, Md.

It is not our purpose to insert in an already over-crowded curriculum another course of study, but our desire to weave safety education into the now instituted subjects. I propose to show briefly what safety education brings to one phase of the English work—oral and written composition.

The weakness of school English has been its isolation, its separation from the child's experience, so that it has been looked upon as something to be left behind in school and therefore has not functioned in life. Children too often are asked to talk or write on subjects in which they have no real interest. Sheridan in one sentence gives the keynote to the whole situation—"It is better to have something to say than to have to say something." Good subjects are vital, realized experiences of the child's own that naturally call for verbal expression, and safety education offers manifold opportunities for drawing out the actual experiences of the child.

When I introduce a class to the safety work, I usually begin with an informal discussion concerning the idea "Safety First." "What does 'Safety First' mean to you?" The answers generally are a series of "don'ts"—Don't run down the steps—Don't hitch on to trucks—Don't jay-walk—and many others. These "don'ts" offer

a fine opportunity to explain to the children Mr. Whitney's idea of the slogan, "Safety First." I heard Mr. Whitney speak at the National Education Association in 1925, in Washington, where for the first time I was made to realize how poor an expression that slogan is because of the selfish connotation that may be applied to it. Mr. Whitney emphasized the fact that we must teach children that there are good and bad adventures in life and that we, as teachers, must help them to choose the good adventure and help them to understand that "safety is the preservation of life to continue adventure of life."

An interesting device to bring out more about the word, adventure, is the use of the dictionary which defines it as "a risk," "a daring feat," "a bold or hazardous undertaking," "an exciting or extraordinary experience." The question, "Was Lindbergh's adventure a good or bad one?" never fails to bring every child to his feet. I try to impress upon the children the fact that before Lindbergh dared to fly across the Atlantic he made sure that his plane was equipped with the safest modern devices, that all equipment was complete, that weather conditions were favorable—in other words, he played safe before he ventured into that great unknown danger.

Some of the thrill in life is in meeting its dangers. Civilization would not be so far advanced if it had not been for the explorers, the pioneers, the inventors, the scientists, who were not afraid to take a chance.

From out of the field of safety education come many opportunities for English activities—activities that are worthwhile and that are a part of the child's life. Safety education supplies a real motive for oral expression. The Junior Safety Council meetings present a real reason to teach the children simple parliamentary procedures, to train boys and girls to think on their feet, and to stand before a group and present their case clearly. Older boys and girls delight in going into lower grades to talk to younger children, and there is an active part, too, for the smaller boys and girls to take in promoting the safety program of their school.

Last year an amusing incident happened at the annual Baltimore Safety Council dinner. It is the custom in Baltimore to have the schools represented that night by a group of children, the presidents of the various Junior Safety Councils that have taken an active part in the safety work during the year. Joe Tarlecki from one of the poorer sections of the city was selected to address the gathering of men and women interested in both educational and industrial safety. Joe began his talk by stating how great the need was for safety work in his school, because it was located on one of the busiest thoroughfares of the city. After telling of the work his council did, he concluded by saying, "Time doesn't permit me this evening to tell you anymore, but if any of you are interested, we'd be glad to have you come down to one of our meetings any Monday afternoon at three-thirty." It is needless to say that Joe was the hit of the evening.

Out of these oral talks grows the desire to put these thoughts on paper, and so a class safety book or a school safety bulletin is started, a safety slogan or a safety essay contest entered into with great zeal. A real motive for letter writing is provided. It is necessary to write to the director of the local or national safety council for information; letters to parents are sent home advising them to start their children to school in sufficient time so as to prevent needless hurrying, or to tell them what the school is planning to do to cooperate with Fire Prevention Week; thank-you letters must be written to show appreciation for help given.

There is no need to go further into these or other activities in the composition work which is made to live through its contact with safety education. You realize after hearing the various units of work in safety education presented that the English work is involved in all and that safety education not only vitalizes the English work and the other subjects in our curriculum, but speaking and writing about "safety" clarifies the children's ideas on this subject, and stimulates forming habits of safety. What is thought about, spoken and written about, is likely to carry over into action.

Increased public consciousness and group action are absolutely necessary if the number of accidents is to be lessened. Safety education not only makes the English work live but it brings to the children, and through them to the community, a full realization of the dangerous situations that confront them daily and helps them choose between the good and bad adventures.

Safety education in attaining its primary objective, habits of safe action, stimulates in children right attitudes; develops their initiative and leadership; and exercises with satisfaction their ability to say something, to say it well, to say it interestingly and convincingly, which is the ultimate dream of every English teacher.

CHAIRMAN FROST: The next number by Katherine Keeler, Lincoln School, New York City.

A Community Study

By KATHERINE KEELER
Lincoln School, New York City

My subject covers a study of the community in which safety education is an integral part. When the modern teacher plans for a year's work for one of the grades, she no longer thinks merely in terms of the fact that the children must learn, but she thinks of the whole child's needs for his best development.

The four points frequently considered are: First: He must be well and happy and normally growing and active. Therefore, we must allow him to be physically active at school and plan tasks and projects that require his moving about and getting plenty of exercise for his larger muscles. Second: He is an individualist—possibly with special talents. So the school day must provide opportunities for him to be creative—to build, to construct, and to express his feelings in various ways. Third: He is an inheritor of all the culture of the world. The school work must be rich in ideas and information and have associations with history, art and the sciences. Fourth: He is a part of a social group and must learn to bear his share of responsibility.

A study of the community seems to supply valuable situations and experiences for an all-round growth for these young children. They are interested in the life about them; their experiences are limited, and through a study of the environment we can enrich and extend their associations. We take them on trips to see interesting things in the city. For instances—we visit a bakery to see how clean everything is and how a loaf of bread can be made without being touched by human hands. A trip to the cold storage plant is filled with new experiences related to food preservation. The congested wholesale district presents new problems of traffic handling. The policemen are welcome friends, and the children are grateful for their assistance. On returning to school the children re-live these experiences and build the things they have seen. They begin to construct a play city and play the things they have seen. Trucks and trains go busily about with great dramatic emphasis upon traffic signals. It is managed by very efficient traffic officers with "Stop" and "Go" signs. Physically and intellectually the pupils need this construction and this dramatic play. With blocks, toy trucks and cars, with packing boxes and a few tools they transform the school room into a miniature city and reproduce the things they have seen.

A visit to the fire engine house is always one of great interest. We see how and where the firemen sleep and eat, how signals come in, how the firemen slide down the pole and how alert they are to any call. After all was carefully explained and many questions answered, one more child had a question. He asked if he might put on the fireman's hat and sit in the driver's seat by the wheel. The fire-

men consulted one another and they decided that this could be done if one would stand ready to take the child in case a signal should come at that moment. This brought home to the pupils more strongly than before the great necessity for vigilance and speed. Their respect for firemen was great indeed. Through this play we find their limitations, and by means of class discussions we help them to understand the significance of some of the common things about us. They find beauty in the commonplace and many opportunities for art expression. They follow step by step, in some of these studies, the complicated activities that lead to the getting of our food, our clothing, or the houses we live in.

Hygiene, sanitation and safety are important factors in all of these community studies. Still another example will show how ever-present the topic is without its having been forced into the situations. When a group of children build an apartment house out of packing boxes, the problems of fire escapes and fire proof materials are discussed. Fire prevention and fire laws are discussed. The fire department is always important in their play cities, and they visit and learn to know the firemen.

On our trips about the city, the children are taught how to cross the streets and to watch for signals. They are interested too in the river traffic with its signals. Here is a poem of a seven-year-old. She was too young to write it out but she told it to the teacher and the teacher wrote it for her. It is called "The Boat and the Bridge." "Toot!" said a boat as it came to a bridge, "Toot! Toot! I want to go through!" The bridge in reply said, 'I'll open for you,' and gave a warning "Toot! Toot!" As the bridge swung around, The boat went through, instead of "Toot! Toot!" the boat said "Thank you."

The play which they engage in we consider is quite a large part of their education, because it is through that play, as I said, that we can see their limitations. After a trip to a freight station, the children came back and realized that in their play city they must have some freight trains and some trucks, so they just made them hit-or-miss they ran over the floor. They had to be adjusted and they worked out that problem. The class that had worked out a farm and a city with its inner connections, one time played that they wanted to go to visit their grandmother who lived in another city. That entailed the arrangements to go on the trip—writing to grandmother, packing, going to the railroad station, waiting in the station for the train, and so on. There was one boy who wanted to put a door-bell on his house. He found he had front steps and a porch, but he had no door.

One of the little books they delight in is one called "We Live in a City," and one of the poems in it is about the fire escape (and I wanted to say that in constructing an apartment house the question of fire escapes always comes up). This little poem is: "We have a fire escape, but I am not allowed to be upon it. It has some iron steps and an iron railing too, but I am not allowed to be upon it. I know that I could climb the iron steps from our landing to the net, but I am not allowed to be upon it."

But safety is a part of everything that they do. Safety is not taught one period a week nor on any certain day, but comes at all times as an integral part of school and community life. The children are taught how to take care of themselves in their games. In playing in the gymnasium all of the games are arranged with the idea of preventing accidents. So many children in the early days of our school ran into the walls in their races and occasionally had had a broken arm, but now we have a black line and that is the goal; the wall is never the goal any more. They are taught how to light the gas stove, for they cook frequently at school. They learn the traffic laws on the streets; laws governing some phases of sanitation and health. They become acquainted with many things in the city through first-hand experiences.

Safety and sanitation are then a part of their thinking, and they become conscious of their share in these measures as responsible members of an ever larger community.

CHAIRMAN FROST: The next number is by Miss Amelia Schaller, principal, P. S. 103, Manhattan.

Safety Habit Formation

By AMELIA SCHALLER

P. S. 103, 49 East 119th Street, New York City

One swallow never made a spring, neither will one performance of any act form or break a habit. It is the constant drip, drip, drip of the water that wears away the stone, and the slow, steady piling up of the sand that makes our pleasant land. Let us not be discouraged if we feel that the safety habit has not been formed. We are nearer perfection today than we were last year, and what we are doing here must bear good fruit. The topics that concern us most in the question of safety are:

- 1—What habits should be formed?
- 2—How shall we proceed to establish safety habits?
- 3—When shall we begin the work of safety habit formation?
- 4—Where shall this work be done?

What habits should be formed? In our educational work we have always stressed habits of obedience, regularity, punctuality, concentration, diligence, etc. How about the habit of self-reliance, the habit of helping others, the habit of unselfishness, the habit of self-effacement, the habit of reflection and introspection? Too often we find people who prepare wonderful posters for this work, most excellent slogans, a faultless course of study which is carried out into practice by the pupils during their school life so that we have few or no accidents. Do our children when they leave school exercise the same care, the same vigilance? I do not mean leaving school each afternoon, I refer to the time when the pupil leaves the school or the university to become a citizen of these U. S. of America.

In my own school we have splendid slogans, we have written letters to the parents, we know that each parent received one of these letters, we have had plays, pageants, songs, games, we have correlated this safety work with arithmetic, English, composition, dictation, physical training, etc. All this is excellent, but what can we do to make our junior citizen feel that over and above all this work just mentioned are the habits of self-reliance, unselfishness, altruism, and self-effacement. If by our own example we can create in the child a desire to be self-reliant, unselfish, altruistic, and willing to sacrifice self for the glory of our country and its future welfare, then indeed may we say that we, as educators, are an inspirational force in this campaign for safety habits. To make this country safe for democracy we must educate in such a way that the citizens of the next generation will be far superior to those of the present generation. But we must make our citizens, old and young, conscious of the fact that we must value life and limb. The civic consciousness must be aroused and a civic conscience developed so that to be accused of recklessness, of selfish personal enjoyment at the expense of another's life, would be something of which we should be ashamed.

Some of you may say I am asking too much of the elementary school child when I wish him to practice the habits of introspection, self-reliance, unselfishness. Do not misunderstand me, I am aiming for this, yes, through the medium of the adult. Present conditions demand sacrifice and unselfishness in order that we may teach the world.

Will each adult, will each parent, form himself into a committee of one to see that he or she is a shining example of right safety habits for our little people to follow? By this question I have just asked, I have entered upon No. 2, namely: How shall we proceed to establish safety habits? The living example of correct safety habits as embodied in the adult citizens of our country is the best way of teaching our young people, and of improving present conditions. In place of giving each child a card with twenty-five or thirty questions in safety habits for him to answer, I think we might change the order of things and ask the parents and citizens of our city to truthfully answer them. Set a good example yourselves and the little people will soon follow in line, for they generally do what they see their elders do. The methods we are now pursuing for safety are excellent, but very often when the child takes to the home the standards we have tried to implant he is given little or no encouragement to continue. Those homes that practice daily habits of care, efficiency, unselfishness and a real bonafide desire to be helpful send to the school a child that requires little or no teaching in character. He learns by example and example is far better than precept. This task of reaching the adult in the matter of safety will not be an easy one by any means. It is far easier for me to tell twenty people what it is right to do, than be one of the twenty to follow my own teaching. Of the many cases in my school experience where I have been obliged to train not only the pupil but the parent to form correct safety habits, I should like to mention two. One parent came to me and when I remonstrated with him concerning the selfish motive that prompted his acts, said, "Oh, Miss Schaller, you're too particular, you'll never get anywhere in this world. If you want anything you must cheat, deceive, or do anything at all so long as you get it. Then when you have it, you can be honest."

Another, upon being told that if he disregarded the law and permitted his child to go to work without the proper employment certificate, he might be fined, replied, "My boy earns big money, and here in this country they don't ketch him so quick, by the time they got him, I have enough money to pay the fine and I have some money over. I take a chance." The moral code laid down in that household can be readily imagined. But I think you will agree with me that in too many homes we have the Rule of Gold in place of the Golden Rule.

Just as soon as we can get the civic conscience working overtime, now if necessary to make up for lost time, just so soon will our safety problem become a very simple one, or it will no longer be a problem at all.

Motivation in our acts should be emphasized. A slight accident occurred in the country not long ago when the following dialogue took place, "What's the big idea, Buddy? Do you think you're the only pebble on the beach? What you've done may make you happy, but haven't I a right to be considered? I don't want to be miserable because you're happy."

3—When shall we begin the work of Safety Habit Formation? We can't begin too soon, heredity plays a great part in making desirable citizens and in preserving life, but education and environment have worked miracles. The well ordered home where matches are kept in tin receptacles, where oily rags are not permitted to accumulate, where matches and cigars are always put out before being thrown away, seldom have fires. Is it not wise to ask the questions: What causes so many fires in certain neighborhoods? What causes the continuance of law-breaking? Is the latter common because we are too lenient with our offenders? Is the punishment so slight and the civic conscience so entirely lacking that law-abiding citizens become the innocent victims?

My reply to No. 4 is—this work in Safety Habit Formation should be pursued not only in the schools but in the homes, the streets, the courts of justice and in all those departments of the city that deal with measures to insure safety to our law-abiding citizens. If we wish to make a success of this work, we can never

give up. Some must sacrifice, the flaming torch must be picked up by others until we win. It is a case of eternal vigilance. Let us all be heroic enough to keep up the struggle for we all know that the reward of well doing is the ability to do better.

Our whole aim in this work is to build a fine character, and character is merely a bundle of habits. If we have citizens practicing daily the habits of self-reliance, unselfishness, habits of altruism and self-effacement, if our people will follow the Golden Rule rather than the Rule of Gold, we shall accomplish what we are aiming for now, and we shall build in our young people such a bundle of habits that the nobility of their characters will make for the highest happiness.

But the selfish ones should be held to a strict account so that those who are working to make fine characters will not be cut off in the prime of life and the undesirable ones become so powerful that lawlessness becomes common.

Let us never falter in our high aims, for all honest work is worship; all useful service is prayer.

CHAIRMAN FROST: There is one more speaker. We will hear from Mr. Herbert J. Stack, supervisor, Secondary Schools, Johnstown, Pennsylvania.

A Unit for the Junior and Senior High School

By HERBERT J. STACK

Supervisor, Secondary Schools, Johnstown, Pa.

You are, and I was impressed by the wonderful things that have been said to us on safety. We are all tremendously impressed. It is for this reason that I am spending this year at Columbia University as a Fellow. I believe that our secondary schools, our junior and senior high schools, have a very great contribution to make. As I listen to the elementary school people, I think, just wait until the next Safety Council next year and see what we have to say to you on what our secondary schools have done.

It has always been quite difficult to introduce relatively new materials into the secondary schools. The traditional idea that the high school existed primarily for training, for college has been very thoroughly ingrained in the minds of teachers and school patrons. Vested interests have kept a strong control on the secondary curriculum and many subjects such as industrial arts, domestic arts, commercial subjects, home training and even physical training, knocked at the doors of our high schools many years before they were finally recognized and admitted into the curriculum.

It is a well known fact that only a small percentage of the pupils in our secondary schools go on to college. In Johnstown, Pennsylvania, for example, some 7 per cent go to college, 7 per cent to normal school, 13 per cent leave school to help at home, 34 per cent are taken into the industries of the city, and 25 per cent go into clerical, sales or office work, with the remainder scattered in various fields. Primarily then, high school training must be for life activities and the solution of real life problems. The major objectives of secondary education—health, command of fundamental tools, good citizenship, vocation, worthy use of leisure time, worthy home membership and ethical training are therefore most important in the secondary school.

It is altogether natural that the newer objectives in high school training such as health, character and safety are having rather a difficult time. High school teachers have been primarily "subject specialists." It is not easy for the teacher who has been teaching the classics, higher mathematics or foreign languages for many years to see much of value in character education or safety education. Moreover,

if they will admit the values of such objectives, they feel that there isn't time for them to spare from what they feel is more important. Herein lies the great weakness of the secondary schools. The curriculum is so full of subject matter that there is little time for the teacher to get to the real objectives of the subject field. It is wonderful what beautiful objectives we can organize for our courses of study in high school, but too often these objectives are placed at the first of the course and promptly forgotten.

The prime reason why we study subjects in high school is after all not to pass college examinations, but to help us solve life problems, find happiness in our environment, become worthy home members and good citizens. We feel that in safety education we have an objective which is basic in many of the high school subjects.

Through the fields of chemistry, physics, general science and biology we learn how to use and control our environment. We learn how to avoid dangers and pitfalls, plan wisely and prepare for adventures of life with an idea of safety. Through community civics, problems of democracy, we may learn how to choose right methods of living and right habits of citizenship. It is rather significant that in one of the newer general science books, the author of which is a New York City teacher, there are over seventy-five specific references to safety—safety in health, safety in business, safety in transportation, electricity, sources of water, foods, exercise, fire, and a host of other subjects.

In our practical arts for girls and industrial arts courses there is a remarkable field of safety education. In fact, in a large share of the high school subjects the wise teacher can through the regular subject matter bring out desirable attitudes and ideals, can stress safe conduct and the good adventure.

In the extra curricular activities there is a splendid place for teaching safety. The Safety Councils, Boy Scout Clubs, Aviation Clubs, Girl Scout Clubs, First Aid Clubs and many others, have a definite contribution to make. It is altogether natural that perhaps the best work in safety in our high schools is done through such extra curricular activities, the school assembly and home room period.

The project lends itself readily to safety teaching primarily because it involves purposeful activity in connection with the subject matter being studied. Projects in general science in safety can readily be organized, such as, First: "How our water supply is kept safe." What a fine thing for you people here in New York City to get your children to know about the Kensico and the Ashokan plants. Second: "How Uncle Sam with the watchful eye of the Weather Bureau safeguards the farmer." Third: (This is one of our best ones) "Securing a safety cabinet for our school." Fourth: "How radio assists in keeping us safe." Fifth: "How our railroads safeguard traffic." Sixth: "How the fire department safeguards our city." (And then fire hazards in our city. How insurance protects our people. What a remarkable field there.) Replanting deforested hills is an excellent problem for the eighth grade. In Johnstown they had an assembly on Tree Day, when they dispensed with the assembly exercises and planted ten thousand trees on the hillside of our once beautiful city. Then there is first aid in the chemistry laboratory—and I could give you many others.

One of the most interesting of these projects that I have seen was organized in my school last year on "How Aviation Is Being Made Safer." I think it is one that any of you people in your own grades can do very nicely—fifth, sixth or seventh grade, or even in the high school. This project involved, first: building and demonstrating various types of planes; second: building landing fields and locating beams; third: talks and demonstrations in regard to improved planes and motors; fourth: building a weather bureau station and demonstrating how observations affect aviation; fifth: building and demonstrating model parachutes (to show how something could be brought down from the plane. They made the

parachutes from silk or linen handkerchiefs); sixth: demonstrations in regard to airplane instruments; seventh: demonstrations of the use of radio and direction finders; eighth: examinations for candidates for aviation schools. The project, as one can readily see, involved the subject matter of general science—air, electricity, engineering, lighting, weather, health and physical training.

The keynote throughout the entire project, of course, was safety. The entire project was given by the class before the entire school at an assembly, and proved to be one of the most interesting and helpful of our school programs, with the specific activities of flying the model planes, landing at landing fields, taking weather observations, demonstrating model parachutes and examining prospective aviators for eyesight, hearing, strength, alertness and the "whirling chair" test. One boy represents the doctor, and a number of boys, about fifteen, come in to be examined by the doctor to enter the flying school. The first boy is rejected because his eyes are weak. The second is rejected because he isn't physically strong enough. The third boy is accepted. One is rejected for hearing defects. One is rejected because he has a weak heart or weak lungs. Someone is put on a swivel chair and given the "whirling chair" test. The children were sitting there with their mouths wide open. What is the point of view in having these boys go through all that? A lesson like that will sometimes do more than miles and miles of moralizing about strength or taking care of your eyes to protect your health.

In just this way many interesting projects can be worked out. It remains for us as high school teachers to be sure when we go through certain subject matter to bring home to the pupils the significance of such subject matter with life realities—suggests guides for safe adventures. If there be character education in subject matter, bring it home to the pupils. If there be health and safety education, press home the essential facts. Don't expect that all of our beautiful objectives of subject matter automatically are realized as pupils pass through the work. It is for us to lead, to guide, to make the way clearer here and give experiences that will hasten good adventures and discourage bad adventures.

ADJOURNMENT

October 2, 1928

The Technique of Safety Education in the Vocational School

OAKLEY FURNEY, Chairman
Chief of the Bureau of Industrial Education
New York State

The second session of the Educational Division was called to order at nine-thirty o'clock by the chairman, Mr. Oakley Furney, Chief of the Bureau of Industrial Education, New York State.

CHAIRMAN FURNEY: The subject of Safety Education in Vocational Schools is one of tremendous importance.

Originally, when we first commenced to have vocational schools under public supervision and control, the matter of safety was pretty largely one of safety first for the teacher in charge of the class. I recall very well one of the stories which Dr. Dean originally told, when he was a Deputy in charge of State Education in the City of New York.

He visited a new trade class, I think it was in Rochester somewhere upstate, and at that time our vocational schools were then pretty largely populated by average and undergrade 14, 15 and 16 year old boys, and the doctor had been there for a little while and was looking around, and he happened to notice in the back of the teacher's desk there was a large break in the plaster. He said to the teacher in charge of the class, "What is that, what is that broken plaster there?" And the teacher replied that a boy had thrown a block of wood, he said, "A boy threw a block of wood at me and he missed me." So that was the original safety problem.

Through the very friendly cooperation of the State Department of Labor, we have been trying to do something in our state in the last two or three years in improving the situation in the vocational schools as regards safety, and Mr. McDowell, our second speaker, is going to tell some of the things he has accomplished, and his department has accomplished, and how he went about it.

Not Enough Knowledge of Safety

Curiously enough, in spite of the fact that we have recruited the best men, supposedly the best men from the trades, those men are not well-informed with respect to the technique of safety devices and safety instruction in the classes, and the whole problem generally of personal hygiene in relation to factory work. With the tremendous spread of vocational work, not only in New York State but in all of the states, the growing number of full time day trade schools and the enormous number of children in vocational classes in vocational schools—last year we had something like one hundred and fifty or two hundred thousand working girls attending vocational schools, evening schools, and so forth—why, we need to give more attention to the problem of safety than ever before. It is absurd for us to pretend to train boys and girls for industrial occupations and not have at least as favorable conditions in the schools, in the public schools, as when they shall go out into industry. Children have a right to expect that our schools be well taken care of, they have a right to be well taken care of in the way of safety education. And industry and their employers also have that right.

Commissioner Hamilton has suggested that the superintendents of the State Educational departments ought to make some move in the matter of compensation for teachers in vocational schools, and acting on his suggestion and on the suggestion of Commissioner Wilson, we sent out to all of the Superintendents in the State, the different cities and the boroughs of the city, asked them to report to us all the accidents of every character that took place in the schools of the State, in the last five years. And when we get these we will make an outline and present it to the industrial commissioner with the hope that some action will be taken to amend the compensation law for both the teachers and pupils.

While the number of accidents has not been large, there have been enough accidents in the schools so that some study of the situation ought to be made, and some remedy should be provided for it. If a boy is permanently injured it is a shame for him not to be properly compensated. I guess it is a shame for accidents to happen anyway, but accidents are unavoidable. We need to be fair to the boy, and we need to be fair to their parents and we need to be fair to society in general, and so should make some provision for him.

The Commissioner regrets that he can not be here today, but this is a time of the year when the budget is in the course of preparation and there are a great many things to take care of. And generally when he can not come himself he sends someone who is obliged to go, whether he wants to or not. So here I am.

Now, I think it would be better if we have the two discussion topics presented first, and then we can open the meeting for any discussion as you may care to have, and for any questions you want to ask.

Our first paper is on the teaching of safety in vocational schools, by Mr. Ronald Kent, Assistant Director, Essex County Vocational School, Newark, New Jersey.

Teaching Safety in Vocational Schools

By RONALD KENT

Assistant Director, Essex County Vocational School, Newark, N. J.

Last year up at Oswego, at the State Conference, there was a discussion one day on the topic of safety in vocational schools, and Dr. Wilson happened to come in and wanted to know if I would come down here and talk on the subject. I asked him if he thought I could give them everything he wanted, and he said he thought so. Of course, I have my own idea as to that. But I will simply present to you just a brief outline of what we are trying to do in this field. Probably you would classify it rather as an experiment, because although we have been working on it for some time, lining up and working the thing out, we can not give you any distinct data as to how successful it is, at least at the present time, excepting that we believe it is based on certain sound principles.

I think I will start by simply reading the directions we put out in our monographs, outlining the duties of certain instructors. That will show you in a general way what the idea is, and then after reading that I will try and elaborate. Here is a paragraph taken from the monograph:

"Hygiene, Safety and Physical Training Instructors will be responsible for the teaching of the general health and safety knowledges and practices listed in the monograph on Health Education. They will not be responsible for the teaching of specific and detailed health and safety knowledges and practices which are peculiar to each trade. This material is listed in the trade outlines under Safety Precautions and will be taught by the shop and technical instructors. They will be responsible, however, for conducting safety campaigns, organizing shop com-

mittees and shop competition, or using any other approved methods for calling general attention to, and arousing interest in these specific and peculiar practices, and for helping shop and technical instructors develop similar or other teaching devices in the field."

To make that clear, I will have to go back just a minute and tell you what our general lay-out is, to which we have fitted these devices that we are trying out. Our schedule and our program for the students and the teachers is something like as follows:

We have the week broken up into 40 periods, 20 periods or half of the time being devoted to shop work, in charge of what we call the shop instructor.

Then 10 periods or one-quarter of the total time is devoted to what we call technical work, which is split up in the usual way into mathematics, and the various subjects, which are in charge of super-instructors; that is, taught by one instructor, a single instructor handling all of those subjects. This instruction includes all such things as safety instruction and safety precautions; I take "safety precautions" to mean safety in the health—what might impair the health, as opposed to accidents, hurting the bodily structure through some injury.

Then the remainder of the 10 periods are broken up or divided as follows:

For Social Science and English, five periods. Library, two periods. Physical Training, two periods. And Hygiene and Safety, one period a week.

The last is given by a teacher who specializes in that work, and that one period a week is set aside for him.

Now we distinguish between what we call the general health and safety, and what we call the specific trade safety. We classify under general safety and hygiene, for example, such things as one's personal health knowledge and habits, the hygiene of the home, social hygiene, first aid, safety in the home, safety on the street, and what we might term general industrial safety, such as carefulness in the plant, carefulness for each person in any shop.

Then we classify what we might term technical safety or specific trade safety in each one of the trades, and we include there safety to the man, the human side of it, safety to the job he is working on, which sometimes in turn means safety to the individual, they are tied closely together; and safety to tools, which again may mean safety to somebody else later on or somebody near the worker.

Now, why did we make this kind of a set-up? First of all, we believe that the big point is the building up of safety habits out in the shop. The big thing is not putting across the knowledge, or information, but building up of habits in the shop; and the whole thing is centered around that. We do have to put across the information, of course, before we can conceive the habit; but we find this thing happens. For example, the hygiene instructor says, "Of course, I can give the fellows an examination on their knowledge, and they can give me their answers. They may not be right at all, and yet I know that they are practicing these things. But if I try to give them the reason why, they simply fall down on it. And yet they are practicing many of the things that they do not know the reason for." They practice hygiene even though they can not put it in words.

So if we once put the knowledge across, we try to get the habit and then we do not concern ourselves about the knowledge once they get the habit. We teach in the actual environment in which the boys are working, which we believe is sound psychology.

Then we supplement this instruction by work with the technical instructor, who tries to give information in the technical room that will fit in with the type of job the student is doing in the shop.

Next we supplement our training by work with the general safety instructor, from the standpoint of general safety outside of the shop, and of emphasizing the shop instructor's work generally. For example, we must have the proper

machinery to do this work, the proper organization. This general safety man organizes safety committees throughout the school. His efforts to keep the shop instructor and his work up to the standard are continuous. If we simply let the shop instructor handle these things himself, he might be apt to let them slide. We attempt to keep him and the students and everybody up on their toes through certain safety campaigns, for which the safety instructor is responsible. These campaigns are conducted throughout the school. We also have shop committees all working to the ultimate end of safety.

And now, why we have these technical instructors teach safety as applied in each particular phase, under each particular condition, instead of the general safety man?

Well, if you have a school with 12 or 13 or 14 shops in it, and you have a man trying to teach this detailed safety for that number of trades, I believe that it is too involved for one man to do properly. Safety is very highly specialized and we believe it requires a thorough working knowledge of each trade, to teach it properly.

And safety in work is often tied up with personal safety and requires a very intimate knowledge of the trade. In the automobile mechanics trade, for example, we have listed there for one unit, jobs involving the installing of engine cam shafts, cam shaft bushings, timing gears, timing chains, and tuning the engine, etc. Here are the safety precautions listed.

First, disconnect storage battery. See that lifting devices are properly applied before removing the springs. Now that is a proposition that a man must understand thoroughly in order to teach it properly. You must show the boy exactly how it is done, and a man can not do it and show the boy how it is properly done unless he knows exactly how it is done himself. It is not a case of just being careful, but how to be careful.

Another example. In jobs involving the checking of the levels, the lining up of front wheels and leveling the wheels the safety points to be observed are: Do not strike the cones or races with a hammer other than a lead hammer, and install the proper locking device in the correct manner. So that somebody later on driving the car will be safe. Some general man can not teach that. Only a man with a thorough knowledge of how that is done can teach it properly.

Again, jobs involving the making of simple tests and replacements and adjustments, on the lighting systems of automobiles. And the safety precautions. The boy should be sure to remove the fuses and disconnect the battery. Also avoid contact with live wires. You can not give him the precautions as to live wires, but he must be told how to avoid them.

And so on, and so forth. I might name a good many others, but I think that will give you what I am driving at. Well, I might add this one more.

Machine shops involving the grinding of one surface of work fastened to the platen of the grinder. The precautions there would be: Be sure to properly fasten and tense. The work must be properly fastened to the platen, and keep hands away from the wheel. Also guard the eyes properly. Those are points that the general man can not put across. You have got to know the technique of the thing to get it across.

All right, then we have all these things, all these habits to be acquired. We put a technical man in who is responsible for the technical safety, and another man on the outside for the general safety, and we have safety committees responsible for the continual safety throughout the school. If the committee reports that "this man has his machine unguarded, or these boys are not following the practices that we have listed," then we go after that shop instructor and bring him up to the standard in these respects.

May I just summarize a little and add some more points on this one thing. How do we make sure that our instructors will not neglect safety?

First of all, each instructor is given an analysis of his trade, which lists such items as I have pointed out, and the safety precautions to be taken. That does not mean, of course, that he is going to follow them, but at least it will help.

Then we attempt to include, as far as possible, in the lesson sheets these same safety points. When the boy gets the lesson sheet to go on the job, there are certain safety precautions listed, certain questions that he must answer before going on the job. So if we get these incorporated in the lesson sheets and in the instructions for the shop teacher, we are fairly sure we can cover them in that way.

Of course there are some things that you won't get in a long time and in some shops you won't get everything in the lesson sheets. But we must try to get our people up on their toes, just as they do out in industry on their safety committees.

We also make use of certain shop posters, particularly posters that have to do with the human element. We want to draw out the particularly true vital point of safety for humanity, safety for the boy himself. We have them posted in the shops, where the boys can see them. Then we are continually using current happenings in the school. As accidents happen we use them for instruction work in the shop where the accident happened, as well as in the other shops.

We should compile our accident reports. One instructor has already done a very fine job in that respect in one school. From these accident reports we are able to locate things that are particularly troublesome, and get the material to conduct campaigns. We also get material from these reports for lesson sheets.

Now I have simply given you a brief outline of our set-up. As I said before, we are trying an experiment and we think we are just beginning and there are many things that can be done yet. I shall be very glad to answer any questions if you have any.

CHAIRMAN FURNEY: We thank Mr. Kent very much indeed for his very excellent presentation of the safety program in Essex County, and at the close of the next paper we will throw the meeting open for general discussion.

We in New York State feel we are under a deep obligation to the State Labor Department and to Mr. McDowell, the next speaker, for the various services performed in the way of outside instruction to the trade and industrial schools and general industrial shops throughout the state. And Mr. McDowell can give anyone a wealth of information as to safety devices and how to take care of the mechanical side of a safety program in the schools. I think we will all be glad to hear from Mr. John M. McDowell, safety inspector, State Department of Labor, Albany.

Safeguarding Vocational School Equipment

By JOHN M. McDOWELL

Safety Inspector, State Department of Labor, Albany, N. Y.

When I received the invitation to speak at this meeting of the National Safety Congress, I accepted it gladly, for the reason that the New York State Department of Labor, through the Bureau of Industrial Hygiene, has preached the same gospel as your own organization, the prevention of accidents and the preservation of human lives. Surely no aims could be higher than these.

It was just about two years ago that the State Department of Education, through its Division of Vocational Education, requested the State Department of Labor through its Bureau of Industrial Hygiene to make an inspection of all of the shop equipment in the vocational schools and in the industrial shops of the

elementary and secondary schools in the State, in order to determine whether they were properly safeguarded.

Since that time we have inspected over one hundred and fifty schools located in all parts of the State, and these inspections were not prearranged, but were made any time we found it convenient. All the machinery was carefully examined and the hazards explained to the person in charge. In this first inspection I found over 2,000 violations of what we consider the established practice for safeguarding equipment.

After each inspection a letter embodying my recommendations regarding equipment and shop conditions was sent to the superintendent of schools and a copy forwarded to the State Department of Education. It thus became the duty of both parties to see that the recommendations were carried out. The first inspection after ample time had been allowed, was followed by a second, in order to learn to what extent the recommendations had been complied with. I am glad to say that in about seventy-five per cent of the cases I found that this had been done. The school authorities, in general, had cheerfully and faithfully complied with these requests, especially when they learned that we were endeavoring to guard the work shops of the schools just as we did the shops and factories in industry. The safety movement, as you know, really begins in the school as the children of today soon grow into the workers of tomorrow.

It may seem odd to some of you that shop equipment in schools needs to be inspected, when a law is already in existence requiring this equipment to be properly protected. Unfortunately the law applies only to shops and factories in which work is turned out for a profit and not to any educational institution where shopwork equipment is used for teaching purposes and not for manufacturing.

It is natural to suppose also that all shop equipment in school shops would be guarded. The equipment is modern, the instructors must be men of practical experience. Why has this other essential been neglected? In my experience with school men of the state I have come to the following conclusion regarding this matter:

In the first place, one of the main faults lies in the way in which shop equipment for schools is purchased. Machines for schools are usually sold on a competitive basis and this often results in a machine being purchased under the regular price, but without the usual standard guards.

Secondly, I have found some school boards who have failed to purchase machine guards because of the expense involved.

In the third place, a considerable number of shop instructors still fail to realize the importance of having all exposed parts of machinery properly guarded. They are willing to have this done for the principal danger points of a machine, but fail to realize the importance of guarding all moving parts of machinery, no matter where located.

Shop teachers neglect also to provide safe working conditions. In many cases these dangerous conditions were not confined to unguarded machinery or unsafe floors but to shafting, pulleys, lack of first aid kits, etc.

Nature of the violations; you may be interested in knowing something about the nature of the violations in school shops. These may be divided into general and specific.

In general I found in the case of shafting, that where it came within six feet of the floor it was dangerous unless encased. This I recommended to be changed.

In some instances I found pieces broken out of iron pulleys. These I recommended to be removed.

In numerous instances I noticed floors unsafe, broken or slippery, and I advised that these be repaired. Where the floor around woodworking machines was slippery I ordered it to be made slip-proof by installing rubber mats or by pouring hot glue on the floor and dusting it with light sand.

Dust, fumes or gases, wherever found, always carry a certain degree of health and fire hazard. Wherever I found melting pots in which dangerous gases or fumes were being generated and woodworking machinery creating wood dust, I recommended that an exhaust system be installed. In schools where automobile work was being carried on and engines being run, an amount of the deadly carbon monoxide gas is generated. I suggested in these cases that the carbon monoxide gas be removed by mechanical means.

In this connection, I always explained to the school authorities that the Bureau of Industrial Hygiene maintains a plan division with competent engineers to advise on blower systems, exhausts, etc., and that these men were at their service. A number of schools have taken advantage of this aid.

In one shop I found that an emory wheel jack had not been provided and that the shop teacher had made a spindle to hold the wheel, hooking it up to the wood turning lathe. The emory wheel usually revolves at a speed of about two thousand revolutions. Under the changed arrangement it was making at least ten thousand revolutions, which in case of bursting, made it a menace to everyone in the school shop. I wasted no time in explaining to the teacher the danger of this practice.

In many instances in my visiting through school shops, I found evidences of poor housekeeping. Lumber in woodworking shops which should have been neatly stacked in racks was piled loosely on floors, unused pieces lying about on work benches or floors. At times shellac and varnish cans were found uncovered. In machine shops, tools were often strewn about on benches instead of being returned to tool rooms. Carelessness was shown also in some shops in having bits of iron, pipe, wood and other materials left on floors and passageways for someone to stumble over. Passageways between equipment were often needlessly cluttered up. While these may be considered minor points by some, to an inspector they are evidences of bad housekeeping and indicate slovenliness on the part of a teacher which may even extend to his teaching.

The school shops may be broadly divided into the following departments: Woodworking, machine, electrical, plumbing, automobile, printing, sheet metal, and foundry.

As woodworking is the most dangerous, I shall give that the first consideration. It is essential that all machinery be properly lighted, especially woodworking machinery which operates saws and other woodworking tools at high speed. In many instances I recommended that the working parts of these machines be properly lighted by shaded or frosted globes in order to destroy eye strain.

In many instances the guards were not properly installed on circular saws; in others, the guard was not automatic and left the saw exposed while in operation. On swing saws I recommend that stops be provided so that the saw would not come beyond the bench and thus endanger the operators' fingers or body. Band saws I often found unprotected at the rear of the table. Fly wheels were also not properly guarded. These defects I ordered remedied.

In the case of the shaper, not many of which are used in school, I recommended that boys be prevented from using them and that they should no longer be purchased as school equipment. The planer, another tool used in woodworking shops, was often found entirely exposed, as well as the drive shaft at the rear. These also I ordered protected.

In the school machine shops, more attention needs to be given to the guarding of belt and gears. Wherever belts were shifted by hand I recommended that only rawhide lacing be used. In one instance a nail had been used to do duty as belt lacing. I suggested that belts running idle should be provided with hangers. With regard to other equipment in the machine shop, lack of guards was found to be the principal hazard; unguarded emory wheels, drill-press spindles, hack saws, boring mills, etc. These I always recommended to be guarded. Mushroomed hand tools, such as chisels and punches, I suggested be repaired or discarded.

In electrical shops, the chief danger comes from shocks, and here I always suggested that rubber mats be used on floors beside machines generating over 110 volts. I stressed the importance of guarding couplings between motors and generators and also that switch boxes should be properly guarded.

Industrial hygiene was necessary to the plumbing shops, and I impressed upon the instructors the importance of having boys carefully wash their hands after using white lead.

Where courses in automobile mechanics were being taught, I spoke to the school authorities about the danger of carbon monoxide gases, and the mechanical means of removing it. I also called attention to the necessity of providing fire-proof receptacles to hold oily waste and rags and thus reduce the menace from fire.

In the school printing shop, improper guarding of machines was the chief danger. I stressed the importance of having platen guards for presses and that fly wheels be properly encased. I recommended as highly essential the guarding of all knives in paper cutters. I also recommended that there be a plentiful use of hot and cold water, towels and soap for boys engaged in handling lead.

In sheet metal work, guarding of machinery was again the prime essential lacking to school shops. I recommended that squaring shears be guarded so that at no time could a boy get his hand between the blade and the bed of the machine.

Finally, there is the school foundry and here guard rails and removal of deadly fumes were the protective devices recommended. For all elevated platforms I suggested that a guard rail and toe board be installed. In foundries where metal was melted, I recommended that exhausts be provided to remove fumes.

Summarizing my inspections, I may say that in general I tried to do two things:

(1) To provide shop teachers and school authorities with technical information relating to the safeguarding of equipment in the school shops, and,

Second, to discuss with superintendents, principals and teachers the importance of teaching right habits of shops practice.

In a few years these boys will be found employed in all the industries of the state, and if in the formative years of their lives, they are taught the proper way to handle tools and machines and the safeguarding of equipment, this knowledge will become indelibly stamped upon their memories so that when they enter industry it will be rightly applied. The result will be fewer accidents in the industries of our state, and a man-power that is active, efficient and careful.

In closing, I want to say that I feel this inspection has brought about a better understanding of the work of the State Department of Labor, on the part of the school authorities; a better appreciation of its magnitude and the importance played by the humblest shop teacher in safeguarding the machines under his care. This work is still in the pioneer stage, but it has so far justified itself that it is to be continued. However, it is only through the close cooperation of the state and the school that this new fight for "safety first" can be carried to a successful conclusion.

CHAIRMAN FURNEY: Thank you very much indeed, Mr. McDowell. Now we have had the problem of safety education in vocational schools presented from two angles. First, from the angle of the supervisor or principal who is primarily responsible for the work of the instruction and protection of the vocational schools; and the other, from the standpoint of the outside agency interested in safety coming in and doing what it can to improve the situation in the schools. And I think the two points presented have been presented in a very able manner, and I think they are tremendously helpful.

If there are any questions, I am sure the speakers will be glad to answer them.

I wonder if there are any questions you would like to ask Mr. Kent or Mr. McDowell in regard to the points presented or any other matters in which you may be interested.

MR. GRAHAM (Detroit): I would like to ask Mr. McDowell concerning the recommendation of the use of wood shavers by students being prohibited, if he feels that this recommendation is justified. I do not, for this reason: That thousands of new employees enter the woodworking business every year, and if they are not able to—well, they have to learn to operate these machines somewhere. Isn't it better to teach them to operate these machines in the school shops and teach them operation in a safe manner, rather than to throw them out into the high speed production of our industries and let them pick up what they can there, under conditions far more hazardous than they might be in the school shops?

MR. McDOWELL: I assume that the woodworking industry today is carried on in the same way as we learned the trade a number of years ago. When a boy went into the machine shops to learn the trade he was taught the machines. I do not see why the school authorities should be responsible for the knowledge of the machines that are most dangerous in the industry. We have the machines in the schools, and the teachers get alongside of the machine and teach them the operation; I am in accord with that. But when it comes to putting a boy of 15 or 16 years of age to work on them, I do not think that is right. We find the majority of the accidents is on saws, and machines of that kind, cutting machines.

MR. GRAHAM: In the Detroit school shops we have a circle painted around these machines, about three or four feet in diameter, and every student has to have an instructor standing within that distance of the machine at the time it is operated, and operation of the machine is done only under the closest supervision. Students are never left with high speed machines of any sort unattended, and we believe, it is our attitude that it is our duty to teach the youngsters the dangerous points of these machines so that when they get out into industry, itself, with the high speed methods, that they are not simply tossed into the thing with no knowledge of the fundamentals of safety at all.

Too often a man will go into a factory looking for employment, and the foreman will say, "You are a shaver?" And he will say he is, and he may never have seen a machine of that kind before, and he starts to operate that machine, and there is a greater potentiality of accident there than if he were properly instructed before he went out into the industry.

MR. McDOWELL: Well, that is hiring people not journeymen to the trade.

MR. GRAHAM: Well, that is the situation. They have to learn sometime, somewhere, some place, and we feel that it is better that they learn in the schools, under the proper supervision, where there is a definite attitude toward safety, than by putting him in the hands of some job setter or foreman, who has little knowledge in that respect, or cares little about it.

CHAIRMAN FURNEY: The general point you present I think is well taken. A little while ago we made a rather extensive study of some 14 to 16 year old girls and boys on part time in the continuation schools in the State. We divided them into two classes, those employed on machinery and the other group. And in making the study of the group that had been employed on machines, we found that roughly one child in every five that had worked on a machine of some sort or other had suffered an accident that required the child being absent from work or tied up at least for one week. That indicated clearly that a good many people are in industry working on jobs that they are not fitted for, for which they have not had the proper preparation.

Now, if we are going to teach this industrial work in the schools, it seems to

me that we ought to properly prepare them for the situations that they will find in their employment.

MR. GRAHAM: I am interested to know whether that study of those people included woodworkers who had worked on shapers?

CHAIRMAN FURNEY: Probably not, because—well, what is the general regulation in regard to employment on machines of that type?

MR. McDOWELL: Very few shapers are found in the State of New York schools.

CHAIRMAN FURNEY: And in the industry itself?

MR. McDOWELL: No boy under eighteen years of age.

MR. BURRIDGE: I am very much interested in this statement concerning the foremen in the industry. Our foreman of the woodworking plant, in Detroit, refused to put on a cooperative student who is twenty years of age, before I had said anything to the student, saying that he did not want to take a chance. I just say that to indicate that there are foremen who understand the danger.

MR. McDOWELL: I do not question that, at all. But in the small shops it is different; the youngsters goes into the small woodworking shop or other shop as a sort of jack-of-all-trades; he does odd jobs here and there; and under pressure of circumstances at certain times he is probably asked if he knows how to operate such a machine and he says sure, he knows all about it. It isn't long before something happens.

Particularly, boys think that if they watch the operation a certain length of time they know all about it; and there are a great many things that their observation has not taken in. I think that is where the greatest danger lies.

There are safety departments that have direct contact with all of the employees hired, and in many cases that contact includes talking to by the safety director, to ascertain the actual safety knowledge of actual machines, and precautions of that nature.

But a study of the employment distribution over the small and large industries shows that there is a small percentage employed in the big industries. A great mass of industrial employees are spread out in factories employing less than five hundred men. The large majority are employed in small shops.

CHAIRMAN FURNEY: I have some figures that bear out your point. According to the 1919 census in this state, we had something like fifty thousand manufacturers, with one million, two hundred thousand workers. The number of establishments which had from one to five employees was 21,000. The number having six to 20 employees was 11,000. Those having 21 to 50 employees, 5,000; 51 to 100 employees, 2,000; 101 to 250, only 1,000; 251 to 500 employees, only 432. And those having 500 to 1,000, 50; over 1,000, 10. Showing the great bulk of all the shops employ a small number of workers.

And in those small concerns, of course there is less attention given to the whole question of safety. The larger concerns like the General Electric Company, and so forth, give a great deal of time and attention to the whole matter of safety and sometimes have two or three or five people looking after the problem of safety, and organizing safety committees, and working all the time on the problem of safety. But in these plants employing less than 100, very little attention is ever given to that.

MR. McDOWELL: Mr. Chairman, the State of New York has a labor law, and this labor law applies to the small factory as well as the large factory. Under this law they specify the dangerous machines, and among them is the shaper in the woodworking industry, for boys under eighteen years of age.

MR. GRAHAM: I do not question it is one of the most dangerous machines in the industry. But that is all the more reason for properly training the boys so that when they get out in the industry they have the fundamentals of safety on

which to rely, rather than trusting to the haphazard safety instruction which they may get wherever they go.

CHAIRMAN FURNEY: I do not believe you found more than one or two shapers in the schools—one in Rochester, I think, and one in Buffalo.

MR. McDOWELL: I might mention this, in connection with the shaper. I had been up in Elmira, and a gentleman came up to me and touched me on the shoulder, and he gave me the name of his school, and he said, "I want to congratulate you." And I said, what for? He said, "Because you did away with the use of the shaper in our school." He happened to be one of them that had had an unfortunate accident in his school.

CHAIRMAN FURNEY: I wonder what the general feeling of the group is in regard to having the school shops inspected by the State Department of Labor, and whether the State Department of Labor should have some authority over the school shops—that is, have the same authority over the school shops as over the industrial shops. The truth is that several letters have gone over my desk, in which the principals of schools have given us this excuse: "We can not do the thing that the State Department of Labor has recommended, because we have not the funds."

MR. EATON (Yonkers): I have had some general experience with outside agencies coming in, and found it entirely satisfactory. As far as this proposition of getting funds is concerned, from the school standpoint I would welcome it. I do not think there is anything would force a tax body to give you the money as quickly as such a thing. I ran a school for about three years, for disabled soldiers; a sort of private, semi-private affair, and we were inspected by the State Factory Inspector. He continually found hazardous things that we did not know anything about.

MR. GRAHAM: It might be interesting, that in Detroit our Board had a Chairman who was very interested in this matter, and he induced the Board of Education to appoint a committee for the purpose of inspecting the schools and to determine exactly what the condition might be with respect to safety from the mechanical standpoint. This committee, consisting of representatives of the State Department, State Safety Engineers' Office, two representatives from the Board of Health, the Industrial Safety Engineer, from the Local Safety Council, and one or two others, made a very careful and thorough inspection of all of the school shops, and made recommendations calling for the expenditure of eight or ten thousand dollars. The report was approved, and the funds were created for the purpose of carrying out these recommendations, yet the State of Michigan Board of Education has not required them to take cognizance of any orders issued by the Department of Civil Engineering or the Department of Labor. It is a cooperative thing, and they feel it is the thing to do.

Every new school shop is inspected prior to its opening, by a representative of the State Department of Labor and Industry, and subsequent to this inspection I spoke of, the Board of Education saw fit to appoint a safety engineer to handle the details of mechanical safety as well as educational work, and the safety engineer likewise inspects and approves any new shop, prior to its being put into operation.

CHAIRMAN FURNEY: I wonder if there are any questions you wish to ask Mr. Kent in regard to their method of handling safety instruction in the schools.

MR. BURRIDGE: I would like to ask Mr. Kent whether there is any first aid in the schools?

MR. KENT: Yes, we have in the larger schools a nurse, assigned to the school on full time. When she is not there the man in charge of the safety has charge of the first aid kit.

In the smaller schools, where we can not have a nurse, the safety man is in charge. There is a room in every school to which the boy or girl can be taken,

The rule is that every boy who is hurt must immediately go to that room. Every accident must be reported immediately.

MR. AXELROD (Bayonne): Mr. Chairman, I am in charge of safety training in Bayonne. I just want to ask whether that would not be Mr. Henig's work?

I happen to be in charge of the machine shop science and also the electric shop science. In this book he has the specific hazards pertaining to those two shops. Now, I think I can not teach the subject of safety as it should be, but by giving a general course, that is, the general rules, I think we do a whole lot in our particular school.

As far as I can remember, we had, I think, last year four or five major accidents, where some person lost part of his finger, and about ten or fifteen minor accidents. What would you suggest that I do, in order to cut it out entirely.

MR. KENT: We used that in a combination of ways. We used it, in the first place, in our analysis of our accidents in the various trades, checking up to be sure we got these things in. We use it to find out where to place the emphasis, what points are particularly bad, and also where to put up posters and conduct a campaign.

ADJOURNMENT

October 2, 1928

Education for the Modern World

DR. WILLIAM J. O'SHEA, Chairman
Superintendent of Schools, New York City

The third session of the Education Division was called to order at two-twenty o'clock by the chairman, Dr. William J. O'Shea, superintendent of schools, New York City.

CHAIRMAN O'SHEA: The National Safety Council bids you welcome at this meeting this afternoon. The purpose of the meeting is to promote our efforts in securing the safety of the people of this country, and particularly of the children. The first great problem that confronts us is one of economical development, development of our time, and particularly of our country. There are fewer people in industry, as the years go on. There are fewer children between the ages of fourteen and sixteen now employed in the industries. That is more leisure time on the part of adults, on the part of young folks, than there used to be. This necessitates a change in education. In this city and in other cities of the country we have met the situation to some extent, but have not completely solved the problem. There will develop this afternoon, through the speakers who will address you, suggestions that you can carry to your respective cities, to your respective schools, that will help you in solving the problem of safety.

In this city we have done a great deal. The schools, numbering over nine hundred in all and containing more than a million children, have set their eye and their mind on developing new thoughts which will help to reduce the number of accidents from automobiles and other vehicles. We have been very successful. We are proud of that fact. The public knows but little of the great efforts that have been made by teachers and by principals to save the lives of children.

Two years ago I called a meeting of all the parents and relatives of children attending all of the public schools of this city. There were about a million people in all that attended these gatherings, and from that time on we have made an intensive campaign in the matter of safety.

As chairman I am not supposed to do more than introduce the speakers of the day. I will proceed, therefore, to perform the duty devolving upon me by introducing as the first speaker of the day, Mr. Albert W. Whitney, associate general manager, National Bureau of Casualty and Surety Underwriters, New York City.

What Can Safety Education Contribute?

By ALBERT W. WHITNEY
Associate General Manager, National Bureau of Casualty & Surety
Underwriters, New York City

Our two meetings this morning had to do with the actual detail of safety teaching. The meeting this afternoon is for an entirely different purpose, namely to find where Safety Education belongs in the general scheme of education for the modern world.

Safety Education grew out of the feeling that the elements of our modern life and particularly the automobile, had become so dangerous that the home was unable, unaided, to cope with the situation and that the school must perforce come to the rescue. It began in most cases with such simple activities as the bringing into the

schools of policemen to talk to the children, and its first developments had neither a method nor a philosophy behind them. The end in view has merely the preservation of life and the educational value of the teaching itself was hardly thought of.

It became apparent however very soon that we were dealing with a subject that had distinct educational possibilities measured not only in its effect in the preservation of life but in its effect upon the development of personality; the progress since that time has been not merely in the building up of a richer content but in the development of a philosophy that would serve to rationalize the possibilities that were becoming apparent.

Briefly, the present situation is this: probably a large proportion of the schools of the country are now giving some instruction in safety, although in relatively few of these is the work of high quality. In the country as a whole while the automobile fatalities to adults are rapidly increasing, the deaths of children have been going down since 1923, which marks about the beginning of any considerable activity in the schools. In schools where the best type of instruction is being carried on actual statistics show a saving of lives of fifty to seventy-five per cent.

I am quite sure that I am expressing the sentiments of people having to do with education in saying that at first sight Safety Education is not merely unattractive but repellant. This is for two reasons, first, because of its apparently negative character, and second, because it seems too thin and too humble a subject to be given consideration in the schools. We in the safety movement had much the same feelings ourselves and we entered upon work in this field with misgivings and with much doubt of its practical effect either in the saving of life or in the development of personality. The results are quite frankly as much of a surprise to us as to anyone else.

The situation, we are convinced however, can be explained in no other way than by the hypothesis that we have stumbled into a really important educational field, the unexpected success of the movement is only another evidence of how much more unerring the instinctive reactions of children are than the sophistication of their elders.

Let me give you a side-light from the industrial field. There too the safety movement was in the first place viewed as distinctly a matter of minor executive importance, something that had to be looked after of course but a matter of quite secondary significance. One who will put himself in the way of feeling the pulse of this great Congress of which this meeting is only a small part, will suspect however that something was at fault in this judgment. Safety instead of being only an embroidery upon industry has now turned out to be an intrinsic element in its right functioning. It has been now proved beyond doubt that the safe factory is the efficient and successful factory and the efficient factory is the safe factory; in other words, safety and efficiency are only particular aspects of an industry that is functioning rightly. The same causes that produce accidents are also responsible for inefficient production. A box, for instance, falling from a badly-piled truck will cause a physical injury perhaps only once in a hundred times but in every case either the box is broken or at least the truck has to be stopped and repiled.

The correlation however goes deeper than that. The safety movement was the first field of importance in which management and labor came together on a basis of mutual self-interest. The old so-called "welfare movement" was not founded on a genuine basis of self-interest and was furthermore largely insincere, and it has consequently passed. The works safety committee made up of representatives of both management and labor was the first forum in which the two parties to the industrial enterprise met on a common, dispassionate basis to attain a result of genuine importance to each. It is well worth noting what came out of this situation. What happened was this: the members of the committees became intrigued with the human quality of the problem and found that they could work together not only with effectiveness but with mutual satisfaction and respect. Having got

results by such cooperative efforts in the safety field, they then found that they could get results in other fields, and the works safety committees not only led to the establishment of better working relationships in general between labor and management, but have been used in a multitude of cases for the solution of other specific problems in the field of industrial relations.

Many elements have contributed to bring about the better industrial relations in the United States which are so manifestly present today; it is not merely my own opinion but an opinion that is shared by a number of important leaders in the fields both of labor and management that of these the industrial safety movement has been the most important. A humble, human activity that went to the very core of life proved to be the key to a door that had not been unlocked by other efforts more ambitious and apparently more powerful.

There are just as serious problems in the field of education today as there were in the field of industry twenty years ago. I am bold enough to believe that the success that has come in the industrial field through this simple, humble, human approach may be possible of duplication in the educational field. It may be that the key to a better education may be found in the meeting of these lowly simple needs, rather than in the more elevated fields where we have been looking for help.

The effect of safety teaching in the saving of life is a matter of statistical record. In Louisville the year before work was begun in the schools the motor fatalities to children were 23, they dropped to 14 the next year, to 8 the next year, to five the next year, and they are continuing on about this basis. In the ten years that safety work has been done in the Detroit schools the saving of lives has been over fifty per cent and amounts to over 1,000 lives. At least equally favorable results have been secured in other cities such as Springfield and Worcester. There are 20,000 children killed by accident in the United States each year and if safety were taught in all the schools in the proper way, it is safe to say that the result would be a saving of at least 10,000 lives a year. The case is so clear from an accident prevention point of view that no more need be said about it.

The part of the case that is by no means so clear is the educational effect of safety teaching, the effect measured in the development of personality. We do not teach chemistry alone or primarily because of those that are going to become chemists. We teach it because it has a value in fitting a person to understand the modern world and take his place in it. 20,000 deaths a year among children after all represent not more than 1 or 2 deaths out of every 1,000 children of school age. What is the effect of our safety teaching upon the 998 that will not be killed by accident even if they receive no instruction? It is questionable whether we have the right in a crowded curriculum to require 998 children to submit to a discipline that has no value in the development of personality. The case for safety education in a consideration of education for the modern world must stand or fall upon the question of whether safety teaching itself has educational value, and the rest of what I have to say will be directed entirely toward that aspect of the subject.

Before discussing the matter in detail however let me say, speaking prospectively, that it is exceedingly unlikely that anything that is so closely tied up with the passing on of life should fail to show itself also in its effect upon personality. That is not the nature of the world. Education and the development of character are not an embroidery upon life; they are part and parcel of the problem of living and anything that has a fundamental relationship to living must in the very nature of things have an intimate relationship to the development of character and personality.

We must look for the nature of the educational value of safety teaching in an analysis of the safety concept and in the psychology of the child.

It is curious how largely an enterprise is conditioned by the terms which are used to describe it. The fundamental fact of the safety movement is avoidance of accidents. Having no accidents is an awkward idea to embody in words how-

ever and safety seems to have been the only practicable term that was to be had. Safety and having no accidents are however not synonymous and if the word "safety" is to be used, it is necessary to explain in what sense it is to be used and to call attention to certain untoward connotations.

The thoughtlessness with which one strays from the idea itself when one has a word to take the place of the idea is illustrated by the use of the term "Safety First." This slogan apparently originated in the railroad field and both there and in the industrial field it has a legitimate and literal application, for we certainly should not desire either speed or ladies' maids on the one hand, or greater industrial production on the other if they can be had only at the sacrifice of safety. This slogan was carried over into the educational field with complete naivete. It is manifestly out of place however for there are certainly a host of things in life that are more important than physical safety—love, friendship, honor, patriotism, for instance, and we cannot educate our children to the idea that safety is the first consideration.

The word "safety" itself must however be given equally close scrutiny. Being safe and avoiding accidents do not mean exactly the same thing. Avoiding accidents does not limit us in the least in the choice of adventure. We may choose to go to the South Pole, we may choose to fly across the continent, we may choose to fight yellow fever in Africa, we may choose (or not choose) to be a candidate for President. Avoiding accidents has nothing to do with the choice itself. Avoiding accidents merely means that having made our choice we must carry the enterprise out successfully and conformably with our purpose. All that the no accident movement says regarding adventure is: "Carry your adventure through instead of letting it go to pieces on the rocks of mischance."

Being safe, on the other hand, does seem to have something to do with the choice of the adventure itself. To be "safe," using the word in an absolute sense, would probably land us in Nirvana or some other spiritual safe deposit vault. However, the word "safe" as a practical matter is always qualified, either explicitly or implicitly. We must know what we are to be safe from. There is however another preposition that is equally applicable and in fact correlative, namely "for." Safety as a practical working conception has no value until we see clearly what we are to be safe from and what we are to be safe for. Safety therefore is substitutional. To be safe does qualify our adventure. It implies a criterion by which we can distinguish between the good adventure and the bad adventure. Safety however not only does not prevent adventure but it flaunts adventure in our face, namely by calling us to secure safety *for* the good adventure.

Now both the concept of avoiding accidents and of practicing safety for the good adventure has extremely important educational implications in the life of the modern world.

The world is full of adventures, more full than ever before. The problem of choice is more important and more pressing than ever before. There are more good choices to be made and there are more ways to go wrong. We need a modern theory of relative values. Some of the old criteria have disappeared, some are not applicable to modern conditions. Furthermore most of the old approaches are gone. We need a new approach to the problem of appraising the values in human life. I do not make the claim for safety that it will supply criteria for choice but I do believe that it furnishes a natural, normal approach to the problem of relative values in a field in which the child is thoroughly emotionalized, and one that is rich in its connotations.

On the other hand there is nothing more modern than the conception of not having accidents. Chance and accident belonged in the world when it was being guided by natural selection, for the variations upon which progress was based were necessarily fortuitous. It has little place however in the world of today. The world of today is characterized by the completeness with which it is under control.

Man is no longer a creature of circumstance but he is imposing his will upon the world and bending it to fit the image in his own mind. In the modern world we know what we are doing, we are acting in a purposeful way, to produce a result and we will brook no interference particularly from the blind, controllable forces which produce accidents. Nothing is more in the spirit of the modern world than an education which focusses attention on purposeful living.

Safety furnishes no criteria for the good adventure nor for the good purpose in life, but it does, I claim, furnish a valuable approach to both problems, and for two particular reasons, first because the approach is emotional and second because it has a negative quality.

A good educational field must not merely deal with forces that have an important bearing upon life but there must be ready access to the minds and hearts of the students. Spelling may have a certain amount of educational value but it has certainly had to get its motivation not from anything intrinsic but from such fields as the desire to excel. No field however is more thoroughly emotionalized than the field of safety. The survival of the fit has been in general the survival of the safe, using the term in its broadest sense, and children have interest in safety because they are themselves the product of a long line of ancestors that owe their existence to their success in learning their safety lessons.

The intense human interest which children show in Safety Education is ample proof of its emotional quality and an evidence also of the ability of children to grasp the fundamental nature of things.

The second reason why safety is a valuable educational approach is the very fact of its negative character. Every important field of human endeavor, so far as I know, has started on the negative side. Education began with inhibitions, religion began with taboos, psychology began with abnormal psychology, medicine was curative before it was preventive. The positive approach characterizes those fields in which the race accommodations have been well-established. The negative approach is found in those fields that have never been brought completely under subjugation. These are the fields of the unsolved problem and therefore the fields in which the fires of progress burn most brightly. If education is to be the instrument of progress it cannot afford to confine itself to fields that are completely positive. We need the challenge of the negative, the incomplete, the unsubdued, the dangerous. And an approach to a positive outcome through a negative field instead of being an element of weakness is an element of strength.

Now I must hasten on to what I consider the most important part of what I have to say, a field in which I hope that safety teaching may make a genuine contribution to modern education.

Safety can be taught by the methods of either the old education or the new education. Under the old system it will usually be taught as a separate subject and instruction will be given in the form of maxims and inhibitions. The subject this afternoon however is education for the modern world and so I shall confine myself to the discussion of modern methods.

Modern education thinks of the child's mind as a seed, containing the elements of the inner world and education as a process of unfolding and growth. The seed has within itself an organizing power that will make it grow into a tree and all that we need to do or can do in fact is to furnish it light and nourishment. Similarly also with the mind of the child.

The child in the course of its development both physical and mental must traverse essentially the same path as the race itself, but this must be done at an enormously accelerated rate, and largely under special conditions. The first nine months of a child's life for instance are passed with no direct contact with the world. A large part of education, and I am including adult education as well, must perforce be done through the medium of play, recreation and art, all of which are

primarily and intrinsically media for receiving a larger experience of life than can possibly be had directly.

Golf is an epitome of the world and a man can in an afternoon's play, with the thrill of drives down the fairway and the equal thrill of getting out of bunkers, get the equivalent of years of direct experience of the world. The drama is a way of experiencing life vicariously and still less directly. Education must perforce make use of these methods for enlarging experience, but there must also be a direct contact with the world. Playing dolls and playing store and playing railroad train, with the projects that they involve, are excellent for part of the time but they must also be balanced by a tasting of the world itself that is not in play but in earnest. Birth itself is an evidence of the fact that our development and education must not all be sheltered and indirect. A butterfly has apparently little to learn from the world and so when it comes out of the chrysalis it is complete.

The rallying cry of the newer education has been self-expression, the need of unlocking the spiritual energy within. This is equivalent to the bursting of the jacket of the seed and the putting out of its first green leaves, but the seed has within itself an energy that will not be satisfied until the infant plant has struck its roots into the soil and finally found expression in the form of a tree. So the nature of the child is not satisfied until its energies are brought into contact with reality and have found expression in activities which are similarly directed toward the goal of human life.

The newer education has been so successful in its efforts to give the spiritual energy of the child expression that it can now turn itself to this next great task of integrating this spiritual energy in the form of purposeful living.

Now it is certainly not in the upper reaches of life where a child first comes into contact with reality but in such lowly fields as safety where the needs are simple and immediate. This is the place where the child's roots begin to strike into the soil and he gets a firm grip on the world as it is, by no means a wholly pleasant world but nevertheless the world that he has to live in.

Not till the plant gets rooted and begins to draw nourishment from the earth itself can it seriously begin to fulfill its destiny and become a tree. So with the child. The need for self-expression is like the stored up energy of the seed but it must be supplemented by fresh energy drawn from contact with the world itself before the child can begin to work out his destiny as a man.

Safety furnishes however not merely this primitive contact with reality that the child needs but it also furnishes an objective toward which growth can be directed. This is amply borne out by our actual experience. Far the most important and successful work in safety is being done by making use of it as an objective toward which the work of all classes can be directed. And in so doing we have discovered the curious fact that safety can be so taught without the use of more time, more money or more teachers. In other words there proved to be an actual vacancy in education as had been suspected; techniques were being taught but not applied to life.

To draw to a close the treatment of a subject which is too large for the time at my disposal let me say in recapitulation that I believe the next great step must be to bring education more directly into contact with reality and to direct it toward the development of purposeful living, and in this endeavor I should seriously like to present the claims of Safety Education on three grounds, first, as a natural and effective approach to the problem of purposeful living, second, as a place where a simple and successful first-hand contact with reality can be had and, third, as furnishing an objective about which the activities of the curriculum can be integrated.

CHAIRMAN O'SHEA: I am sure that I voice the sentiments of the audience in expressing to you our gratitude for that splendid talk.

What Mr. Whitney has said relative to the importance of inculcating habits of safety, agrees fully with my views on the subject. I think the teaching that we have done in the schools along these lines has helped to increase and teach self control, self protection, obedience and many other virtues, that were to some extent lost sight of. The intensive campaign which has been waged along these lines is also an advantage to the teacher. As I said at the beginning, in introducing the speaker, we have departed in recent years from the mere teaching of the three R's. We have taken up health education, safety education; we have given more attention to moral education, and what we are doing along the lines of safety education is in line with the progress we are making in other directions.

It is now my pleasure to introduce to you Professor Rugg, well known for his work in curriculum revision. He is largely responsible for the movement to establish a unit course in social science, history, civics and geography. He, with several others, has written a series of text books along those lines.

What Does the World Need?

By HAROLD O. RUGG

**Professor of Education, Teachers College, Columbia University,
New York City**

I shall take my cue from the central thought in the admirable paper of Mr. Whitney, namely, that the world needs, more than anything else, an education which will prepare youth for a reasoned life of adventure.

I think a central thought might be stated as this—we must find some way by which in the short years of schooling, we can bring about a generation of youth who will be launched upon an effort of reason and the adventure of beauty—the effort of reason and the adventure of beauty.

The present situation in the American schools is the product of three centuries of the most spectacular transformation in economic and scientific lines that world history has revealed. Europe in the sixteen hundreds, located in the most stimulating climate, inheriting tremendous sources of coal, iron and other great natural resources, produced in the next three centuries a startling and totally unique civilization. Inductive science, growing out of the spectacular seventeenth century, turned, in the eighteenth, into the development of the formula, and produced in the nineteenth century this world-wide exploitation of natural resources.

The Puritan in 1600, in England, going into business, and going into government, produced attitudes of thrift and industry, hard work, adjustment, agreement, that eventually revolutionized the means of production and distribution of material good in the modern world.

I say to you that we are living too closely to the modern economic life to realize its significance to the public schools, because the philosophy under which American education has for the last 75 years developed itself into a great national system of schools, that philosophy has been so developed that it is practically impossible to produce out of it the philosophy of reasoned adventure which Mr. Whitney was talking about. This tremendous change that has come about in the modern world began to show itself especially in the late seventeen hundreds in the production, in a most startling and revolutionary way of the steam engine. Man learned how to produce artificial power and stopped for the first time in nobody knows how many million years, being his own draft animal, or stopped gradually the conditions under which his wife could be his draft animal; and at the same time developed with almost uncanny insight a scheme by which this mechanical power could be harnessed to wheels—and then changed the lives of human beings the world over. People came out of their handicraft homes and went to work in

cities, huddling together in densely populated regions. Little England, and other island nations led a century long race for land, for coal, iron, for world-wide markets, and produced, with the other European countries, the transformation of this entire modern world.

In America we outdid Europe because of our fortunate inheritance of all the land between two oceans, and with it the world's greatest concentration of the three basic natural resources, coal, oil and iron, and with it a stimulating cyclonic climate that kept our ancestors everlastingly at the job. And over night we, more spectacularly than Europe, produced great cities; and over night we, since 1850, produced the graded school. Children huddled together in towns and cities with their parents, and the graded grammar school was the necessary eventuation. And so rapidly did this phenomenon produce itself that our school men could do no more in the first fifty years than grade these children in groups and design for them, practically on makeshift methods, reading books, arithmetics, spelling books, geographies, histories and so on. The history of the American school curriculum is the history of thorough going opportunity. Our ancestors were compelled to do the job of housing, organizing, administering and securing, as best they could, over night, nearly a million teachers for 23,000,000 children.

About 1890 in the modern world, it became very apparent, especially in Western Europe, that the first stages of this rapid, economic transformation were about over.

Remember, that from 1600 to nearly 1900, creative art, creative thinking, outside of the field of applied science and mathematics and engineering, creative art and creative thinking were submerged, stamped upon. The tendency of the human mind was to apply itself to the immediate problems of production and developing a material civilization, and we today are intensely grateful that that job was done.

But in the 1890's there appeared in the various centers of culture and vision in Europe, rare, creative souls in painting. In music, in literature, in each of the outstanding arts, men and women appeared who said, "We must produce original ideas and original statements and original emotions." And since 1890 we have had the startling phenomenon of the appearance in France, in Germany, in the Scandinavian countries, in England and in America, of groups of creative artists who have said that the life of adventure can be lived only as each individual personality is permitted to develop its own capacities and to experience its innermost ideas and emotions.

Now the demand of the artist, the original, innovating, creative artist, apparently runs counter to the general philosophy of education under which the Western countries have developed their school systems. In the United States, after 1875, the very philosophy of education became phrased as pragmatism and the aim of education for elementary and secondary schools was set down as social efficiency. It was produced originally by an engineer, Charles Pearce, who influenced William James, and afterwards, John Dewey, and set, if you please, the whole philosophic stage. Now we have had, since 1900, the arising in America of a totally new educational movement.

In 1896, John Dewey relates how one afternoon in the fall of that year he went about from supply house to supply house in Chicago, asking for furniture for a new school that he was to establish. And as he went from one store to another he was answered in each case by the same reply, "No, we haven't the kind of furniture that you could use in your school." He had specified the requirements; he wanted flexible furniture, movable furniture, chairs and tables that could be used in terms of the needs of the children at any moment. And finally he came to a store where there was a young lady saleswoman, who, with more discernment than salesmanship, said, "No, we haven't it and you can't find it; what you want is furniture for the children to work at; in ours they can only listen."

Some of you may have seen on the screen of the Pathe Weekly not long since,

views illustrating the wreck caused by the recent storm in the South. Perhaps you saw, in the succession of rapid, kaleidoscopic views, the picture of the schoolhouse standing in the midst of the street after street of ruins. The street was flat, except for a part of the schoolhouse; the roof had been torn off, all the walls were gone, but the floor was rigid, and screwed religiously in place were the forty chairs and desks.

Now put together the two pictures, of John Dewey searching for flexible furniture that could be moved about and used in terms of the needs of the children, and the picture of the remains of the holocaust, and you have the old and the new education, or the new and the old education, adequately epitomized.

What kind of an education will produce, if it ever comes in America, the effort of reason and the adventure of beauty? First, a right-about-face in educational philosophy. There was a music master in Geneva by the name of Emil Jacques Dalcros. Some of you know that name, Dalcros, as the designer of a great system of musical education. Dalcros had a slogan that he was fond of using as an epitome of his whole educational theory. It was, "I would have a child say, not, 'I know,' but, 'I have experienced.'" And John Dewey, 3,000 miles away, almost at the same time seized upon the phrase, in 1890, in writing his first little monographs about the new school, said, "The central doctrine of learning and education shall be the reconstruction of experience; not until a child has taken in the world, taken in an idea, taken in an outside stimulus and reassimilated it into his own nervous system, not until that has happened has the child learned, and is the child on the road to true growth."

Now I take that slogan for the central thought of this method by which this new education, this new product of the effort of reason and the adventure of beauty, can be accomplished and attained, because the fundamental, psychological fact that you and I have to confront in producing the new education is that every one of these 23,000,000 children in America, and every one of these million children in New York City today is a unique personality. And the fundamental job that you and I face in American education is the development of that individual, unique personality to the maximum, all his powers. The psychologist has shown us very clearly that we are utterly and totally unique.

At birth a child is essentially a rhythmic bundle of capacities; he comes into the world with a certain heart beat, rhythmic, periodic, intermittent, with the rest pause a little longer than the action pause. He inherits a certain rhythmic, periodic rate of flow of breath; he begins to walk after a few months in a particular mode and style and rhythm as a time beat of locomotion. He begins to talk and to use his hands, use all parts of his body in an intricate, coordinated, integrated scheme of nervous life. So that as he grows from the age of birth he is becoming more and more his own unique, rhythmic self. And the foundation of his education must be an educational method that will start with the education of his body. And so Dalcros, and other great music masters, watching conductors of orchestras as they respond with brain, highly central nervous system, muscles, all the sensibilities, to the music, they are portraying, or the singer or the painter or the artist in any field, responding with his whole personality, so, I say, Dalcros, and these other great masters of education, have seized upon this central doctrine of individuality and of self expression.

Now if you go into one of the new schools, some of which are found in the publicly administered systems and some of which are found under private auspices, you find illustrations of the way in which this new theory is working out. You go to a certain school and ask to see the program of the work in that school. You ask to see English Composition, in the elementary or junior high schools, and you are told that they have no English Composition. And you ask the children, "Don't you write?"

"Yes, of course we write; we write a great deal."

"When do you write?"

"We write whenever there is occasion or need to."

In the spring, Saunders of the First Grade, is impelled to write to his teacher as follows:

"Dear Miss Harrison:

"I made up a song. This is it:

"The birds have come again;

"The birds have come again;

Irma of the Second Grade writes to the shop instructor:

"We have made patterns for our dolls' beds. Will you bring us some wood?"

The boys of the Third Grade visit the ships and the docks and cannot rest until they have made a complete record of every delicious detail.

The Fourth Grade writes a group play about Christopher Columbus, and this, of course, must be put in good written form, or how can the actors learn their parts?

But in the meantime the girls have been making cottage cheese in a new way and naturally the world and his wife should know something about it via a mimeographed recipe.

And out of this new environment which you observe in the new schools come in the most startling way exhibits of creative ability that we have no suspicion existed in these children.

Two Fifth Grade girls write a poem, call "Spring and Summer."

On an evening soft with mist
The moon shone on a silver brook.
Summer came from the shadowed glade
And Spring came from the wood.
Summer stepped across the brook
But Spring stood still.
They stayed together for one happy night,
Oh, the wonder of that night.
Night had gone and with it Spring,
Dawn found Summer all alone.

And you begin to inquire what kind of an environment it is that centers education upon the development of individual capacities. How is it done? How can children of not more than ordinary mental ability write so deeply and fundamentally, as, for example, this, a poem called "Heaven."

I went to church one day, and God
Sat by my side.
And we laughed at the preacher
And the people with their prayer books
Saying prayers to a god so far away.
"Heaven is pearly paved,"
Said the preacher,
"And golden angels sing His praises
On their harps. It is there that
You and I will some day go."
And God laughed and said to me
"Heaven is a broad field and the brook,
And the lean, scarred, beaten horse,
And the houseless cur,
And the hunted deer,
Will go there with me."

The child of 14 who had lived five years with a teacher, with other boys and girls had heard this teacher read day after day very wonderfully from great

writings about the life of adventure of beauty, and had entered into a very growing interplay of critical discussion with the teacher and each other about the readings that were being used in the class. And then in this school interesting discoveries are made, hidden reservoirs of wit and humor, that mark a great soul.

I remember well, Emma, who was more or less an outlaw in such a school, who was sent to me some years ago to be given (in the days when I did such things), an intelligence test, and Emma was discovered to have, in the jargon of the trade, a very high I. Q., indeed, nearly 150. The school couldn't understand quite how Emma could have that I. Q., but immediately took it upon itself to see if someone couldn't draw that out. And then a great teacher, an artist teacher, came, and Emma began to be found out. Two years later I found her out. She had written a poem about me, after the episode of the intelligence test, and it was called, "The Moron Turns, or The Danger of Obeying the Philosopher who said Nobody Thinks." And this is it:

At intelligence tests I am not at my best,
They are not my idea of a spree,
They possess no attractions for me.
There is no fascination or fervid elation
In slowly and patiently filling the blanks
That confront me in ranks.
There are other better ways
Of passing idle days
Than eternally perusing a hazy, confusing,
Ultimately disillusioning test.
And the things the test show
I'd much rather not know.

And I mustn't stop without letting you have this. Emma wrote about her classmates, too, and one was called "Johnny."

He used to find content
In standing always rather bent
Like an inverted letter "J."
His angry relatives would say,
"Stand up, don't slouch, you've got a spine,
Stand like a lamp post, not a vine."
One day they heard an awful crack,
He had stood up straight;
It broke his back.

And then, out of the environment in which Mr. Mearns, this artist teacher, described the central element as "permitting poetry and not summoning it"—that is not a half bad slogan for creative education. "Poetry cannot be summoned, it can only be permitted," said Mearns, paraphrasing in a way the words of a great Austrian painter-teacher, who, when asked how he produced the wonderful results with children in painting and drawing, said, "I take off the line, and other art masters clap it on; that is the difference."

But out of this environment of drawing out rather than pouring in, out of this environment of critical discussion, with full-hearted appreciation of beauty, came some very wonderful productions. I would like to read you one more, and my examples are before you. It is called, "The Door Stands Open," and came out of one of those critical discussions in which Mearns had said to the girl who had handed the poem in in its earlier form, "How can you do such things? There is one good line, 'The ever passing steps went by our door.' Now if you could write a poem about that it would be worth something."

And late that day the poem in this form came back:

The ever passing steps went by our door,
We did not listen then,
Nor did we look outside,
But now the door stands open.
Some hang back, afraid to join
The crowd that passes,
Some gather in the doorways
And watch eagerly.
I am not afraid; I am not eager.
I stand by the window and look
At the faces.
I would know what life is,
What the world is, before I go.
Those who come back are often
Sad and tired.
The stories they tell are not
Always pleasant.
And yet all who go out are happy,
And they hurry, looking ahead
At something just beyond.
There goes one now, she almost runs,
And there come some who are returning.
Their faces are lined and ugly,
But their eyes are wise,
Not all of them.
I see one coming back whose face
Is smooth and happy,
But her eyes are empty, foolish.
Why? I will find out.
There goes a face like mine
That searches for an answer.
What has she learned?
She may tell me; but she has passed.
I see a youth whose eyes are fixed
On something far away,
His is a face to follow in despair.
I lean out, "Where are you going?"
The vague, deep eyes turn slightly,
"Just over there." "Where?"
But he is gone.
Here returns a man whose face must
Once have been like that youth's,
His eyes are broken windows
And he babbles without sense.
What is this world that does such
Things to men?
There stands a man who watches
Those who start out.
He sees them drop unnoticed things of value,
For which he stoops and searches
In the dust.
He is one who went out and
Has returned with nothing.
I leave the window and look about
The empty room.

They all have gone; I cannot wonder.
 'Tis just as well.
 Youth's saving gift, I think,
 Is that it will not look and cannot see.
 I take a last glance back
 And gently close the door behind me.
 I catch a friendly hand
 That is half outstretched,
 And I am part of the crowd.

Now every one of the 23,000,000 children in America has some ability to produce out of his own developing experience something unique; if the school will listen to that child's personality. He can't help but produce something unique for he is unique himself. But the school, under the doctrine of adjustment and social efficiency, tries to groove him into a standardized goose-step sort of person.

Now creative self-expression, the production of individuality, a scheme of education in which we will permit poetry and music and the dance, and ideas, and not coerce or summon them—I said at the beginning that a slogan that would be fitting or adequate for the modern world, the education in it, would have to be two-fold. Not only the adventure of beauty do we want to launch these children on, but to fit them for a modern world that is full of the gravest and most difficult intellectual and emotional, as well as physical, dangers. We must launch them on the effort of reason. It is not only understanding of the modern world that we want, an understanding that is almost impossible to get under the hampering conditions of modern life, but it is tolerant understanding.

I was an eye witness to a little episode that illustrates perfectly what we want at this point in the modern world. I was going into one of the schools in Denver, one afternoon, with the superintendent of schools, and just as we were going into the high school, two boys came out, evidently from the gymnasium, engaged in a heated discussion. And as we passed them, one boy turned and said to the other, "Fred, your point is well taken, but what is your authority?" I gasped and said to the superintendent of schools, "Is that a representative product of your educational system?" He said, "I would like to think it, but I fear those children have been trained in deliberation outside the classroom as well as in."

But note what that boy had said—"Fred, your point is well taken"—(an open mind, a flexible mind, a mind that was willing to say, "Perhaps the other fellow has got a point?")—"but what is your authority?" A critical mind, a mind that was open, but as someone said, "Not a drafty mind, one open at both ends." A mind that was questioning, that said, "What are the facts; have we got them?" Put even more than that, a mind that had the uncanny instinct to say, "What is the faith back of that statement?" Because it is faith more than facts, after all, that determine our statements.

And that is the problem the school is up against, in this effort of reason, or producing a setting, producing problems, producing readings, and securing research enterprises and library materials and what-not, through the use of which children can be growing in their capacity to be open minded about these problems of immigration, of industry, of community life, of democracy, of international affairs, and so on.

And so it is this great two-fold problem of first discovering how we can set up an educational régime in our schools, an atmosphere in which we draw out the capacities, physical, emotional, intellectual, in these children, and on the other hand, by which we confront them day after day with issues, with problems. We don't dare not confront them with problems. We don't dare exclude from the schoolroom of the American schools the issues and problems of modern life.

Otherwise, if we do, conduct will continue in America to be governed by impulse and not by tolerant understanding.

CHAIRMAN O'SHEA: The rapt attention with which you received Prof. Rugg's beautiful talk, is an ample compensation to him, I am sure, for the effort he has made this afternoon.

We will now have the pleasure of listening to Prof. Overstreet of the College of the City of New York.

Round Table Discussion

Led By HARRY A. OBERSTREET

Professor of Philosophy, College of the City of New York

I hope you see the humor of this situation. This is now supposed to be a round table. I have looked around and I can't find anything but a long, green, oblong table, and a square room. And you may remember what Doctor Rugg said about inflexible furniture, and so on. I seem to see in front of me the kind of furniture in which you can only listen.

But what is a round table; and what is a round table that is led? I am supposed to lead something. For those of you who are totally ignorant of such exceedingly technical terms, let me tell you that that means that I am here not to tell you anything, but you are now to have your innings and to come back at these learned gentlemen and tell them—well, just tell them. I mean, tell them what you think about it. Now that is going to be a very difficult thing for us to do in a square room like this with square people sitting in front, and so on. But I think perhaps we can manage it.

We have had two very remarkable addresses. Old and bored to death as I am at all these educational things—of course anyone who is at all educational in his occupation gets rather bored at hearing other people talk, you know—but old and seasoned as I am, I must confess that I have never heard two addresses quite so fundamental, quite as challenging, as these two addresses. Both Mr. Whitney and Dr. Rugg were giving us pioneering ideas, ideas about a new kind of education—Mr. Whitney, with his philosophy of the adventurous life and of education, serving the purpose of putting us into the adventurous life in a reasoned, in a controlled way; and Dr. Rugg accepting that and going further and asking the question, "What is an adventurous life; what is the adventure about?" And then taking us into this fascinating new region of American and world life that is the region that goes way beyond the traditional, utilitarian concept of things, and takes us into a sense of something far more fascinating, far more beautiful than life may be. You remember his startling sentence that at a certain time the philosophy of education had to make a right-about-face, and the philosophy of education is making that right-about-face.

Now the discussion that I should like to be able to lead, if you will cooperate, really centers upon this question; granting that we are entering upon a new educational era, that with the world we are passing into something new—not that education has gone off on a nice little jazz party by itself, but that the world has changed, and that education has to change with the world. Now granting that, and that the philosophy of education, the fundamental concept of what the whole thing is about, has to make a right-about-face, I am wondering whether you will agree that both these gentlemen have said the final word, or have said the adequate word. I wonder whether there are perhaps dissenting voices in this audience. What really is education for as we see it today?

Now I should be very glad, if any of you have ideas about this, to have you speak. Perhaps it would help us if you would rise from your chairs, and in

order that this shall get to the larger audience, because millions and millions and millions of people are listening to us now, I shall repeat the gist of what you say. What about it? Are you all in agreement that the matter has now been settled and that we know what education is for? Who will be the first? Well, what is it for?

MRS. BURTZ (Peekskill, New York): To live life in the fullest possible way. No teacher can be satisfied in putting things inside; they must bring them out. You must fit your teachers to meet the needs of your class and the individual members of it.

PROF. OVERSTREET: The answer that I got was that education should be for the fullest possible life in the individual, and should not be simply a matter of learning lessons. There is one point of view—education is for the development of the individual personality and not simply for the learning of lessons. And therefore the training should be an individual training that pays attention to the individual, unique, qualities of a person.

MR. JONES: It is not education that you get through with but something that gets through you.

PROF. OVERSTREET: There is an epigram. Mr. Jones makes an epigram, yes; will someone make a speech?

MR. KNOELKE: I happen to be chairman of the Safety Commission of Milwaukee. I am not going to make a speech, but my thought is this, as I hear Dr. Rugg now and have heard him before, he loves to tell about education as a three-fold sweep, educating for a living, making a living, living with one another and living by one's self. I think you will admit that.

Now I think, as members of a group that are in conference on safety, we need to remember that that second point should be stressed. I am in hearty accord, as I feel that education should be an outpouring rather than a compression. At the same time we can't have any real individualization without a certain amount of socialization, living together, and it seems to me we ought to express that in the case of the work along safety instruction, in the case of a particular phase of this education.

I find great difficulty in trying to get people to regard the rights of others. In this consideration, in letting them know they have privileges which they are bound to express in wholesome, purposeful activity, I think that we need to remember, as educators, that there is such a thing, even in this day of free expression. There must be a certain restraint in the matter of deferring to the rights and privileges of others.

And in connection with safety I just want to call that thought forth and see what reaction that suggestion receives.

PROF. OVERSTREET: Mr. Knoelke objects to jargon and suggests that too much stress may possibly be laid upon the development of the individual in his unique individuality, and that attention must be paid to the fact that we live in a social world and the individual must be trained to live in that world with full consideration for others, so that group life may be successful.

What are we going to say about that? This certainly brings in the safety side of the issue and perhaps will enable us to take up Mr. Whitney's point, that the safety issue really is the integrating issue about which our educational objectives will be ranged.

Is there any further suggestion?

MR. CARLSON: I am not a teacher, simply a merchant. My idea of education is that it should teach children to think, and to think interesting thoughts.

PROF. OVERSTREET: Mr. Carlson says he thinks education should be for the purpose of teaching children to think and to think interesting thoughts. Who will rise to that challenge? There are two challenges now.

MRS. BURTZ: Education is for the purpose of a reasoned life of adventure. I suppose learning to think is part of the reasoned life of adventure.

MR. CARLSON: I should add to that, to carry the thought into direct action.

PROF. OVERSTREET: Have we overstressed the matter of the development of the unique personality of each individual? Have we understressed the fact that children have to live together in a world in which they must show consideration, in which they must know the people around them, and perhaps contribute to the common welfare of the world in which they live? Has that been overstressed?

MISS. RIEGER: I don't think it has been overstressed, but I think school teachers find it difficult to be able to emphasize it in the classroom. There are many problems and the time allotment is not sufficient to bring out the individual differences among all the children in the classroom. As a rule we have such a big curriculum to go over and so much ground to cover, that it is impossible to give 50 children in the class the actual individual time they need.

PROF. OVERSTREET: Miss Rieger suggests that the individual progress has not been overstressed; quite the contrary, as a matter of fact, that mass production in the schools—I suppose one could use that term—has made it quite impossible to pay any attention to the uniqueness of the individual, and so we have neither served the individual nor have we served the group. Would you agree with that? I mean to say, that neither has been accomplished?

MR. NOBLE: I think that in safety education it must be a matter of group consideration. If it is just education, per se, then we can think of the individual. But on safety education we must think of group work, because if we were an individual on a foreign isle there would be very little cause for safety work, while here in the city we must not only consider ourselves but others, and safety education that way would be greatly enhanced.

PROF. OVERSTREET: Mr. Noble suggests that safety education is really the point of approach whereby we may secure what was suggested in the way of group education. That is, safety education is essentially concerned with the individual in his group.

MR. SUTRO: Our worthy chairman would tell you that we have 1,250,000 children to teach in this city, with classrooms running up to 60 children or over.

If you want to get any results from this afternoon's conference, what is the practical result of this whole teaching? Shall we go back to the little red school house where each child can be individually taught? That would be impossible; the economic question would prevent that. And I would like to get the consensus of opinion, as far as possible, from the standpoint of the large city where we have millions of children to teach. I would like to hear from somebody. I am not able to give the solution myself as to how to teach the children so we can get the best out of them. It has been said that group teaching is necessary. We know that we are forced to that whether it is the best or worst method—I don't know. Some people claim that if a child wants to learn, he can. They cite Abe Lincoln to show how he learned, and they seem to think that no matter how careful you are to individualize, you will not get exactly the same result—this is not my opinion—as you will by group teaching, to educate the child to think as far as he can and to learn and develop his own mentality.

I would like to hear from somebody on this angle, if possible.

PROF. OVERSTREET: Mr. Sutro is asking a question. He paints the picture of the difficult situation we have in a city like New York, for example, with its millions of children and regimented classes, and he wants to know how we can teach so as to get the best out of each student.

Of course, before you take up that, may I suggest that what we are trying to discover this afternoon is a rather difficult thing. What are we trying to educate for? What is the whole thing about? Then it may be possible for us to know how to do it. Is there anyone who wants to answer that question?

EDWARD STAFF: May I be allowed to say that I am not a learned person, but I would like to say this—we are losing sight of the fact that society, in working for this education, has a purpose in view. It is perfectly well and fine to try to individualize a person, any person, child, grown-up, adult, or anybody else, but society, in going through all these pangs, I take it that the purpose it has in view is to make this person or those persons as valuable adjuncts as possible to the community in every way. Outside of that, and past that point, this person may be individualized, but until he reaches that point he must be taught according to the concept of society, in such a way that he will be a valuable adjunct to the community.

PROF. OVERSTREET: This gentleman makes the point that the object of education should be to make the individual a valuable adjunct to society. Now shall we let that pass unchallenged or shall we say, "What do you mean by valuable adjunct to society?"

MR. STACK: I am also an unlearned gentleman. I am a supervisor of secondary schools. I want to tell you just a few things because I think the whole secret of these things that you have been talking about today strikes particularly in the secondary schools, in the junior and senior high schools—and they give us a great deal of trouble. We know, in Johnstown, that just ten per cent of our boys and girls will go to college, but we also know that some 30 per cent of our girls will go into home life within a few years; and in five years some 50 per cent are married. We also know that some 25 per cent of our boys and girls will go into industries of our commercial establishments in our city. Therefore, I believe that all of this material that you are giving us is heartening to us, because instead now of thinking of our high schools wholly as the preparation for college, we, in our domestic arts courses, in our music, in our commercial courses, in our home baking courses, in our extra-curricular activities of various kinds, in our assemblies, in all of this safety work, are trying to give real life experiences. And so our secondary school curriculum is rapidly changing, and I believe there is coming a day when many of these home experiences, many of these vocational experiences to which you are listening today will become a part of the curriculum, so that our boys and our girls will be better home-makers, workers in the city, and the life in which they are engaged, better workers in their vocation, with a better appreciation of music and the fine arts, rather than the emphasis purely upon the college preparation.

PROF. OVERSTREET: Mr. Stack makes the statement, first, of the rather significant fact that only about ten per cent of the students in the high schools go to college; 30 per cent of the girls go into home life and 50 per cent marry. He didn't say what becomes of the remainder.

MR. STACK: That is within five years.

PROF. OVERSTREET: Some of them become school teachers. At any rate there is here the serious point that education should not be for the ten per cent; it should be for that larger number who go into the issues of life, either in the home or in industry and what-not. And he welcomes the fact that particularly through this safety education movement, the educational activity has become integral with the life activity. He welcomes that as one of the great advances in education.

MR. GOLDBERG: I think that the trouble is due to the fact that we baby our children too much in the schools and in the homes; we do entirely too much for them. When we help them day by day and take them across the street, lead them by the hand and keep them out of dangers, we are not doing them any favors at all. From the time that they are very young they should be given a chance to find out what they can do and to learn by their own experience. The ones who are hurt are probably, if we could investigate it, the ones who have been taken by the hand and have had everything done for them in the schools and in their youth. We do

entirely too much for them; they are babied along and that is where most of the trouble lies.

PROF. OVERSTREET: Mr. Goldberg suggests that we baby our children too much and the children who get hurt are probably those who have been taken by the hand and led across the street, until one day the hand was absent.

Mr. Whitney made the point earlier in part of his paper when he said—is safety education simply a sort of little extra thing thrown into the curriculum, or is it true that through safety education we develop a very fine kind of character in our children? Now I wonder whether we could pursue the point you made, Mr. Stack, and ask ourselves—are we getting more integrally into life situations with our children? Are we, through this attention paid to the safety matters, really developing a fine kind of character in our children? I happened to see as I was sitting here these placards: "Do It the Right Way." If you don't do it the right way, something happens. Any old stick won't do; you have got to have the right kind of stick. "What Will Happen When the Door Falls In?" If you don't have your door properly put on, something is going to happen. I just want to throw this out as a challenge. All those seem to be scientific statements to me. We have science in our schools, but why isn't this science: "Do It the Right Way." If you do it the wrong way you don't get the results. Is safety education a way of teaching science, and teaching science by actual manipulation of the life processes? "Don't Leave the Brake Handle Like This." That isn't the scientific way to leave a brake handle. "Don't Get Out of the Left Side of Your Automobile." That is the scientific way to die, but not to get out of your automobile.

Now I should like, rather, to see that question taken up—Is safety education a way in which we are now developing the scientific-mindedness of our children by actual application to life situations?

MR. KNOELKE: I think that your question resolves itself into two parts, the first of which is—Where do we plan to go with education? And the second—Does safety work, as it is being done in the schools, contribute?

I should say that if we accept, just for the sake of having a motion before the house, the usual objects of education that are given, health, vocational aptitude, the three R's, and citizenship as the fourth, and the aesthetic training—if you accept those as being guiding directions, whether they are absolutely perfect definitions or not, if you accept the direction indicated by those objectives as worth while, I want to point out that the lower order of those objectives—and I call them lower not because they are less important but because they come lower down in the scale—that is, citizenship, worthy home membership, aesthetic training, and preparation for leisure, if you take those four particularly, I believe your safety education does indicate tremendously how those things can be better achieved by causing people who are being, I will say, subjected to the present method of educating along that line, by telling them just how these things can be attained.

Citizenship—obviously I needn't go into that. Worthy home membership—by having the older boy or girl take care of the baby sister. Aesthetic training, surely, by being considerate of the rights and privileges of the weak, in crossing the street, for example. And preparation for leisure, surely, in that you regard your leisure time as something of more import than merely lowering your vitality in preparation for the next day's work.

As we are doing it at Milwaukee, I believe that the lower range of objectives is being very definitely aided in its attainment through safety education, and for that reason I think safety education worth while.

I submit that as an answer to the question submitted.

PROF. OVERSTREET: Mr. Knoelke makes the point that safety education becomes the central, integrating force in education. That is, if one takes citizenship, and cooperation in the home, and preparation for a life of leisure, and preparation for the aesthetic life as four of the objectives of education, each one of these is

furthered by safety education. Obviously, citizenship, because one is, I suppose you would say, not a good citizen if one is making possible the wrecking of the lives of others, of making possible the devitalization of one's own life. Preparation of citizenship, then would depend very largely on safety education.

Preparation for the aesthetic life, surely—consideration for others, and so on.

Preparation for home activity—the older boy taking care of the younger.

And preparation for leisure—no devitalization for the next day's work.

MR. SHERRARD: I have been much interested in this discussion and it seems to me that there is a great ethical background and social background in this work in safety in our schools. In the Pittsburgh schools we have perhaps 40,000 children who have taken the following pledge, and I will just take a minute to read this because I hope you will see what we think is the ethical and health side of this socializing work of safety.

I will work for the safety of others as I would want them to work for my safety. I will not take unnecessary chances for in doing so I may lead into danger a younger child who is not so well able to take care of himself as I am. I will do my part to reduce the number of accidents in this city this year. I will try to take care of my health and be clean in thought, word and deed. I will try to do right at all times, telling the truth and respecting the rights of others. All this I will do for the sake of humanity and for the honor of my school.

And just this last week I was called to an elementary school for the installation of officers, and there the boys and girls, without assistance, or with only partial assistance, had picked out the leaders of that school to be president and vice-president and secretary of this year's safety council.

I think it has a vast influence on the ethical training of our children.

PROF. OVERSTREET: This, it seems to me, is getting rather fundamental. Safety education is not a little thing on the outside but is the center of the whole thing, because here we are getting an ethical point of view in education and teaching ethics not by maxims or prescriptions, or, as Mr. Whitney said, by proverbs—thou shalt do this, or that—but teaching ethics in terms of actual, living, human relations.

MR. SHERRARD: May I say, before you read that for the radio audience, that every boy and girl, before he gets a safety button, has to commit the pledge and recite it.

(Prof. Overstreet repeated the Safety Pledge for the benefit of the radio audience.)

PROF. OVERSTREET: I suppose that has a very direct bearing on the points made, that while education should be for the development of the unique personality of the child, the very development of that unique personality means that the personality is being used in the service of humanity in the midst of which the child lives. And so we combine the individual and group objectives of education and give it a thoroughly ethical foundation.

It has been suggested that you might want a little vacation before the play comes on. We have had a number of points of view presented in this square round table. It has gone—very much better than I expected. I think it has gone rather nicely.

At any rate, I wonder whether we can simply sum it up by going back to Dr. Rugg and Mr. Whitney and agreeing with them that somehow, education is for the sake of training human beings to take their place in life. And what is one's place in life? Life is an adventure. It is not an adventure that is to be entered into haphazardly. It is not an adventure that is to permit any kind of capricious adventure or impulse to wreck it. It is an adventure that has to be entered into with understanding. And the business of life therefore is to be in this adventure,

and when we are in the adventure we don't want any accidents, as Mr. Whitney says, to wreck the adventure.

And so the very essential point of view which we must start in life is to see that we understand the conditions of life. To use the wrong kind of wood; to have the door hang the wrong way; to drop things from a four-story window; all of that is not facing life conditions as life conditions are.

So that the fundamental of education, then, is a positive thing. It is not simply learning from books, as has been suggested. It is rather getting our youngsters ready to enter upon something that is a thrilling enterprise, and that thrilling enterprise requires all the power of our scientific insight, and requires all the fine humaneness in which we pay consideration to the rights and the welfare of others.

Now from that point of view it looks as if the last shall be first, doesn't it? It looks as if this, which came into education as a little bit of sort of interloper, almost, hardly claiming any right in the curriculum, becomes the very center or the integrating center around which the objectives of education shape themselves.

Well, I am not so sure that we have settled anything, but it has been rather nice to talk together, and now Dr. O'Shea wants to say something.

CHAIRMAN O'SHEA: I am well advanced in years, but I find I am not too old to learn. There were some thoughts expressed here this afternoon which I think are valuable. To be practical about this matter of safety, we, here in New York, think that it is wise to give advice to children. As you train the twig, so we train the child. We give them certain pieces of advice with respect to crossing the streets; we give them other kinds of advice and furnish them with power. And in the regular work of the class we teach them how to study so that they will be independent of individuals and will have the advantages of a training that will enable them to eventually launch out for themselves, and not have the crutch by them all the time.

It is often said that the proof of the pudding is in the eating. The kind of training we are given here in New York, and Mr. Whitney will support me in this, is the kind that has shown continued progress so far as the saving of children's lives is concerned. I believe in advising children; I believe in giving them the helping hand at the beginning. I believe in playgrounds offering facilities which will enable them to spend their leisure time profitably. I believe in teaching boys and girls the kind of work that will enable them to spend their leisure hours to their own profit and advantage and the advantage of society.

A. W. WHITNEY: I want to speak about the play, but before doing that it occurs to me to back up what Superintendent O'Shea has said. I don't know whether these facts have been brought out, but they are very interesting facts, that in spite of the rapidly increasing population of New York, in spite of the rapidly increasing congestion of the streets, there has been a steady decline in the accidental deaths of children in New York since 1922. In other words the accidental deaths of children are going steadily downward, and everything else is going upward, including accidental deaths of adults.

Now at four-thirty there is to be a play given right on this stage; this is the setting for the play. It is to be given by the children of Public School No. 45, in the Bronx, of which Mr. Angelo Patri is principal. It is under the supervision of Mrs. Mabel Foote Hobbs, consultant on community drama for the Playground Recreation Association. Mrs. Hobbs and Mr. Patri and their assistants are doing a very, very lovely thing which you can't afford to miss.

(A fifteen-minute recess was taken which was followed by the presentation of the play, "The Lost Camping Place," which has been published and is for distribution by the Education Division, National Safety Council.)

ADJOURNMENT

October 5, 1928

Safety Patrol Rally

CHARLES H. MacCALL, Chairman
Director of Attendance, Public Schools, Newark, N. J.

The Safety Patrol Session convened at two-thirty o'clock, Mr. A. J. Van Brunt, Director of Safety Education, Public Service Corporation of New Jersey, presiding.

MR. VAN BRUNT: To me has been assigned the duty of telling those of you who do not know, what this is all about. In a small way it was intended to represent the daily experiences that you have on the streets, and we wanted to point out to you that the toll of life and legs and arms and feet was greater than it would be if you all did obey traffic.

The pedestrian is not getting the blame for the lack of traffic observance that the automobile driver is and in my estimation maybe there are cases where they are much more to blame, so that the Safety Patrol boys and the policeman are there for your assistance, and if you will only help them, we will cut down the accidents not only in this wonderful city, but also over in Jersey.

I want to introduce Mr. Charles H. MacCall, the Director of Child Welfare of the City of Newark, state of New Jersey, who will act as the Chairman.

CHAIRMAN MACCALL: As Mr. Van Brunt has so aptly put it, this little stunt that was carried on was intended to bring individually to your minds the dangers that every school child is brought face to face with every day. The actual work and this demonstration, were performed by Safety Patrol Officers who are doing that sort of thing on the public streets in and around school houses every day in the city of Newark. They are caring for 100,000 children four times each day and in eleven years we have had no accident to any school child while the public school Safety Patrol has been on duty. I think that is a record of which we may be very, very proud.

As chairman of this meeting it doesn't devolve upon me to make any extended speech and, therefore, we will go on with the program. The first number on the program will be a selection by the DeWitt Clinton High School Band.

(The DeWitt Clinton High School Band played a selection.)

CHAIRMAN MACCALL: It now gives me great pleasure to introduce to you a man who has been accustomed to welcoming royalty, queens, kings, princesses, dukes, and all that sort of thing, tennis champions, and even prize fighters. We all know him all through the country and we all love him. It gives me great pleasure to introduce to you Commissioner Grover A. Whalen. He is of the Mayor's Committee on Reception to Distinguished Guests of New York City.

Address

By **GROVER A. WHALEN**

Chairman, Mayor's Committee on Reception to Distinguished Guests
New York City

After an introduction of that kind it is rather hard to live up to it, but it makes me feel that today I am welcoming and facing the future kings and queens, only of America, and not of the rest of the world.

Somebody said that we were playing against Lindbergh today in that he is giving a talk at another hotel on something along the same lines, and I told our

Chairman that we weren't out of luck; we were just playing against loaded dice, and we boys understand what that means. It means that we just simply couldn't beat Lindbergh at an audience if we tried, no matter how interesting, but it is splendid to see so many of you young folks here interested in something so vital to the nation and, after all, we ought to begin to think of our young people very early in life so that they can make their contributions to the progress and prosperity and to the safety of the nation.

Boys and girls should not take chances. You might say to me, "Well, Lindbergh took a chance when he flew from New York to Paris, and the world has acclaimed him ever since." Yes, but Lindbergh took a justifiable chance because his chance was in the interest of science. He was a pioneer of the air. He was justified in taking every reasonable, or even an unreasonable chance to accomplish what he set out to do, so that when you take a chance in crossing the street at an improper time, you are not taking a Lindbergh chance. You are taking a chance that is not justified. Lindbergh could not have succeeded to the great heights to which he has risen today had he taken unnecessary chances in his youth. Any chance that he took was in connection with the advancement of a new science that deserved even the sacrifice of life that it might prosper and that it might continue to bring benefits to the rest of mankind.

Safety drives and safety congresses are good for all of us because they focus public attention on something that we are very apt to forget or think very little about during our everyday life. It used to be that it was the Good Samaritan who would provide safety features in business life. Today it is good business for industry to provide safe machinery, safety in food, and safety in wages. All those factors enter in very much to our everyday life of a community and so we find that the question of safety is one that interests everybody.

It interests the child. It interests the youth. It interests the grownup, and it interests the old folks, as well as interesting business and industry generally.

Statistics are very dry, I know, but sometimes they bring home to us very definitely the seriousness of it all. I am reminded that in the past year somewhere in the neighborhood of 20,000 children sacrificed their lives through accidents. What a frightful toll that is! How terrible that we should have lost from our population 20,000 of our prospective citizens! It is too great a toll for any nation to pay, even the United States of America.

Anything that you may do, and you can do much, to prevent accidents, needless accidents, is making a real contribution to our everyday life.

When we realize that aside from the children there were almost a hundred thousand people who were killed during the year from accidents, we realize further that it is even beyond the children's stage and goes into the life and daily work of our community and then when I think further that beyond the deaths, those that were fortunate enough to have accidents and not pay the supreme sacrifice—there were 10,000,000 injured in the United States during the past year, we realize how enormous a question confronts us today.

Newspapers have been interested to a certain extent in the proposition, but not to as great extent as we would like to have them.

I am reminded of a newspaper campaign that took place a short time ago in Brooklyn where there was a Golden Rule Campaign inaugurated for the safe operation of automobiles.

That took birth through the instrumentality of a very patriotic publisher in Brooklyn by the name of Mr. Paul Block, and through the columns of the *Brooklyn Standard Union* some eight thousand men and women in industry gathered and pledged their support to a campaign that had as its result a very material reduction in the accidents in Brooklyn during the progress of that campaign.

What does this indicate to us? It shows us very clearly that while public attention is centered upon the subject, some real progress in the prevention of accidents

takes place and the moment we forget about the subject, we become careless again.

Remember that in law there is a basic principle where the law of negligence operates, that the injured person must be free of negligence. If the person injured is not free of negligence, he has no means of redress. So that you, too, in your walk of life must be free of negligence if you intend to make any contribution to the great safety movement that we are all so much interested in at the present time.

I don't know of any subject that should engage our attention every day in the week more than this question that we are all so interested in. We all hope that as a result of this conference great good will be accomplished in many ways.

The other night some of us had the pleasure of listening to a talk from Dr. Rabbi Wise and he demonstrated to the entire satisfaction and to the great pleasure of the audience that was present at the Hotel Commodore, that safety begins with the human being, begins with the soul, and he developed an idea there that the priests of all religions had been in a safety drive campaign from the very earliest times and their success along that line has been demonstrated by the splendid humanity, the splendid governments, the splendid conditions that we now find throughout the United States and other parts of the world.

So that we find that in every phase of life in our religious phase, which is taken care of by the priests of all religions, we find that there have been safety drives conducted there. The safety drive in that particular sphere for the soul, and we should be interested primarily in the drive for the protection of the body. That is our job today and I don't know of any group in a community that can be more helpful than the teachers and the pupils.

After all, we don't always tell the teachers what we should about what we think of their work, what great contributions they are daily making to our common one and not always receiving the proper amount of praise and commendation. I don't know of any profession that is deserving of more kind words and approbation than is the teaching profession and I often wonder if the boys and girls of our public school system and our private schools realize the great debt that they owe to this fine group of men and women who are making daily sacrifices and imparting knowledge that is to be of benefit and advantage to the pupils in the school systems.

I know full well that if we have our school children center their attention in essays or in other fashion upon this subject that we will get much of interest and benefit from it and if I dare to make a suggestion today, it would be that the supervisors of our schools, of our children, if they have not already done so, adopt a program of writing an essay on the subject of safety, what they think of it, how they think the children of our city can make their contribution towards that end.

I wish to congratulate those who have had charge of this Congress to take care of some thousands of people, I think ten thousand attended this Congress, and to have them come in to a city such as New York with such ease and safety, and with such comfort as I understand that they have all experienced—it has been a job that has been really worth-while and it has been well done, and with great intelligence.

I know that the city itself has contributed in every way possible to assist in this movement and I am sure that through its Mayor and all the way down through the line of municipal offices that the Congress will always find a great helping hand in New York.

His Honor, the Mayor, was frightfully disappointed that because of pressing official duties he was unable to be here today, but he had hoped to come here and talk to you boys and girls personally, because he wanted you to know of his personal interest in this great work, and if I should leave a message with you at all today, it would be for you to continue your interest in a subject that is not the

other fellow's business, but it is your business and my business, not the business of just once a year to give an occasional thought to, but it is a subject that should engage your everyday attention.

I am sure that this has been a pleasure for me to come here this afternoon and to have this privilege of saying a word to you.

CHAIRMAN MACCALL: I am sure we are all very grateful to Commissioner Whalen for being with us and bringing to us the welcome of New York City and for his inspirational address. I might say for his benefit particularly that the teachers of this community, particularly around the Metropolitan District, are interested in the safety of the pupils to such an extent that they do have compositions written and they do have regular safety curriculum in the schools.

Before we begin the next item on the program, I want you all to consider yourselves as part of a public school auditorium; that is, that you have been assembled from your various classrooms to witness a demonstration of the Safety Patrol operation, and this demonstration will be under the direction of Officer John L. McBride, Supervisor of Safety Patrols, Trenton, N. J.

Remember that you are all children, and the first speaker to whom you are going to listen is Officer Harry Gurley, Director of the Safety Patrol, of Paterson, N. J.

Demonstration of Safety Patrol Operation

Under Direction of JOHN L. McBRIDE
Supervisor of Patrols, Trenton, N. J.

OFFICER HARRY GURLEY: Good afternoon, Boys!

Boys: Good afternoon!

OFFICER GURLEY: Boys, we are here this afternoon to perform a very important duty. Several weeks ago I called around to your school and in conference with your Principal it was decided to organize in the school a Safety Patrol. Entirely too many accidents have been happening to children while on the way to and from school. It was thought that the lives of the children could be saved by such an organization in the school.

You boys have been selected by your Principal, he tells me that you are up in your studies, your marks in deportment are very good, and he says that you boys will not only be a credit to the school, but a credit to the community. He has also told me he thinks you are the type of boys who will be willing to make a sacrifice of an hour of your play time each day for the safety of the children in your school. Is that right?

Boys: Yes, sir.

OFFICER GURLEY: I am glad that you boys have been selected. You are a very likely-looking group of boys. I hope when the school term has passed that you will be able to go back to your Principal and say that you were everything that he recommended you to be.

We are going to organize this patrol this afternoon and I wonder if you boys have given any thought to the Safety Patrol work or just what you are expected to do in this work. Have you any questions to ask?

Boy: Officer, are we supposed to stand in the street and stop the traffic, or stay on the sidewalk?

OFFICER GURLEY: You are to stand at the curblin. Your first consideration is the child at the curblin. You stand at the curblin and hold the child there until there is a break in the traffic and the path is clear for the youngster to pass.

Boy: What are we to do to the boys and girls who do not obey the school safety rules?

OFFICER GURLEY: Take the name of the girl or boy and turn it over to the Principal or teacher of the school. Are there any other questions?

Boy: Are we allowed to stop any children crossing any other points of the street?

OFFICER GURLEY: Absolutely. The cross walk is the bridge that crosses the river of traffic and that is the place for the children to cross.

Boy: Are we allowed to stop children playing on the street?

OFFICER GURLEY: The street is death's playground. If the children are out to play, they should play in the school playground, the public playground, the back yard, or on the sidewalk; never in the street.

Boy: How are we to report a boy for damaging school property?

OFFICER GURLEY: Take the name and turn it in to the principal of the school.

Boy: What would we do if a car sped swiftly by while the children were passing?

OFFICER GURLEY: Take the number of the car. See that it is turned in to the officer in charge of the Patrol. Are there any other questions?

Boys, you have been selected for this work and in order to carry it on, we ask each and every boy who takes up the Safety Patrol work to repeat the Safety Patrol Pledge. I will ask you to arise and repeat the pledge after me.

(The boys arose and, with their right hands raised, repeated the following pledge:)

"I promise on my honor that I will do my duty to God and my country and to obey the laws, to work for the safety of the pupils of our schools as I would want those appointed to safeguard our city; to work for my safety and the safety of my family and friends; to try to protect myself and those with whom I come in contact from the risk of unnecessary chances; to keep myself clean morally, mentally, and physically by being honest, trustworthy, loyal, helpful, obedient, and brave, and to do my part in helping to reduce the number of accidents during this year; by my example to make my school a model one for safety; to faithfully perform the duties as outlined for a Paterson School Safety Patrol Officer."

OFFICER GURLEY: Remain standing, please.

(Officer Gurley invests boys with their Safety Patrol badges.)

OFFICER GURLEY: Boys, you have made a pledge to try to make your school a model one for safety. That means it will be necessary for you to report at the school building or your post each morning just thirty minutes before the children are expected to be in the school building. At noontime at dismissal, you are to be at your post just a minute before the children are dismissed from school and stay at that post until the children have crossed and go on their way home from school. That means that you will be making a sacrifice of one hour each day of your play-time and remember that it is your duty to consider the children in your charge, that you are not to get out in the center of the street, that your place is on the curb and you are to stand and guard the children with outstretched arms until there is a break in the traffic and the coast is clear for them to cross the street.

The accident reports show that a great many of the children of grammar school age, especially, who are injured, are injured by starting out into the street.

If you do nothing more than stand at the curbline with your insignia on your arm, that will be a reminder to the boy or girl just after leaving school of just what you represent, that you are a member of a safety organization and a member of the school Safety Patrol and it is your duty to stay at that point and see that they do not cross at any other point than the cross walk and only when the path is clear for them to cross and they have been given the signal by you to do so.

Do you all understand that?

Boys: Yes, sir.

OFFICER GURLEY: Let's see how well you can carry on this work so that when the end of the school term rolls around, your principal will be able to say to me, "Mr. Gurley, we have gone through the term without a single accident in or around or about the school." Do you vote "Aye," or "No"? Let's see how you can get up and march off the platform.

(The boys marched off the platform amid applause.)

OFFICER GURLEY: This is the way the Safety Patrols are organized in our schools. A motion picture will be shown later showing just the kind of duty that the boys do on the public highway.

CHAIRMAN MACCALL: Now you will please remain still as pupils assembled in an auditorium, this time to be addressed by a Director of Public School Safety Patrol, who will tell the children just what to do and how to do it in order to be safe at all times.

Officer John L. McBride, Supervisor of Safety Patrols of Trenton, will deliver that address to the pupils.

OFFICER JOHN L. MCBRIDE: Mr. Chairman, Boys and Girls: In September of this year there came into existence in New Jersey a new traffic act, a reconstructed traffic act. Among other things, this act provided in particular a section concerning children begging rides from the roadway, saying that that shall not be allowed. That is prohibited. It also provides that unloading from automobiles at any other points than the curb shall be prohibited and throwing bundles from automobiles while in motion shall be prohibited. This applies particularly to you boys who deliver newspapers at the busy thoroughfares in the downtown district.

In making this traffic act, the committee spent a lot of time and a lot of effort was given to it. In addition to this your Police Department is charged by the Director of Public Safety with carrying on an active safety campaign during the entire tour of his duties each day. In addition to this, the school authorities of your city have charged the principals and teachers to make mention in their classrooms of the different items of safety that you should know. Further in addition to all this, we have around your school a Safety Patrol organization.

Now all this effort, all these agencies, and all this thought is directed at but one thing, that of accident prevention. Are we doing that? Do the police records show that there are no more accidents? In my opinion they do not, and you, too, know that they don't. We have but to analyze the police record of last year to prove that accidents are occurring on our streets with startling rapidity.

Let's look at the accident report for last year for our city. Let's assume that every accident that occurred during the year of 1927 occurred yesterday about four o'clock and every person injured in these accidents had been taken to a big hospital and placed in a large room. They have been placed on cots and the cots have been divided into groups according to the manner in which they received their injuries.

Here is what we will do today. We are going out to that hospital and look at those people and talk to them and ask how they have received their injuries and while we are asking these questions, we will check up on ourselves and ask if we have committed these offenses that have taken these people to the hospital and if we have, we will make our minds up that from today on we will stop or we will get a ride in the police ambulance. We will also check up on this phase of our conduct and ask ourselves if we have stood idly by and watched a little boy from the first, second, or third, or fourth grade dart out into the street between parked automobiles. We are going to ask ourselves if we stood idly by and watched them perched on the top of a new building and would make no effort to instruct them to stop the bad habits that lead to the hospital.

As we enter the hospital there is a group of five people who were brought in because they were struck by boys who carelessly rode bicycles. Every rule of the road that applies to the automobile applies also to the bicycle. The bicycle rider

must obey the signals just the same as the automobilist. He must not exceed the speed law and he must refrain from riding with his feet off the pedals or his hands off the handlebars, and he must not carry another boy on the handlebars.

Such an accident occurred at the corner of Market and Broad three months ago. Market and Broad are situated about the same as the crosswalk marked out here on the floor. A boy was coming down the street on a bicycle. He wanted to make a lefthand turn and go in that direction. There was an automobile coming in this direction. Wanting to go straight across the intersection. He gave the traffic officer a signal indicating that the boy on the bicycle should go ahead. He failed to give the signal that he wanted to turn and the result was that when the whistle blew and the traffic started in the direction they wanted to proceed, the bicycle started across the path of an automobile and he was struck by the automobile. The man in the automobile became confused when he saw the boy lying on the bumper of his car and his car shot across the street to the opposite sidewalk where a man and woman and child were waiting to cross the street under the direction of the traffic policeman. The little girl and her mother were crushed against the rear of a taxicab standing there and the little girl was killed. The automobile then made another sharp turn and shot across the street and the boy resting on the bumper received a broken leg against a telegraph pole. There were three people seriously injured and one of them killed. Why? Because a boy failed to realize that he must give signals when riding a bicycle. Does that stress the importance of obeying the rules of the road?

The next group in the hospital consists of twenty-six people and we find that every one of them is over the age of forty. They are the people who fell on the sidewalks and they fell in a great many cases because of the carelessness of children, because they failed to use the cans that are provided for trash around the schools and threw apple cores and banana peels on the sidewalks. Don't forget also that in using the cans provided for the remnants of your lunch, you keep your school clean and tidy in appearance and reflect credit on yourselves.

Then we have another group of twenty-six people, all over forty, and they were injured in the collisions of automobiles, and they were injured because men drove cars with defective brakes, drove them while intoxicated, or without giving the proper signals, in disregard of the speed laws, or exceeded the speed laws in turning corners and at street intersections. They drove their cars in such a reckless manner that these twenty-six people were taken to the hospital.

Why am I telling of this carelessness? So that when you go out of your school today to cross the street, you will remember that you don't know whether the man crossing down the street is a careless fellow or not, but take it for granted that he is and let him get by before you attempt to cross the street, and don't forget your little brother.

Next is a group of 367 persons. They are the pedestrians struck by automobiles going back and forth to school as you do each day, and in the case of the children, they were struck because they crossed improperly, hitched on back of vehicles, played in the streets—the most glaring example of that crossing improperly comes out in an accident that happened about three months ago. A little boy came out of the Cook School from the kindergarten to the corner of State and Oak Streets. It was necessary for him to cross the street at that point and we had a fireman stationed there, but he failed to cross right there. He skinned around the building to the center of the block and from there he rushed off the curb between two parked automobiles and was struck by an automobile and was instantly killed. Had he continued on to the next corner he would have been assisted across the street by the Safety Patrol boys and a uniformed policeman, but he failed to do that.

Perhaps he was afraid of a policeman and perhaps he was afraid of the fireman, and so I want you to carry this message to those little folks in your neighborhood, that the policeman is your friend and if they have any problems in regard to

safety in their neighborhood and home, they should take them to the policeman. He wants to be their friend and he will help them. He doesn't want them to leave the corners on which he is working and go to the middle of the block to cross the street.

In connection with hitching on back, we had several serious accidents so far this year. One boy was hanging on back with a sled and he shot to the lefthand side and was struck by an automobile coming in the opposite direction and he was instantly killed.

A young man of sixteen was riding a bicycle on a straight street and he pushed over by a trolley car taking on passengers and he took hold of the guard rails and with the other hand he held the handle bars and they started off down the block. He was a pretty big boy and he was supposed to have intelligence; the other boys on the street used to call him a "wise guy." Ahead of him there was a little rut in the pavement and it was too small for him to think of, but that cost that boy his arm. His front wheel struck it and began to wobble. The bicycle slipped. He went over and under the trolley car's trucks which went over his arm at the shoulder. I have often seen him at the gym at Junior High School playing basket ball but now he stands on the sidelines and he can no longer be an athlete. He used to play football and basket ball, but that one little accident has caused him to sacrifice a whole lifetime of many kinds of pleasure on the athletic field.

Is it worth it?

That is why we have a Safety Patrol in your school and ask you to cooperate one hundred per cent with the Safety Patrol. I am sure you are going to do it and to prove it, let's give the Safety Patrol boys one big round of applause.

Thank you, boys and girls!

CHAIRMAN MACCALL: I don't think any of you wonder why the Safety Patrol in the state of New Jersey in the various communities is successful when we have officers like those who have appeared before you and Officer Dunn who conducted the demonstration at the beginning of this meeting.

Now we may resume a state of mind which will be more normal to most of us, the adult state of mind. We have passed out of the school auditorium and we will have the great pleasure of listening to an address by Mr. Lewis E. MacBrayne, General Manager of the Massachusetts Safety Council.

The Safety Patrol—Its Place in the School, the Home, and the Community

By LEWIS E. MacBRAYNE

General Manager, Massachusetts Safety Council, Boston

You know, if Mr. Grover Whalen hadn't gone out, I was going to tell a story for him before I began the address at all.

Always when he is introduced they tell about his receiving and welcoming royalty. This summer I was in London and, you know, the King owns Buckingham Palace in London, but he does not own Windsor Castle. That belongs to the country and there is a written or an unwritten law that whenever the King goes out of Windsor, the public may go in. That rule does not apply to Buckingham Palace. I had heard much of the royal family and I thought I should like to go in the back door as they went out the front door and I got in so closely on their heels that when I went into the state dining room, I found the chairs were around the table as they were left when the family and their guests had arisen a short time before and I asked the old chap who was showing me around to tell me who had been seated at the different places and he did, and there were twenty-two in the party and when he came to one chair, that was pushed back further

than the others and he said, "Well, the Duke of So-and-So sat here and he has a rather nasty temper. He got into a jolly row last night and went home in a huff," so I presume when royalty isn't on an official visit, it is just like ordinary people at home and that is what I want to talk about, ordinary people and their problems and why we have the Patrols.

First of all, the Patrol is just a gesture to arrest the attention of our young people and wake up their minds to the fact that a third of all the automobile accidents in most communities are injuring them. Second, the Patrol is not primarily to prevent accidents in front of the school, because in my state at least, the statistics show that the accidents almost never occur while the boys or girls are going to and from school. Then why Patrols? Well, for two or three very important reasons. First of all, the school is the very important place where we go for training.

In the city of Boston we have in our course under the head of Character Training, citizenship. That means that somewhere in the course of the instruction young people must be shown their relation to the community and what is more important than cooperation with the police department in the greatest problem that the police have today? So the Patrol primarily is to give us instruction in what the officer says when he talks with his hands, instruction in the orderly use of the cross walks, instruction in giving the right of way to traffic when it has the right of way, instruction in self-control, and once we have formed the habit in front of the public or private school, to use the highway as the law requires, then during the hours from four to six, the hours of greatest hazard to young people, we are going to act according to the habit formed and give ourselves protection when we are away from the school.

So I say the School Patrol is justified in every school in every community. It is a gesture to arrest the attention of the young people to the fact that a third of them are being injured, but it goes beyond that and gives instruction in the habits which so many of our adults lack.

Occasionally in the community where the patrol is not in use, some rather crusty old chap in the school department says, "I don't want the boys standing in the street and getting the idea that they are policemen."

Well, it was quite apparent from the instruction here today that that is not the object and that is the type of instruction in 98 per cent of the Patrols, that the boy is not out there as a policeman. In Boston we give him this instruction: We say, "The police have asked your help and assistance. They have not delegated to you police power. You haven't the authority, as the policeman has, to stop street traffic at any time when conditions may warrant it. You are there under the common law or under the state regulations of traffic which say that the pedestrian has the right to cross on a crosswalk and that the motorist must permit him to cross," and so when the Patrol standing on the edge of the sidewalk at the intersection or the crosswalks, says to the motorist, "We are about to cross," he is merely giving notice under the law. "We have been waiting. Now is the reasonable break in traffic. Please give us the opportunity to cross," and in turn he says to the children, "Wait a moment. Traffic still has the right of way. Don't take the chance of crossing," and in due time he stops the traffic and says to the children, "Come along!"

Once we can establish that idea there are certain rights that the pedestrians have, but also certain rights of the motorist, then we shall have accomplished the first part of the problem, but it goes much further than that.

I heard one of the boys inquire about reporting damage to property. I want to tell you an interesting thing that happened in the University in the city of Cambridge across the river from Boston. In the first place we found that to be the most dangerous city in which to bring up a child. The death rate was double what it was in any other city of its size and when we made a survey we discovered

that the hazard of a city may have no relation to the population of the city whatsoever. Here was a city of 150,000 that in volume of traffic had the problem of a city of 300,000 and naturally did not have the police force to meet it, because it was on the main gateway into Boston.

Now in that city a police officer was assigned for this very work and he not only organized the Patrol, but he said, "Let's have a meeting of one group every Saturday morning. We want to keep you boys interested." After he told his story a couple of times, he invited the Fire Department to come in and two or three other people, to give talks of interest and containing information for the boys and occasionally some one of the local manufacturers would give a little theatre party for them and keep the boys interested—a small payment for what they were doing.

Although at the end of the year 200 more adults were injured in automobile accidents than in the previous year, accidents to boys and girls went down to the number of 87 and that wasn't all; not only had these Patrols accomplished the reduction in the face of the increase in grown-up accidents, but \$500 worth of stolen property was returned to the people from whom it was stolen through the efforts of these Junior Patrols.

I asked the officer what he meant by that when he reported it to me. "Well," he said, "the police will find a break occurred down the street here and it is the work of boys and I take it up with the Patrol and I say, 'Some fellow has gotten into trouble. Let's find out who he is,' and the Patrol finds out and the boy is brought in and has a talk with the officer and he is shown how he is losing his rights as a good citizen by doing those things and the boy makes restitution, and instead of being arrested, he is put on parole with that one traffic officer and he doesn't get into court at all."

Here was a by-product of the work of the Patrol that we had not thought of at all.

I am asked to discuss the relation of this Patrol to the home. Well, let me tell you that throughout the country where we have the Patrol, there is a downward trend in the fatal accidents to boys and girls of school age, but there is an upward trend in the accidents to the children under five years of age. That is one of the problems we are going to put up to the Patrols in our state this year. Go home and talk with mother about the accidents to the children younger than school age, because when we take the police reports, we find a child of three, three and one-half, four, four and one-half, and five, sometimes up to seven, but seven out of ten accidents to children are in that group and so the Patrols will find the way to reach the mothers with the information that the traffic-officer is giving as you say in the meeting this afternoon.

We made a study of accidents to old people. If I had a blackboard here I would draw a line representing accidents to old people, starting in October and going up until it reaches the peak in February. We are going to ask the young people if they won't during the months when these accidents are so high, do a kind deed to older people who are confused in their efforts to cross the street.

Some reference was made to Colonel Lindbergh. When I was at the conference in Richmond, someone made this statement, I am not sure that it was not Commander Byrd. He said, "Every time Colonel Lindbergh goes into the air, he does the dangerous thing, but he never does it carelessly," and the reason why so many men who have tried to cross the Atlantic have never been heard from is because they also did the dangerous thing, but did it carelessly, didn't have enough gas to take them across, the machine was only a little overweighted, but when Lindbergh flies, he never takes a chance on any of those safety factors.

Now we are not going to eliminate the danger of crossing the highway. It will be more dangerous next year than it is this or was last. It is a part of our problem in a world of young people to take it as we find it and do the dangerous thing care-

fully because crossing the street or driving the car is always dangerous, but if we perform the act carefully, it makes all the difference in the world.

I believe myself that through the patrol and these other agencies we are developing an alertness in young people that will give us not only a better generation in crossing the street, but in performing the other duties of civic life.

In one of our convention meetings this week a man from the West got up and he said, "I never saw such jay walkers in my life as I have seen in New York." Of course everybody said that was true except myself and the only reason why I didn't say it was because I made a study on a commission in Boston last year and we found that we have people walking in the street and we suppose we have the traditional right to walk in the street and walk there because we choose to, but when we made a scientific study, we found this: The point of saturation is reached when eight hundred of us per square foot per hour are trying to pass this table. Eight hundred of us per square foot per hour is the point of saturation and we discovered that one thousand people were trying to do it and two hundred got pushed into the street and in New York we have reached the point of saturation and the people continually pressing forward are pressing forward because there isn't any other place for them to be if they remain much more than a second, and the fact that that saturation point is pushing them out into the street, that fact is so well known to the motorist that we have a lower speed approaching intersections in New York than in almost any city in any other section of the country.

Of course, that is a minor factor, but I give it to show what an interesting problem traffic is and these boys who go out on duty before and after school and during the noon hour will find there is more to the problem than they ever dreamed, and the thing is so interesting that they will be able to carry the information to the parents and the older people in the family who need it.

CHAIRMAN MACCALL: I know you enjoyed listening to Mr. MacBrayne because he showed very plainly he knows what he is talking about and that is the kind of person we like to hear.

The next item on the program will be rather unique. It is a roll call of children representing cities having active Safety Patrol organizations. The Master of Ceremonies is the Honorable Philip D. Hoyt, Deputy Commissioner, Police Department, New York City.

HON. PHILIP D. HOYT: Mr. Chairman, Ladies and Gentlemen, Boys and Girls: A great army to operate successfully must have discipline. The individual soldier knows that he must submit himself to certain rules of conduct which, although they may for the time seem to him inconvenient or unnecessary, he knows are essential if it is to be an army and not a mob.

The greatest army that America has ever gathered together for military operations is a very small force compared to the army that is being mobilized and demobilized every day throughout the country, the school children. The task of moving that army safely and smoothly requires discipline and discipline requires leadership. The higher officers who direct this movement may be considered as a certain class of officers, the highest type of officer I know, the police officer.

Every army also has another group of officers, the non-commissioned officers, the men chosen from the ranks because they have exhibited special qualities of leadership, alertness, self-control, and the ability to command respect and obedience, so if the higher officers of this army are the police officers, the junior officers, who in military circles are often referred to as the backbone of the army, are the leaders of the School Patrol. The higher officers could not get along without them, and, speaking particularly for this city, I want to congratulate the leader of the School Patrol here for the great assistance they have given to the police department and I think it has been a great factor in the reduction of accidents among children here.

Today we are mobilizing from all parts of the country this Junior Patrol. There is hardly room enough in this room to get them all together at once, so we have chosen one representative from each unit which, in this case, is a city, and in order to show how many of these patrol leaders there are in each city, we are announcing each one. I will indicate the number of Patrol leaders; the members of the Patrol will indicate to you in their own way the number of children whom they are engaged in safeguarding.

(School boys and girls passed across the platform bearing cards with the names of cities.)

City	Number of Patrol Leaders	Number of Children Cared For by Patrol
New York	10,000	770,000
Philadelphia	2,900	225,000
Chicago	8,500	369,000
Detroit	225	140,000
Boston	500	103,000
Los Angeles	10,000	133,000
Cleveland	2,000	98,000
Newark	1,500	60,000
Memphis	330	28,000
Seattle .....	.....	45,000
Kansas City	800	42,000
Baltimore	500	80,000
Pittsburgh	2,000	72,000
Jersey City .....	.....	28,000
Rochester	1,500	30,000
Providence	375	40,000
Washington	1,128	49,000
Indianapolis .....	.....	43,000
Louisville	750	32,000
Milwaukee .....	.....	55,000
Portland	250	42,000
Birmingham	1,400	40,000
Minneapolis .....	.....	46,000
Omaha	2,000	28,000
Toledo .....	.....	35,000

CENTER BOY: Patrols of twenty-five cities are we, guarding 2,943,000 children, you see. Smaller cities with patrols are not mentioned here. Still there are cities without patrols, I fear. Patrols for all cities is our plea.

(The children left the platform amid applause.)

CHAIRMAN MACCALL: That was a demonstration showing you how many children are being protected by Safety Patrols in large cities. There are quite as many probably in the smaller cities, but we want you to take that as a message to your home towns and communities if you have no Safety Patrol. Be the pioneer. Start one, and you will see the fruit of your act for the rest of your life.

The final item on the program this afternoon will be the showing of the Safety Patrol film called, "The Knights of the Cross Roads," which we will show, giving you the definite action of a Patrol boy protecting the lives of school children.

ADJOURNMENT

**SEVENTEENTH ANNUAL SAFETY CONGRESS
NATIONAL SAFETY COUNCIL**



Women's Session

October 5, 1928

MRS. FRANK HOPKINS BETHEL, Chairman
President, Scarsdale Women's Club, Scarsdale, N. Y.

The Women's Session at the Seventeenth Annual Safety Congress was called to order at nine forty-five o'clock by the chairman, Mrs. Frank Hopkins Bethell, President, Scarsdale Women's Club, Scarsdale, N. Y.

CHAIRMAN BETHELL: This meeting is in the nature of an experiment and we hope it will prove a successful one. We all feel that women's responsibility touches every phase of human life but perhaps in some communities we have been backward in recognizing the value of women's work in safety.

Today we have with us four speakers who will try to show us not only what the responsibility of women toward this movement is, but also how we may best assume our responsibility. Our first speaker is Dr. R. M. Little, Chief of the Bureau of Rehabilitation, State Department of Education, Albany, and I am sure that he will make us all feel the great importance of women's work in safety.

Women's Responsibility for Safety

By DR. R. M. LITTLE

Chief, Bureau of Rehabilitation, State Department of Education, Albany, N. Y.

If our meeting is not large, it is potential. Sixteen years ago there was a meeting not quite so large as this in New York of men interested in industrial safety. It was the second meeting of the group which forwarded the organization of the National Safety Council.

The preceding year five men met in a hotel one Sunday afternoon in Milwaukee. In that meeting there originated the idea of a Council and the next year here in New York a small select group organized the National Safety Council which is in session in this city with many divisions and many in attendance from all over America.

One of the remarkable things of our American life in the last score of years has been the organization, development, and spread of the National Safety movement in industry, in the home, in the schools and in public life, but notwithstanding what has been accomplished, there is a great deal yet to be achieved and men are discovering that they cannot accomplish what ought to be done in safety without the assistance of women. No vital and important subject of life can ever be promoted and made stable and beneficial to all of society without the joint effort of both men and women, and women can take up this subject of safety not merely in the home and school and community, but also in industry and by an

intelligent study of the subject and cooperation with what is being done in industry, in the schools and in the community and bring to us a safer and healthier, a happier and a more prolonged life with the majority of our people.

Dr. Dublin remarked the other day that accidents are seventh among the causes of death and of the 95,000 accidental deaths last year, 25 per cent of them were in the homes. That shows that the biological unit of the race, the home itself, has something to do concerning safety. The home dweller isn't very much safer than the industrial worker. It has been my observation since the development of safety work in our larger, better organized industries, that the conditions in plants often are better than in the streets around about the plants and better than the average home from which the workers come to the plants.

In other words, as difficult as it may be to promote industrial safety in the great basic industries where there is the relationship of human activity to mechanical activity with all of its natural hazards, that the safety thought, habit, and practice has been carried farther in the plants than in the homes from which the workers come.

The gross figures of accidental deaths in the country, the per cent of them in the homes, then the number in the streets, and then the large number of them of little children, a disproportionate number under five years of age shows that it will be absolutely necessary to get the intelligent interest and cooperation of fathers and mothers and brothers and sisters. Men and women have organized safety in plants and organized women's activities in clubs, and schools, and parents' associations, all taking up the thought and finding out the causes, gathering together the facts, laying out the program and putting into it and back of it a motive power of human interest and consideration that will gradually reduce the horrid toll from preventable accidents in the industries, on the streets, and in the homes.

It's a sort of indictment of us, is it not, that when we are having this large toll of accidental deaths, perhaps 50 per cent of which could be prevented, that we do not prevent them, and since 1911 the accidental deaths in the gross in this country have increased 20 per cent, even though it is true that in that period the automobile traffic has greatly developed.

The larger industries have been on the job for these fifteen years and in the major industries a very handsome accident reduction has been accomplished and with the prevention of the accidents, an improved morale has been established in the plants. Good housekeeping and order and system in industry is a productive thing in dollars and cents just as it is in happiness and good will and feeling within a well ordered home, or well ordered community.

So we have discovered that the safety thought and the safety practice are good business, good civics, good human relationship, that sweetens up and preserves all the values of human life and that is the reason why, ladies and gentlemen, there have come to New York City for this week some five to ten thousand men from all over the United States and a good many women here gathered in these various sectional and general meetings of the Congress, who are applying their minds as seriously as they can to the practical experience of the years past, the problems that are not yet solved, and seeing what may be done for the further prevention of accidents and the conservation of life.

That women can render a very important service in this line goes without speaking. As the Chairman has remarked, the women certainly have a very vital and fundamental interest in human welfare and the maternal instinct for its preservation and protection which we men can't claim original control of, and if the womanhood of our country were aroused and organized and made safety a part of their activities, particularly in the women's clubs and teachers' and parents' associations, and would lay hold of the material which is already available, they could have just as interesting meetings on the subject of safety as they could have on

the last novel or on such community problems as trying to clean up the streets or the parks.

Speaking about a woman's natural desire for the preservation of her offspring, which I suppose is inherited from the animal world and cultivated when the moral and spiritual nature arrives, I am thinking of one of the greatest men who has been developed in our safety movement in America, here in New York now, a man who as a boy went to work in the steel mills of the Middle West. His father was a mill worker and this chap had to turn to the mills just before he was through high school. It was quite a walk to the plant. There wasn't good transportation; his father walked and carried his lunch and so did he. His mother placed his lunch in a little tin bucket and the last thing she said was, "Arthur, be sure to watch and don't get hurt today." The mother said this to her boy because of the great toll of accident that was occurring in those mills every day and every week, and when the father and the boy would come back from the mills, they would tell of these horrid happenings, the loss of life and limb taking place in the great steel plant. Her heart was wrapped up in her boy and she wanted him to be careful.

He stayed with the steel company for a good while and went through the various stages of the work that were possible for him. When this organized safety work came along and into those plants of the Middle West, he had a keen interest in the project. He found his way into the Safety Committee of the plant, then became assistant supervisor of it and then head of the safety work, and he has gone on from one stage to another in the interest of better industrial life in America and throughout the world until today he is one of the leaders of the greatest industrial betterment organizations on the face of the earth. And I have always thought, as he told me that story of what his mother said to him, that she was sowing in his mind at that time the thought of safety, carefulness, the development of the safety habit and the safety practice and that she filled his mind and spirit with the safety philosophy and vision which is today making out of him one of the greatest and most effective men in industry in this country.

That is the result of sowing this seed in the fertile soil of the mind of the girl or boy by a loving mother's spirit, concerned for the preservation and protection of her own offspring and having the maternal instincts that would preserve and nourish and care for all of human life. If you could get that working broadly throughout the splendid womanhood of America, the National Safety movement will become dominant in American life and the home life of America will be more safe and comfortable and enjoyable and prolonged than at the present time.

This is my message to your meeting. Women here today are engaged in this line of work effectively, taking hold of it and sending it along through the communities, and this meeting is for the purpose of bringing our minds together that out from it there may go persons who may become interested leaders back in the various communities, who will lay hold on the organized women's movement to get the idea of safety lodged there so that it may become effective.

The whole subject is so replete with opportunity and so filled with human interest that I can't think of anything that would give more enthusiasm to the work of organized women's clubs than just to take up this subject of human safety and welfare.

CHAIRMAN BETHELL: Dr. Little has given us the inspiration for our meeting and I am sure, if any of you would like to ask questions of him personally, he will be very glad to answer them.

We need inspiration in safety work. Women have needed that very much because to them safety has simply meant to be safe and to adopt the slogan "Safety First." We are getting so far away from that now that we are realizing that this work of safety is going to make life a very much more perfect and a very much

more beautiful thing. To make our children safe for the adventures of life seems to be the keynote of this whole convention. Some women have already entered into this field, and some communities have taken up the work of women much more enthusiastically than others. One of these is Pittsburgh and our next speaker is going to speak to us on women drivers.

Women Drivers and Automobile Accidents

By MRS. D. EDWIN MILLER

Vice-President in Charge of Home Safety, Western Pennsylvania
Safety Council, Pittsburgh, Pa.

We were shocked at the number of deaths of American soldiers in France during the nineteen months of their occupation of war territory. We paid comparatively little attention to the number of deaths in this country during the same period. Yet, for every American soldier who nobly died in France, there were three deaths by accident in this country in the same time. We said smugly, "Accidents will happen," and pursued the even tenor of our way with little concern indeed over this appalling condition.

The war was over long ago, but every day—today, if you please—a mounting toll of life and limb is one of the serious problems of our vaunted civilization.

We hear much of the hazards of industry, but it is rather startling to learn that more than one-fourth of all accidents occur in and about the home. The one agency in society which exists as a haven of security and protection for the very young and the old, the helpless and the dependent, is the scene of almost as many accidental deaths as the American workshop where men are constantly exposed to all the dangers that surround the use of every type of machinery, the handling of huge masses of hot metal and the presence of moving locomotives and cranes.

It is not obvious that safety education in the home can yield wonderful results in the reduction of loss of time and of human misery? The introduction of power driven devices, the general use of gas and electricity, the all-pervading influence of the modern tendency to higher and higher speed in living, all contribute to the need for such education.

Within recent years another factor has entered into home life. The use of the automobile has become so common in the United States that a recent visitor from England, upon his return home, characterized us as "A Nation Upon Wheels." As a matter of fact, we have become accustomed to spending such a large part of our time riding in motor cars, that the automobile is becoming truly an extension of the home. Our home Safety program must therefore take account of this development and provide for cooperation with other agencies of public safety in meeting the hazards of this newest addition to home life.

Twenty-five years ago an automobile on the streets was a curiosity. Excited groups would gather about and speculate whether the contraption really would go. When it started off, which it didn't always do, many of the spectators could hardly believe their eyes.

Then automobiles began to appear in increasing numbers—great high affairs, but built like the circus band wagons. There was always something the matter with them, so that no one except a skilled mechanic dared undertake to drive one for any distance. The popular song of the day was "You'll Have to Get Out and Get Under," which was an accurate characterization of the motor car of that day.

Not only were the early automobiles hard to keep in condition, but they were heavy, clumsy things that were hard to handle, so much so that it took

all the endurance of a strong man to drive one throughout the day. Those were the days when men were men and women were only back seat drivers. Since then women have been gradually becoming emancipated and graduating to the front seat, left, back of the steering wheel, where they properly belong.

Today, the automobile is a mechanical masterpiece, a beautiful creature ready to respond instantly, easily and surely to practically every demand made upon it, so that the day of women drivers is here. Since we have truly become a "nation upon wheels," it is our business to see to it that the wheels run true. Inventive genius and manufacturing skill have produced a motor car that offers no problems that an alert trained woman cannot master. She must be alert and trained.

Women drivers have already made an enviable record of freedom from accidents in driving. In Allegheny County, Pennsylvania, with a population approaching two millions Coroner William J. McGregor reports that since 1923 only one woman driver has been involved in a fatal automobile accident. It is interesting to note that during the years 1923 to 1927, inclusive, there were 1,351 automobile fatalities in Allegheny County. While it is true that the woman drivers have been greatly outnumbered by men, nevertheless the record of only one woman in a total of more than 1,300 fatalities calls forcibly to our attention the fact that women are better, much better, drivers than they are commonly given credit for.

To stand on this record would be the height of folly. As women drivers are rapidly increasing in number, it is increasingly important that they be prepared in every way possible to meet the hazards of traffic. Not only has the death rate due to the automobile increased steadily throughout the United States from 9.3 per 100,000 population in 1918 to 19.6 per 100,000 population in 1927, but in addition, in 1927 the death rate per 100,000 automobiles registered jumped to 100.5 compared with 95.5 in the preceding year. It appears not only that automobiles are increasing rapidly in number, but that fatalities are increasing at a still more rapid rate.

A study of the causes of automobile accidents shows that they generally result from failure on the part of the driver, through ignorance of the law, disregard for the rights of others, recklessness, or incompetence chiefly due to physical disability or intoxication. Of 54,438 cases reported, 19,720 did not have right of way, 7,451 were exceeding the speed limit, 7,247 were on the wrong side of the road, 5,581 failed to signal intention, 4,280 cut in, and considerable numbers ignored rules of good driving by failing to stop when entering through traffic, by passing standing street cars, by turning improperly, by passing on the wrong side, by passing on hills and curves, by disregarding officers or signals, by driving through safety zones, and by parking improperly. Add to these causes of accident poor judgment in handling cars on hills, carelessness regarding brakes, recklessness in approaching grade crossings and we have a compendium of all that a driver should not do.

The gruesome records show, however, that drivers are continually, through ignorance or willfulness, violating the principles of safe driving. There can be no question as to the urgent need for safety education.

There is a common impression that women drivers are apt to go to extremes of driving; that either they are apt to drive with so much caution as to be indirectly responsible for accidents which are charged up to others, or that they may drive ahead with little caution, expecting others to give way to them because they are women.

It would be unfair to judge women drivers in general by the actions of the few that go to extremes, in the light of the generally excellent record of safety that women have made. Nevertheless we must recognize facts as they are. Naturally women expect others to give way to them as a matter of gallantry,

and we would never wish to suggest that the ladies receive less than their rightful due. Of course women must have their way—it has always been so—but we should make sure beforehand that it is the right way.

No one should question, either, woman's prerogative—her right to change her mind. It would be a wonderful thing, though, if a woman driver would always indicate to other drivers that she is changing her mind before she puts the change into effect. The whole world would be the happier for it.

Women, as a rule, do much less driving than men, and frequently little of that driving is in heavy traffic. As a result, when they get into a jam they are more likely, through lack of experience, to become timid or excited, with disastrous results. The obvious cure for such a condition is greater familiarity with conditions that are met while driving, and with proper methods of meeting all possible situations.

When we consider that frequently a large part of a woman's driving is in carrying children to and from school, the importance of safe driving is increased, not only for the safety of the children but as an example to them. That women should have opportunity for instruction is self-evident.

Recognizing this fact, and recognizing the automobile as an extension of the modern home, the Home Safety Division of the Western Pennsylvania Safety Council, as one of the phases of its work, organized the Safety Drivers School for Women, in Allegheny County, under the auspices of the Safety Council, with the following organizations cooperating: The Congress of Women's Clubs of Western Pennsylvania with 30,000 affiliated members; The Pittsburgh Better Traffic Committee; The Pittsburgh Automobile Dealers Association; and the Pittsburgh Post Gazette.

The Women's Safe Drivers Club was organized with a Central Committee of which the vice-president of the Western Pennsylvania Safety Council in charge of Home Safety was chairman. This committee included the manager of the Safety Council and chairmen of the following committees: Entertainment, Community Singing, Ushers, Halls and Fields, Speakers, Prizes, Publicity, Banquet and Attendance. The president of the Congress of Clubs as chairman of sponsors was also a member of the committee, with every president of a woman's club in Western Pennsylvania as a sponsor.

The first meeting of the Central Committee was held November 19, 1927, the second January 16 of this year and the third, January 24. Plans were made and an organization developed to reach every woman driver in Western Pennsylvania with information regarding the school. Two hundred and ten women's clubs were circularized three times. One 15 minute talk was given over radio station KDKA and numerous announcements of the school were given over stations KDKA, WCAE and WJAS. Newspaper publicity amounted to 850 inches, including seven editorials, with 20 pictures. Cards advertising the school were placed in all street cars and the Pittsburgh Railways publication, "The Transit Guest," available to all street car patrons, carried notices of the school. The result of this publicity was the registration of one thousand women for the school.

The projected program for the school included eight meetings extending from Monday, March 5, to Saturday, May 19. Because of heavy rain one meeting, Field Day Exercises under the direction of the Pittsburgh Automobile Dealers Association, was postponed to coincide with the Driving Contests with which the school closed.

The first four meetings were for the purpose of instruction and were held in the auditorium of the Pittsburgh Chamber of Commerce. The general plan for each of these meetings was as follows: Time, from 7:45 until 9:30, distributed thus—

7:45 to 7:55, ten minutes, Community singing from the Safety Song Bulletin; 7:55 to 8:55, 60 minutes, instruction by speakers; 8:55 to 9:20, 25 minutes, enter-

tainment; 9:20 to 9:30, ten minutes, announcements and distribution of attendance prizes.

The first meeting opened with a welcome on behalf of the Mayor of Pittsburgh. This was followed by brief talks on "Cooperation of Women's Clubs," "How the Safety Council is working for Greater Traffic Safety," "Safe Driving from a Woman's Point of View," and "Qualifications of a Safe and Efficient Driver." Entertainment was provided by the Congress of Women's Clubs.

At the second meeting, the subjects were "Steering Mechanism and Brakes," "The Schools Part in Traffic Safety," and "Traffic Safety in Allegheny County." Entertainment was provided by the Pittsburgh Public Schools.

The subjects discussed in the third meeting were, "Lubrication in Relation to Safety," "The Driver and the Fire Department" and "Safe Driving and Traffic Engineering." Entertainment was provided by the Philadelphia Company.

At the Fourth meeting, the subjects were, "The Power Plant (Engine, Carburetor and Cooling System)," "Traffic Safety in Pittsburgh," and "Traffic Safety and the New State Law." Entertainment for this meeting was provided by the Cab Company.

Each speaker was an official of the State, County or City, or of one of the organizations associated with the school, and was chosen because of his expert familiarity with the subject assigned him. Those in attendance took notes of all material presented for further study in preparation for the examination which was given later under the direction of a member of the Engineering Faculty of the University of Pittsburgh, who is also a member of the Better Traffic Committee.

At each meeting the names of those in attendance were placed on cards, the cards were mixed together, and the names drawn for attendance prizes. A large number of firms were very generous in providing, without cost to the committee, numerous prizes ranging in value up to ten dollars. During the four meetings a total of 59 attendance prizes were awarded. The average attendance at all meetings was 500. During the meetings copies of a booklet containing a brief summary of the State Traffic Laws published by the Gulf Refining Company for the school were distributed. The series of six leaflets, "You and Your Car," issued by the National Safety Council were placed on sale to members of the school, many of whom took advantage of this source of information on safe driving. Diplomas were issued to all those who attended three of the first five meetings.

At the written examination on material presented at the first four meetings, 150 women passed with a grade of 70 per cent or better. All those passing the examination were eligible for entrance to the Safe Drivers Contest with which the school closed. Before this Driving Contest, however, the banquet, attended by 248 members, was held at the Schenley Hotel. Entertainment was provided by the Joseph Horne Company, following the address upon the subject, "Safety with Courtesy." Diplomas were then given to those who had earned them.

On Saturday, May 19, the school came to a close with the Safe Driving Contest held on the oval in Schenley Park, under the direction and control of the Traffic Inspector of the Pittsburgh Police Department. The tests included stunts in driving through difficult turns; backing into imaginary garages marked by barrels placed on the field; and a practical test of driving over a marked course which provided tests of driving ability under a large variety of traffic conditions. Judges were stationed at points along the course which called for exhibition of skill in handling a car, and were provided with official tally cards for keeping score of each contestant on the various hazards offered. Immediately after the last contestant had passed the judges returned to the oval and their scores for each contestant were added and the results tabulated. Prizes were then awarded, based upon the best exhibition of driving alone, and upon the

best average obtained in driving and in the examination which followed the meetings for instruction. The Pittsburgh Automobile Dealers Association comprising 30 dealers had been assigned places around the oval where they had exhibits of their respective cars, with crews of mechanics and other experts to answer queries concerning their cars. Thus closed our first Safe Drivers School for Women.

A study of the statistics of the school reveals further that there were 723 cars registered, including 50 makes. One third of those enrolled were club women, while two-thirds were non-club members who were interested in the school through the general publicity provided through the newspaper columns, radio and car cards.

Our first Safe Drivers School for Women was distinctly a success. I am quite sure that any similar enterprise which commands intelligent and whole-hearted cooperation from a large number of able people will be a success. Every city in the country—every community, indeed, where there is any considerable number of women drivers,—should have its Women Drivers Club with the motto, "Pedestrians should be seen and not hurt;" a club where social considerations are kept in the background and where the common interest in the welfare and safety of all who use the roadways is the dominant note in all discussion and activity.

Women are leaders in many other matters of public and family welfare, and the influence they can exert to check the alarming increase in automobile accidents can be tremendous. First of all they must perfect their own driving ability and practice. Then through organization in Women's Drivers Schools they can become a distinct force for safety throughout the country. Once organized, these groups can well extend their interests to include cooperation with local safety councils or other organizations for various remedial measures in their communities.

What could be more fitting than that woman, the giver of life, should be in every respect its protector? Every woman driver should make it a point of honor to be not merely able to drive, but rather to drive expertly, not only that she may avoid accidents herself, but also that she may, by her example create a stronger and stronger sentiment against recklessness and lawlessness on the road.

Let us mobilize the women of the Nation in the interest of safety.

CHAIRMAN BETHELL: Mrs. Miller has given us inspiration and something else, too, which is the concrete expression of inspiration, without which inspiration is perhaps valueless. I hope that those of you who are here, I am sure in the interest of your own communities and groups, will ask something of Mrs. Miller, will either see her perhaps afterwards or perhaps you would like to ask her some questions about this very wonderful work.

JOHN A. OARTEL (Safety Director, Carnegie Steel Co., Pittsburgh, Pa.): I can't add anything to what Mrs. Miller has said in the way of information. I just want to inject, if you please, a thought that Dr. Little started. He talked about safety in industry which began fifteen years ago and we have seen the development of it in a large way. He has helped in that development.

I am a safety man from industry, from a steel mill, if you please. I haven't known much else in my life and yet when I think of it, we men who have charge of safety in steel mills have found that in order to make a safe worker, we have to make people safe in their homes and on the streets. When we get the women in the home, when we cooperate, when we work together, then we are going to make a reduction in that awful toll of 95,000 men, women, and children whose lives are snuffed out annually. I am very proud indeed that when this work, under the direction of Mrs. Miller, was started in Pittsburgh, I was President of the Western Pennsylvania Safety Council. That is going to be a lasting

memory and I want to tell you folks no matter where you live, you are going back to your communities to try to do something in the homes and with women drivers. I want to tell you that Mrs. Miller has demonstrated in western Pennsylvania that it can be done and that it is being done.

Safety in industry is no guess work any more. We have developed it into a science and we can say that by doing certain things we will get certain results in safety. The same thing can be said of safety in the home and on the streets.

CHAIRMAN BETHELL: Our next speaker is the head of the Children's Bureau in Kansas City and by virtue of that relationship, she has been able to do a great deal for home safety.

Women and Home Accidents

By ROSAMOND LOSH

Executive Secretary, Children's Bureau, Kansas City, Mo.

Save the child has become the watchword of the hour. During the past decade a gigantic "Child Conservation" movement has swept the entire country. "The Child's Age," it has been called.

We are told that the best single index to a community's civilization is its child death rate. We have learned how expensive, how extravagant, how wasteful of vitality is disease and every effort is being made to eliminate needless sacrifice of child life from preventable disease. We hear repeatedly that the toll taken by home accidents is as great as that by any single disease. The most marvelous bit of inconsistency to be found is, that disability or death by accident has not been considered in the child conservation movement.

It is quite evident that no program for child conservation is adequate that does not include accident prevention. A glance at the long list of tragic accidents, occurring yearly, is sufficient to convince the most skeptical of the need for a city wide program for home safety as well as health safety. The only way a city's death rate can ever be reduced to the minimum is through effective health and safety education in every one of its homes.

It is obvious that the health organizations offer an opportunity for safety education unequalled in scope and effectiveness and with practically no additional cost. The Kansas City Safety Council, last year, organized the Women's Activity Division in order to carry on an educational campaign among the women of this city, with the hope of being able to reduce the number of accidents in which women and the home are involved. Sub-committees were organized to deal with the various problems. These committees were as follows: (1) Statistical. (2) Legislation and Enforcement. (3) School for Women Drivers. (4) Publicity. (5) Home Fire Prevention. (6) Membership. (7) Home Safety. (8) Pre-School.

It is of the work of the Pre-School committee I wish to speak in detail. The pre-school committee was organized for the purpose of safeguarding the lives of the pre-school child through parent education.

The program was city wide in scope. It offered definite practical helps through personal conferences with each mother and through group instruction. Good leaders were selected and trained to carry the information into the home.

As a result of the activities of this committee last year, safety information was carried into each of the 25,000 pre-school homes of Kansas City.

The cost of a city wide program of these proportions would have been prohibitive unless undertaken by a functioning organization.

The chairman of the Women's Activities, recognized the possibilities for safety education through a child health organization and asked the executive secretary of the Children's Bureau to head the pre-school committee.

The Children's Bureau, doing a city wide work in child health and parent education, goes into every one of the pre-school homes in Kansas City. In addition to its paid Staff, it has a force of 3,000 volunteer workers of exceptional training and ability who aid in its work. The Bureau, aware of the need for greater effort along safety lines, readily agreed to extend its work to include the activities suggested by the Safety Council.

The purpose was effected by:

1. Using the school districts as a unit of organization.
2. Educating all workers in accident prevention.
3. Making a visit into every home at least once each year.
4. Providing a special worker for individual safety talks at each of the 116 annual health Examination Centers.
5. Exhibits and demonstrations of safety devices and measures. (The use of films and slides is a part of the plan.)
6. A follow-up visit in the home where a safety inspection, in cooperation with the mother, is made.
7. Educating parents and the general public in safety through individual conferences, and talks before pre-school groups, Parent Teacher association, social, civic and study clubs.

The first step was to select and train the special workers in the need for home safety work, and the best method of approach; what to observe and record; and in practical measures for home safety.

Group meetings were held in each school district for the purpose of instructing workers. The canvasser is given a block plan of the territory which she is to cover and is held responsible for every home in her district. The worker notes unsafe home practices and unsafe home equipment, on blanks provided for the canvass. The information is for the use of the Center worker who meets at least 85 per cent of these mothers two days later at the Examination Center.

A special trained worker is present at the Examination Center to talk with the mothers individually, or in a small informal group, on accident prevention. This conference affords a very satisfactory opportunity for safety discussion. A card, carrying warnings against the most common accidents, prepared by the Kansas City Safety Council, is given the mother. The most recent accident in the city provides an approach to the discussion of home safety and the fact that the work is carried into every home in the city removes all cause for resentment. We find the mother most willing to assume the responsibility for the home and eager to benefit by any help we can give.

An exhibit of safety devices at each center is of special interest to the mother. This exhibit consists of a few simple, practical suggestions that all mothers can put into effective use. The following are a few of the suggested safety measures forming the exhibit at the 116 centers.

1. Small bells on all poison bottles, that ring when the bottle is moved, warning mother that it is in dangerous hands.
2. Safety window screens and screen-hooks, fire screens.
3. Pins inverted in the tops of boxes containing poison tablets, that prick sufficiently to cause children to let them alone.
4. Box of sand for slippery steps and walks, a necessary equipment of the safe home.
5. Safetyized house furnishings. (No sharp corners.)
6. Safetyized play equipment. For the yard: (a) Round sand boxes. (b) Ladder for climbing with hand rails for the very young. (c) Play pens for in or outdoor use. (d) Screened-in beds. (e) Canvas covers for swing springs. (f) Round tables.
7. Sheaths for all scissors, both blunt and sharp pointed.

8. Defective floor sockets safetyized by inserting plugs.
9. Defective extension cords, wrapped with tape.
10. Covers for scrub buckets or tubs of water, screens for wringers, etc.
11. Gates for stairs, railings for porches.
12. Tightened gas cocks. (Test for degree of tightness necessary to prevent small ones turning gas on.)
13. Home-made pens to hold baby, made without cost from padded dry goods boxes.
14. Coffee cans for matches.

There is no attempt to cover in a single conference every conceivable type of accident. The aim is to stress the prevention of those of most frequent occurrence. At a later date other safety measures will be stressed.

Following the Examination Center, each child found to be in need of attention, is followed up in the home. This gives another opportunity for safety education. On this visit we endeavor to make the home safety inspection with the help of the mother.

The mother is led to see that home accidents are preventable, that a child can be made safe in his home, that practical safety devices reward with a feeling of security, and that safe habits aid in the preservation of the individual.

We find most mothers not only willing to assume the responsibility for their own homes, but willing to assist in solving the city's home accident problems as well. To encourage an interest outside their own homes, the mothers are asked to turn into the office lists of possible hazards noted in their own and in other homes of the community.

During the past year visits were made into 25,000 homes to interest the parents in bringing children to the Health Examination Center.

About 18,000 conferences were held with these mothers two days later, in the 116 Health Examination Centers; and 11,256 follow up visits were made following the Examination Centers—a total of over 36,000 home visits. Fifty-nine safety talks were given before Parent Teacher associations, social and civic clubs, community groups, etc. Sixty-one exhibits of safety posters and safety devices were held with an estimated attendance of 30,000. Twenty-five thousand pieces of safety literature were distributed. Three exhibits of model nursery equipment and three exhibits of model play equipment, of 14 days duration, were held.

The same procedure will be followed throughout each year and it is hoped that a marked decrease in home accidents will result from this continuous effort.

CHAIRMAN BETHELL: That seems to be a very logical way to introduce safety into the home, through a children's organization.

MRS. CORA E. FISKE (Weehawken, N. J.): There are some homes that have nothing to do with Parent-Teacher Associations and perhaps if an interested person called, he or she would not be let in. How would you overcome something like that?

MISS LOSH: We have not had any trouble of that kind. We go into every home and the fact that we are going into every home seems to remove the objections. We put on a large educational campaign before we began and we don't confine it to the Parent-Teacher Associations. We get our educational program before all clubs, even the Kiwanis Clubs and other men's clubs.

MRS. RALPH T. SIMMONS (White Plains, N. Y.): In our schools in White Plains they use a book on hygiene and they take up each week different phases of these home hazards. Our children come home and often tell us something we are doing wrong. One day I laid a small paper on top of my gas stove and my boy said, "In school the other day we were told we should not lay any papers on gas stoves," and things like that happen every few days. While the young children are studying these things, they bring home this advice to their parents.

F. C. LYNCH (Kansas City, Mo.): Having worked with Miss Losh on the work in Kansas City, I should like to say one thing and also I should like to contribute a little to Mrs. Fiske's question which seems to be unanswered. In the first place, the thought that Miss Losh gave you I think could well be emphasized and that is that the statistics show with the pre-school child between the ages of one and five years there are more accidental deaths than deaths from any one sickness.

The problem that came to Miss Losh was just the question you asked, just exactly that. She said, "I accept the responsibility. What shall we do?"

Naturally, the educational campaign had to be built up around whatever information was available, so we immediately made a survey of the home fatalities to the pre-school child. There was no record in our hospitals, practically no record of the non-fatal injuries, but we took over a period of years the fatalities to the pre-school child that occurred within the home, and then Miss Losh centered her campaign around those fatalities which were the most serious. She directed the attention of her three thousand workers to these causes and through this method she is gradually getting a lot of information about how the child is hurt.

She has models of the things she has designed. She has brought into cooperation with her the builders of the city and the architects and they have designed things such as the sandbox. These were always built square or rectangular. Mother made dad build them some evening and he nailed four pieces together and there were four sharp corners. Miss Losh has worked up propaganda against that and she demonstrates a model of the correct type of sandbox, and so it goes on, and through it comes the remedy for the elimination of the hazard.

She has a wonderful little screen model. It locks and the key may be put away and the child can't possibly fall out. That is spectacular and gets into the newspapers.

MISS JULIA KENNEDY (Detroit, Mich.): I was formerly in Kansas City and I know that the name of the Children's Bureau is a passport into any home in Kansas City. In making a house to house canvass, if you mention your organization when you step to the door, they are eager to let you in and talk about the children.

CHAIRMAN BETHELL: After the meeting is over, I am sure some of you would like to come up and look at the exhibits I have asked Miss Losh to put on the table. They look very interesting.

JOHN A. OARTEL (Carnegie Steel Co., Pittsburgh, Pa.): This is a wonderful work you are doing in Kansas City. I think we should take inspiration from this line of endeavor. There is a point of contact which I have seen for years and yet which we cannot use effectively and that is the contact with the ministers of the churches.

Every year in the month of November we have a No-Accident Campaign. We send out literature and yet in my own church my minister has never announced it. How can we line up the ministers of the Gospel?

MRS. BERTHA WINTER MAHONEY (Erie, Pa.): May I answer the gentleman? In Erie we have all the religious societies affiliated with our movement. They were delighted to take it up and they have stimulated our program in a very delightful manner.

MISS LOSH: I might add that among the clubs or groups we have gotten before I don't remember the number of ladies' aids and home missionary societies, but twelve or fourteen of them have been able to have a meeting on the subject of child health and it included accident prevention.

CHAIRMAN BETHELL: I think sometimes when a community is a little backward, and especially a smaller community, it becomes the responsibility and the duty of the women to stir things up. Erie isn't such a small community, but I happen to have been told privately that one woman is responsible for the development of

the safety work and of the women's responsibility in that community and that she has done some very remarkable things in Erie, Pa. It gives me great pleasure to introduce Mrs. Bertha Winter Mahoney, Vice-President of Home and School Safety, Erie Safety Council, Erie, Pa.

A Practical Program of Community Safety Work for Women's Organizations

By MRS. BERTHA WINTER MAHONEY

Vice-president for Home and School Safety, Erie Safety Council, Erie, Pa.

The gravity of the home accident situation has been elaborated upon by the preceding speakers. It is unnecessary for me to dwell further on why a systematic program of safety education for the homekeepers should be instituted in your community. Last September this problem was presented graphically to the delegates at the National Safety Congress, in Chicago, and many of us returned to our respective homes resolved to improve the existing conditions. I am hoping you will be inspired by these addresses today and will immediately face your home accident problem and make plans for its solution.

I shall endeavor to outline, point by point, a scheme of continuous education for the homekeepers of your city. It is the plan outlined by the National Safety Council in a series of lessons entitled, "A Course of Study in Home Accident Prevention." You will notice that I say "continuous education." With many local safety councils sending out literature to women's organizations periodically with more or less successful reactions, I wish to emphasize the difference between our plan and theirs.

We realize the value of mimeographed or printed sheets of accident information sent to the presidents or safety chairmen of various women's groups, but I question their value when read before such a group by an inexperienced member of the organization.

The homekeepers of today must be educated by men and women especially informed on the subject that they are presenting, that of home safety. We need the opportunity to question them on our particular problem as it faces us. A club president or chairman is unable to inform her fellow members ably on the subject, because she has had no special training or instruction. Therefore such addresses or reports should be given if possible by trained speakers.

If you are fortunate enough to have a local safety council, the Course of Study I have mentioned can be obtained through them. If not, you can procure it direct by writing the National Safety Council headquarters in Chicago. A study of this folder and its enclosed lessons will suggest to you immediately ways and means of injecting it into the regular programs of your local organization. We in Erie have followed the first lessons issued by the Council and are now using the revised edition, which is much more efficacious.

The general plan that we followed provided that a series of six lessons in home accident prevention be given one a month to every woman's group in the city.

I, being a member of the Executive Board of the Erie Safety Council, was appointed chairman of the new Home Division of the Council. With the able assistance of the three other women on our Executive Board, we planned a luncheon meeting, to which were invited the leaders of the business, professional and social groups of the city. They were appalled by

the mass of statistics regarding local home fatalities that we presented, and were delighted to include in the programs of the organizations they represented our system of education. With this group as a Board of Control, its various members were assigned to one of three committees: Speakers' Bureau Committee, Statistics Committee, Publicity Committee. Our initial step was completed.

The second phase of our venture began. We needed trained speakers to present the various lessons:

Lesson I—The House We Live In.

Lesson II—Outguessing the Child.

Lesson III—Electricity and Gas—Their Use and Abuse.

Lesson IV—Flaming America.

Lesson V—When Accidents Occur.

Lesson VI—Accidents a Community Problem.

The Speakers' Bureau immediately began the most difficult task. We succeeded in listing a bureau of fifty speakers who were fully equipped to instruct any group on the subject with which they were particularly identified and they were definitely instructed by us.

The speakers who presented each lesson were brought together before they would be called upon by organizations, and a round table discussion of their service in this educational scheme was extremely beneficial. In this way each group had its own meeting and the definite aims of its efforts determined.

May I say just a few words regarding the type of trained speakers who volunteered his services for this great humanitarian work? For Lessons I and II: the president of our Pro-School Children's Group, the safety chairman of the President's Council of the P. T. A., the president of the Daughters of the American Colonists, a member of the D. A. R. two former school teachers and various members of the P. T. A. and Women's Club.

For Lesson III: men identified with the two local electrical and public service companies, including both managers and assistants under their supervision.

For Lesson IV: the fire prevention board of the Chamber of Commerce, including various fire underwriters, one of whom is also the president of our Rotary Club. They were assisted by a demonstration team from the Erie Fire Department.

Lessons V and VI included physicians and registered nurses, also members of our Executive Board. With a skilled speakers' Bureau the second part of our program was completed.

Now began the lessons. The Parent Teacher Organization through the safety chairmen began immediately last December. They were followed by various organizations throughout the city. We now number seventy-five groups with a membership of 12,000, and many more still to be reached. This is a continuous plan, for many began their course in December and January, others in February and March, while some began this September. We have constant publicity, for on our Board of Control is the society editor of each of the local newspapers. A friendly spirit of rivalry exists between them, and all publicity sent to them is printed verbatim if requested. They realize the service they are rendering their community and the society pages are perused by every woman who reads. Naturally with notices of speakers and safety lessons being printed month after month in their columns those women unacquainted with the plan, are curious and desirous of participating.

This program of organized education had its influence felt elsewhere. How were we to reach the foreign element? How were we to enter the poverty-stricken homes, where ignorance and heedlessness so often exist? The foreign newspapers printed safety information in Italian, Polish and German. The International Institute with its safety trained case workers has taken this course to foreign clubs, and has given the lessons in the individual homes of the immigrants who have recently entered our country. Safe American customs and practices are taught them immediately in their own language.

Our night schools emphasize home safety principles. The neighborhood home schools for foreign mothers did likewise—not one lesson, but many—so that what was once heard would not be forgotten.

The Visiting Nurses of the City, after taking the Home Accident Course, proceeded to spread the gospel of home safety to all the families with whom they came in contact. Insurance collectors, especially of the five-ten-and-twenty cent policies, were also instructed how to point out to the women whom they met so regularly, the elimination of various serious hazards that were visible where they called. Ninety per cent of the homes of any community are visited at regular intervals by these insurance collectors. An admirable medium for the dissemination of safety principles. The third step of this plan was completed.

Meanwhile the Statistics Committee, cooperating with the Health Department, Police Department, Visiting Nurse Association and various hospitals, had compiled local home accident statistics that were of immeasurable value to the speakers when presenting their various lessons. We found several hospitals with only meager records of causes of accidents while one large hospital kept no record at all, merely listing the kind and extent of injury. The work of the Statistics Committee this year is to work on a uniform and complete method of accident reporting in hospitals, police department and the schools.

But realizing that women assume only a part of the responsibilities of the home, it was deemed important that our attention be centered on the men who naturally must be interested in the homes they are supporting. Men's organizations, all the luncheon clubs, the shops with their various shop publications, have included in their year's activities home safety programs and home safety columns. Their responsibility and their seeming lack of interest and attention have been stressed with the result that home safety is becoming more and more important as we continue our work.

These lessons have had their influence in the safety teaching in the schools. While Erie's educational program in safety has been hindered by the lack of interest in the State Department of Education, nevertheless popular demand from the parents of the city has resulted in a tentative course of study being written and included in all of our public schools. Our parochial schools have always been alert and interested, and with a foresightedness uncommon in most communities, have instituted definite safety teaching in their curricula. I may say here, that not until the mothers of the city became insistent did our Board of Education think it advisable to include such instruction. Another effect of Home Safety Education.

We have a broadcasting station in Erie, with a low wave length, station WEDH, owned and operated by the Dispatch Herald Publishing Co. The head of the Children's Radio Club donated part of his time, as often as we wished, to broadcast home safety talks. Twelve talks have been given so far on this subject. Then wishing to enlarge his field of usefulness for children, our famous "Uncle Charlie" organized a children's safety club. Stories, talks, buttons, pledges and various diversions make the club interesting to the kiddies and also bring in those children who have no radio. He

has devoted pages of publicity to the cause of the Home Division and publishes verbatim all the talks broadcasted pertaining to home and child safety. Another outcome of our scheme of education that cannot be measured or even estimated.

Our home division was the chief factor in passing an ordinance forbidding the sale or purchase of fireworks in our city. After a Fourth of July celebration and its resulting tetanus deaths the united plea and demand of the mothers caused our city fathers to authorize the framing of such an ordinance. To prevent, in so far as possible the bootlegging of fireworks, we are taking the necessary steps to have our ordinance adopted by the various townships and boroughs throughout the county. Several have already signified their willingness and others are waiting for further deliberation and observation.

With drowning included as a home accident, the home division conceived the idea of staging several life saving demonstrations by the life guards along our lake front. Short instructive talks were given and the Prone Pressure Method of Resuscitation demonstrated. The dangers of water sports were emphasized. The Water Commissioners who are in charge of portions of our bathing beaches, were so impressed that next year these demonstrations will be weekly performances. Several talks on swimming and lifesaving were broadcasted and published by the head of the Red Cross Chapter of Northwestern Pennsylvania.

You might ask how much such a program has cost us for our year's activities? The time, the thought, and the constant efforts of many interested men and women who have accomplished this work and \$231.15 in money.

This paid for the Manuals and lessons, printing and stationery, repairs on an old typewriter, the organization dinner and the regional conference dinner deficit.

When serious accidents can be prevented by the gospel you spread, when precious lives can be saved for the great work of the future, when our happy homes are kept intact—is it not worth while? There is a feeling of content and satisfaction in your heart for the part you have played in the fulfillment of such an ideal.

You need a spirit of unselfishness, helpfulness and willingness to work, which is best expressed by these two verses that are pinned above my desk at home:

It matters not where I may go,
To grammar school or college;
It matters not how much I know,
If I but use that knowledge
For others.

It matters not what men may say;
It matters not what men may give;
'Tis my resolve that, day by day,
I'll do my best to give and live
For others.

MISS HELEN PURCELL (Director of Elementary and Kindergarten Education, State of Pennsylvania, Harrisburg): I want to give the *fast speaker* some encouragement respecting the State Department and also to express gratification and to spread the news. I represent the State Department of Public Instruction at this meeting. I was sent by the State Superintendent of Public Instruction, Dr. John A. H. Keefe, and my expenses are paid by that department.

The state course of study for elementary schools published in 1923 does contain a very detailed course of study in safety education and the normal schools and

teachers' colleges are supposed to give their students the material in that course of study. If any normal school is not doing that, it is a special case and should be taken care of.

For myself, before coming to the State Department two years ago, I was a Director at Teachers' College at Stroudsburg, and I know we very thoroughly covered that course in safety education and I want to pledge the support and help of the Pennsylvania State Department of Public Instruction in any program for safety education.

DR. ETHELBERT STEWART (U. S. Commissioner of Labor Statistics): I have received more knowledge today than I have learned in a long time. I wondered whether there was any practical way of getting at the home accidents. My own experience has not been very satisfactory, with a young lady who is a university graduate and is working on statistics of accidents in the office, where, if she had done the same thing, I would fire her, at home gets on a rocking chair to hang a picture and if I say anything, she says, "O-o-o-oh, DAD!"

You women have got to do it.

Massachusetts was the first state to show that we were probably spending more money on protection of machinery than the facts justified; there were fewer accidents from machinery than from causes that could not have been prevented by any machinery guarded. Then they began to spend some money on something else.

I talked to the Textile Section the other day and in preparing the statement that I made to them, I found that 66 per cent of their accidents would have happened if there hadn't been a machine in the mill, had absolutely nothing to do with machinery.

Now we are beginning to find an increasingly large percentage, except in towns where such work as you have talked about today is being done, I have been perfectly amazed at the work that is being done in some towns and I can only say that when the report of what you are doing gets out to these other towns and cities where it seems hopeless, it should do great good.

MISS HOUSMAN (Hudson County Safety Council, Women's Division, New Jersey): I noticed today in the remarks that were made that in the program for education in home accidents we named every type of organization except one. We have great need of instruction through our women's clubs and visiting nurses and every facility that can be used, but I think we need to reach also the growing girls and get them interested.

We are just beginning our work in Hudson County, but I think pretty soon we will have a real program. Last year in attempting just a little work, we tried to reach the Girl Scout organization. I think it did some good and if we could add to our list Girl Scouts, Boy Scouts, Campfire Girls and all these young organizations, and show them the need of safety, it might be an additional means of spreading our gospel.

CHAIRMAN BETHELL: Are there any more questions or remarks? If not, I am going to ask Mr. Williams to take the meeting from me now and let us find out just how deeply you are interested in having this kind of meeting and an organization in the future.

SIDNEY J. WILLIAMS (Director, Public Safety Division, National Safety Council, Chicago): I don't want to take the meeting from the Chairman, but merely to present this question to you.

It has seemed to the headquarters organization of the National Safety Council that we ought to do something to tie together these different pioneer jobs that are going on, to encourage and help other communities that want to take up similar work, and to tie that all together with the National organizations of women or that consist largely of women who are in a position to promote the same sort of work in the communities they reach. It has occurred to us to ask the opinion

of this meeting today whether the time has come when the National Safety Council should set up a Committee which might be called either a Women's Committee or a Home Safety Committee; which tentatively would include a representative woman from each community Safety Council or any other community organization that is doing a real job or starting in to do a real job along this line in any community, and also a representative of every national organization of women or largely of women, which wants to cooperate.

The National Safety Council has not the slightest desire to set up paper committees. We all have too much to do to serve on any committee that won't get anywhere, but it is my feeling at least that there would be a definite advantage in setting up a committee of that sort for a little better coordination of these efforts and to work with our headquarters' staff.

May I ask, Madam Chairman, for an expression of opinion from this meeting as to whether such a recommendation should be made to the National Safety Council?

MRS. D. EDWIN MILLER (Pittsburgh, Pa.): May I say that the safety movement, like every other great movement, is of greater value when there is consolidation of effort. We know that solidarity always means success. We have tried an experiment in the Safety Council of western Pennsylvania recently. We have sent out letters to the chairmen of all clubs of western Pennsylvania, the Children's Service Bureaus, the mothers' clubs, the International Institute of Pittsburgh, which takes into consideration our Americanization groups.

Our office, through our manager, Mr. Clarkson, has just sent letters stating that all these organizations and clubs that would like to come in under a Home Safety Division will be very welcome and we will be happy to organize that division very widely. There will be a bit of expense connected with it and a committee working on dues or membership have put it this way: Any club wishing to have literature, speakers, monthly information concerning the number of accidents of all kinds, might come in with a membership of ten cents per member.

The Consumers' League of Western Pennsylvania, one of our big organizations interested in industrial work, is coming in at ten cents per member. We believe that is a fine way in which to have the home safety work get spread about.

I am for a National Committee on this work and personally I prefer "Home Safety Division" rather than "Women's Division."

I don't know whether you are ready for a motion that I should like to make, but to get it before the house for discussion, Madam Chairman, I move that this assembly here today go on record as favoring a national division of home safety work.

DR. R. M. LITTLE (State Department of Education, Albany, N. Y.): I wish to second the motion, or the thought of the motion, but I think that it perhaps needs to be restated, slightly differently; namely, that this meeting of today would recommend to the Executive Committee of the National Safety Council the creation of a Home Safety Section of the Council.

MRS. MILLER: May I make my motion to include Dr. Little's suggestion? I am very glad to accept the suggestion made by him.

DR. STEWART: I second the motion.

CHAIRMAN BETHELL: It is moved and seconded that we recommend to the Executive Committee of the Council that they form such a group. Is there any discussion?

DR. LITTLE: It seems to me as I have listened to the reports from the ladies so active in this work that there are certainly sixty other communities in America where there are local safety councils that would furnish equal representation and if the Executive Committee would think it wise, that next year wherever the Council meets, there might be a very, very large gathering. The few general remarks I made at the beginning rest on the deep conviction that we are not

going forward in the general work of this section with as great rapidity as needed until the women are thoroughly interested and active in their respective communities and that won't be unless we have a National Section with officers and a program and a convention and put pep and power into it.

(The question was called for. The motion was put to a vote, and was carried.)

CHAIRMAN BETHELL: It seems to be unanimously carried.

I think we have nothing more before us this morning. I only want to say that those 60 other communities to which Dr. Little referred I think would have great difficulty in producing such speakers as we have had with us this morning. We will part to meet and prove that, I hope, next year.

ADJOURNMENT==

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